



**Field Marshal Sir J L A Simmons, GCB, GCMG, Colonel Comandant RE**

**HISTORY**  
**OF THE**  
**CORPS OF ROYAL ENGINEERS**

**BY**  
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## PREFACE.

THE Corps of Royal Engineers owes a debt of gratitude to the late Major-General Whitworth Porter, for the energy and zeal which he devoted to the compilation of *The History of the Corps of Royal Engineers*, published in 1889, a work wherein was traced the story of the King's Engineers from the Norman Conquest to the reign of Queen Victoria ; and only those who have devoted considerable attention to the subject can realize the labour and research, which were required for the production of these two interesting volumes. But General Porter himself would have been the first to acknowledge that they can hardly be regarded as complete, but rather as contributions to the history of the Corps, and in his Preface he remarked : " I trust that I have created, at all events, a framework, which may be developed at some future time in the hands of a more capable historian."

Whether General Porter's hope will ever be fulfilled is doubtful, for to compile a complete and continuous story of a Corps like the Royal Engineers, which has had so long an existence, and has been employed in such a variety of services, civil as well as military, in all parts of the world, would be a difficult task, and the book would extend to many volumes.

General Porter's work brought the History from early times up to 1886, and the present volume deals with the period from 1886 to 1912 ; but, like the two preceding volumes, it must not be regarded as a complete history, rather as a collection of contributions concerning points of special interest. In its compilation, as it is only a continuation of an already existing work, it has been considered better to adhere generally to the arrangement already adopted, and not to alter this, although it is, in certain respects, open to criticism. The only change of importance made is, that, whereas in the first two volumes, the subject matter was divided into Parts, and these Parts again into Chapters, in the present volume, the division into Parts has been omitted and the Chapters are numbered consecutively. This appears to be more convenient for reference.



Following the example set by General Porter, the important work done by the Corps in India has been omitted, because, to quote his words: "to include it would have been either to treat it most inadequately, or to produce a book far too voluminous for the ordinary reader." The work done by the Royal Engineers in India and the countries connected with it during the period 1886—1912 has been so important that it is to be hoped that a separate volume dealing with it may some day be published by the Royal Engineers Institute; but it will have to be written by an officer who has served in India, and is personally acquainted with the civil and military duties of the Corps in that part of the British Empire.

The early history of the organization of the Corps was treated in Vol. I., Part I., Chapter I., and continued in Vol. II., Part II., Chapter I., in which were described briefly the duties under the Board of Ordnance, and the changes made in consequence of the abolition of the Board in 1855, and the transference of its work to the War Office. The story of the organization is continued in Chapter I. of the present volume, but on rather fuller lines than in General Porter's History, as it appeared desirable to give some details of the district, as well as of the War Office organization.

During the years under review, considerable alterations were made in the composition of the Regimental Units, as the scope of their duties was extended, and the strength of the Corps was largely increased in order to meet the requirements of modern war. An attempt to place these changes on record is given in Chapter II.

The two wars of importance which took place since 1886, *i.e.*, the Sudan Campaigns of 1885—1899, and the South African War of 1899—1902, are described, so far as the Engineer operations are concerned, in Chapters III. and IV. In the case of the South African War it was by no means easy to confine the story within reasonable limits, as the Royal Engineers were employed everywhere, and it has been necessary to omit many interesting episodes. It is to be hoped therefore that the readers of this chapter, many of whom have themselves taken an honourable part in the campaign, will forgive me if they observe any serious omissions. As regards two important

items of Engineer work in the campaign, namely that connected with the railways and telegraphs, full information will be found in the *History of the Railways during the War in South Africa, 1899-1902* (Fol. 1903-4), by Lieut.-Colonel Sir E. P. C. Girouard, K.C.M.G., D.S.O., and in the *History of Telegraph Operations* (Fol. 1903), by Colonel R. L. Hippisley, C.B. I would like also to refer to the compilation by Colonel S. Waller, C.V.O., entitled *The History of the Royal Engineer Operations in South Africa*, which contains a mass of useful information, especially as regards the Regimental Units. This work has not been printed, but several typewritten copies have been made, and of these two are in the Royal Engineers Library, Horse Guards, S.W., and are available for study.

As regards Chapter V. on Barrack Works, it may be thought by some that its length is rather out of proportion to other parts of the volume, but this is due to the fact that General Porter in his *History* hardly alluded to Barracks, although their construction and maintenance has, from early times, been one of the important duties of the Corps. In this case, therefore, it seemed desirable to begin at the beginning instead of taking the year 1886 as the point of departure.

Chapter VI. on the work of the Ordnance Survey, and the operations connected with Boundary Commissions and Colonial Surveys, which have been carried out in recent years, has been contributed by Capt. W. Hyde Kelly, now employed on the Ordnance Survey. Work of this kind has been entrusted to Engineer officers from early times, at all events since that distinguished officer, Sir Richard Lee, was engaged on the delimitation of the boundary between British and French territories in France, after peace had been concluded between the two countries in 1546.

Chapter VIII. containing short biographies of distinguished officers, who have died since 1886, is in some respects the most important part of this volume. It is evident that in compiling a history such as this, there are two methods which might be adopted. The first is to follow the story of a particular kind of duty, as, for example, the Engineer operations in the South African War. The second is to give briefly the life work of a distinguished officer, who has been employed on services of

various descriptions during the course of his career. Of these the second has considerable advantages, and I am inclined to think it gives the most satisfactory results. For this reason the number of biographies included in the present volume is larger in proportion to the time than in the corresponding part of General Porter's History. In the latter were given short biographies of 35 distinguished officers who had served from early times and had died before the History was published, with the exception of one officer, Lord Napier of Magdala, who was still living at the time of publication, but whose memoir was included, because, as General Porter says: "to have produced a series of Engineer biographies, in which that honoured name found no place, would have been an unpardonable omission, and in this instance I have broken through the rule." In the present volume, on the other hand, there are given memoirs of 30 officers, who died in the comparatively short period dealt with. The names of those to be included were selected by the Colonels Commandant, and the memoirs give an idea of the very varied duties, military and civil, entrusted to officers of the Royal Engineers.

I would wish to express my thanks to Major W. G. C. Brown, of the Coast Battalion, who has given valuable assistance as regards many details, and the admirable manner in which the Records of Services of officers are kept in the Assistant Adjutant-General's Office has much facilitated the work. *The Royal Engineers Journal* contains a mass of useful information, but it is somewhat to be regretted that the officers of the Corps do not make more use of it to record work that they have been engaged upon. If officers would do this, it would much assist future historians of the Corps.

I would like also to thank Major W. A. Harrison, the Secretary of the Royal Engineers Institute, his able assistant, Mr. W. J. Sampson, and Mr. S. G. Thornton, the excellent Librarian of the Royal Engineers Corps Library, for the kind way in which they have assisted in matters connected with the compilation of this volume.

C. M. WATSON.

July 10th, 1914.

## CONTENTS.

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CHAPTER.	PAGE.
I. The Organization of the Corps . . . . .	I
II. The Regimental Units . . . . .	33
III. The Sudan Campaigns, 1885—1899 . . . . .	53
IV. The South African War, 1899—1902 . . . . .	77
V. Barrack Works . . . . .	131
VI. The Ordnance Survey, and Survey Work Abroad .	173
VII. Service in Various Departments of the State (not including India), 1886—1912 . . . . .	219
VIII. Short Biographies of Distinguished Officers . .	241

# HISTORY OF THE CORPS OF ROYAL ENGINEERS.

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## CHAPTER I.

### THE ORGANIZATION OF THE CORPS.

Headquarter Royal Engineer Staff, 1886-1895—Duties of the Inspector-General of Fortifications—Changes in the War Office Staff, 1895-1903—The War Office (Reconstitution) Committee—Abolition of the Office of Inspector-General of Fortifications in 1904—Appointment and Duties of the Director of Fortifications and Works—Headquarter Royal Engineer Staff, 1904-1912—District Organization in 1886—Duties of Officers employed on District Work—Districts at Home and Abroad—Changes in District Organization, 1886-1902—The Army Corps Commands of 1902—Reorganization of Military Commands in 1905—District Organization of the Royal Engineers in 1912.

THE organization of the Royal Engineers for the work that it is their duty to carry on in peace and war, may be considered under three heads :—

The War Office Staff.

The Staff at military stations at home and abroad.

The Regimental Units.

Of these, the last, the Regimental Units, are dealt with in Chapter II., and the two former will be described in this chapter.

#### *The War Office Staff.*

A *résumé* of the history of the Royal Engineer Staff at the War Office, from early times up to 1886, has been given in Volume II., Part II., Chapter I., and the following pages will take up the story from that date, and in them will be described the appointments that have been held by different officers, and the various changes that have been made between 1886 and 1912. Of these changes, some, though small, should be placed on record, while others are of considerable importance.

On January 1st, 1886, the Headquarter Staff of the Corps was constituted as follows :—

	Dates of holding Appointment.
Inspector-General of Fortifications and Director of Works, Major-General Sir A. Clarke, G.C.M.G., C.B. C.I.E. . . . .	1882—1886
Deputy Adjutant-General, Major-General Sir J. Stokes, K.C.B. . . . .	1881—1886
Assistant Adjutant-General, Lieut.-Colonel W. Salmond . . . . .	1884—1889
Deputy Director of Works (Barracks), Colonel R. N. Dawson-Scott . . . . .	1882—1887
„ „ (Fortifications), Colonel H. Schaw . . . . .	1883—1887
Assistant Director of Works (Barracks), Colonel H. Locock . . . . .	1881—1886
„ „ (Barracks), Colonel C. J. Moysey, C.M.G. . . . .	1884—1889
„ „ (Fortifications), Lieut.-Colonel R. H. Vetch . . . . .	1884—1889
„ „ (Fortifications), Lieut.-Colonel J. G. S. Davies . . . . .	1885—1886
Inspector of Submarine Mining Defences, Major R. Y. Armstrong . . . . .	1884—1891
Assistant Inspector of Submarine Mining Defences, Captain R. M. Ruck . . . . .	1886—1891
Inspector of Iron Structures, Major T. English . . . . .	1884—1887

On the retirement of Major-General Sir A. Clarke in 1886, Lieut.-General L. Nicholson, C.B., was selected to succeed him as Inspector-General of Fortifications and Director of Works, and was also appointed Inspector-General of Royal Engineers, a post that had not been filled up since the death of Sir J. W. Gordon, K.C.B., in 1870 (see Volume II., p. 95). A further change in the title was made in 1888, when the words, "Director of Works," was dropped, and the Chief Officer of the Royal Engineers was called Inspector-General of Fortifications and Inspector-General of the Royal Engineers. At the same time the titles of his assistants, the Deputy and

Assistant Directors of Works, were changed to Deputy and Assistant Inspectors-General of Fortifications, this being a return to the titles of the officers, which had been in use prior to 1860.

During the period from 1886 to 1890, the following officers were appointed to the War Office Staff in succession to those whose names have been given above :—

	Date of holding Appointment.
Deputy Adjutant-General, Colonel R. Grant, C.B.	1886—1891
Assistant Adjutant-General, Colonel E. Wood, C.B.	1889—1894
Deputy Inspector-General of Fortifications (Fortifications), Colonel A. G. Durnford ..	1887—1889
Deputy Inspector-General of Fortifications (Barracks), Colonel H. Locock .. ..	1887—1891
“ “ (Fortifications), Colonel R. H. Vetch .. ..	1889—1894
Assistant Inspector-General of Fortifications (Barracks), Colonel G. E. Grover .. ..	1887—1892
“ “ (Fortifications), Colonel E. M. Lloyd .. ..	1887—1892
“ “ (Fortifications), Colonel H. P. Knocker .. ..	1889—1894
“ “ (Barracks), Colonel F. W. Nixon	1889—1894
Inspector of Iron Structures, Captain H. B. Willock .. ..	1888—1889
“ “ Captain C. McG. Bate ..	1889—1895

In March, 1891, General Sir L. Nicholson was appointed Governor of Gibraltar, and Major-General R. Grant, C.B., succeeded him as Inspector-General of Fortifications and of Royal Engineers, Major-General J. M. H. Maitland, C.B., taking the place of the latter as Deputy Adjutant-General. At this time the work of the Headquarter Staff had been much increased by the passing of the Barracks Act of 1890, under which a sum of £4,100,000 had been provided by Parliament for the erection and improvement of barracks, and for replacing the wooden hutments at the large camps by building in permanent materials (see p. 162). It was therefore decided to

establish a new branch for dealing with the Barrack Loan, and the charge of this was given to Colonel H. Locock, who was succeeded as Deputy Inspector-General of Fortifications (Barracks) by Colonel W. Salmond, while Major C. M. Watson, C.M.G., was appointed as Assistant Inspector-General of Fortifications for the Barrack Loan Division.

In November, 1895, the title of Inspector-General of Fortifications and of Royal Engineers, was changed to that of Inspector-General of Fortifications, thus reverting to the old title, which had been in use from 1802 to 1862. It is a little difficult to understand the object of the alterations that had been made in the title from time to time, as the duties of the office remained practically unaltered. These duties were defined as follows by an Order in Council dated November 21st, 1895:

"The Inspector-General of Fortifications shall be charged with the construction and maintenance of fortifications, barracks, and store buildings, and the inspection of ordnance factory buildings; with military railways and telegraphs; with the custody of War Office lands and unoccupied buildings; with advising as to the design and issue of Royal Engineer and submarine mining stores. He shall submit proposals for the Annual Estimates for Engineer Services, and shall advise as to the general distribution of the Corps, and as to the appointments of officers to, or their removal from responsible positions in connection with works. He shall advise on all questions relating to the technical instructions of the Corps of Royal Engineers, and shall make such inspections as may be necessary to secure the efficiency of the services under his control. He shall advise the Secretary of State on all questions connected with the duties of his department."

These instructions were considerably modified by a further Order in Council, issued on November 4th, 1901, and, as this contains the last authoritative statement of the duties of the Inspector-General of Fortifications before the abolition of the office in 1904, it should be placed on record.

"The Inspector-General of Fortifications shall, under the supervision of the Commander-in-Chief, be charged with the



selection of sites for barracks, ranges, and manœuvring grounds ; with the construction and maintenance of fortifications, barracks, and store buildings, and the inspection of ordnance factory buildings and Engineer stores ; with military, railways and telegraphs, and Engineer stores ; with the purchase of land, and the custody of War Office lands, and buildings ; with advising as to the design and issue of Royal Engineer and submarine mining stores. He shall submit proposals for the Annual Estimates for Engineer Services, including Engineer stores, and shall advise as to the general distribution of the Corps of Royal Engineers, and as to the appointment of officers to, or their removal from responsible positions in connection with works. He shall advise on all questions relating to the technical instruction of the Corps of Royal Engineers, and shall make such inspections as may be necessary to test the professional training of the officers and men of the Corps, and to secure the efficiency of the services under his control. He shall advise the Secretary of State on all questions connected with the duties of his department."

It is interesting to compare the instructions, contained in this Order in Council, with those of the Principal Engineer, as the Head of the Corps of Engineers was then called, described in the Royal Warrant of July 25th, 1683 (see Vol. I., p. 49). It will be seen how the duties and responsibilities had increased during the two centuries that had elapsed. But the principle remained the same, namely that the Chief Officer of the Corps was to be responsible for the work carried out in peace and war, and to secure that the officers and men of the Royal Engineers were efficient for their duties. History shows how admirably the officers, who had in succession filled the important position, carried out the duties of the appointment.

Lieut.-General Sir R. Grant, K.C.B., held the appointment of Inspector-General of Fortifications for seven years, and was succeeded on April 18th, 1898, by General Sir R. Harrison, K.C.B., C.M.G., who was followed by Major-General W. T. Shone, C.B., D.S.O., on April 18th, 1903. Major-General Shone was the last officer to hold the position of Inspector-General of Fortifications, as the office was abolished in 1904 under circumstances which are described below.

The names of the other officers who held appointments on the Headquarter Staff of the Royal Engineers from 1889 to 1903, were, as follow :—

	Dates of holding Appointment.
Deputy Adjutant-General, Major-General J. M. H. Maitland, C.B. . . . .	1891—1896
„ „ Major-General W. Salmond, C.B. . . . .	1896—1902

In 1902 the appointment of Deputy Adjutant-General was done away with, while that of Assistant Adjutant-General was changed to Deputy-Assistant Adjutant-General, thus reverting to the title which had been in use prior to 1879 (see Vol. II., p. 100).

	Dates of holding Appointment.
Assistant Adjutant-General, Colonel D. A. Scott, C.B., D.S.O. . . . .	1894—1899
„ „ Colonel E. Dickinson . . . . .	1899—1902
„ „ Colonel R. C. Maxwell, C.B. . . . .	1902—1906
Deputy - Assistant Adjutant - General, Major F. R. F. Boileau . . . . .	1902—1905
Deputy Inspector-General of Fortifications (Barrack Loans), Colonel H. Locock . . . . .	1891—1896
„ „ (Barracks), Colonel W. Salmond, C.B. . . . .	1891—1896
„ „ (Fortifications), Colonel H. F. Turner . . . . .	1894—1897
„ „ (Barracks), Colonel A. Hill . . . . .	1896—1899
„ „ (Barrack Loans), Colonel C. M. Watson, C.M.G. . . . .	1896—1902
„ „ (Fortifications) Colonel G. Hildebrand . . . . .	1897—1902
„ „ (Barracks), Colonel C. H. Bagot, C.B. . . . .	1899—1904
„ „ (Barrack Loans), Colonel N. M. Lake . . . . .	1902—1905
„ „ (Fortifications), Colonel R. M. Ruck . . . . .	1902—1904

	Date of holding Appointment.
Assistant Inspector - General of Fortifications	
(Barrack Loans), Major C. M. Watson, C.M.G.	1891—1896
" " (Barracks), Lieut. - Colonel J. Matheson	1892—1895
" " (Fortifications), Colonel T. Fraser, C.B., C.M.G.	1892—1894
" " (Fortifications), Lieut.-Colonel G. Hildebrand	1894—1897
" " (Barracks), Lieut.-Colonel R. M. Hyslop	1894—1901
" " (Fortifications), Lieut.-Colonel G. Barker	1894—1901
" " (Barracks), Colonel H. H. Settle, C.B., D.S.O.	1895—1899
" " (Barrack Loans), Major N. M. Lake	1896—1902
" " (Fortifications), Major H. W. Smith-Rewse	1897—1899
" " (Barracks), Lieut. - Colonel R. Thompson	1898—1903
" " (Barracks), Lieut.-Colonel C. H. Darling	1899—1904
" " (Fortifications), Lieut. - Colonel W. J. Mackenzie	1899—1904
" " (Fortifications), Lieut.-Colonel H. D'A. Breton	1899—1904
" " (Fortifications), Lieut.-Colonel F. Rainsford-Hannay	1901—1904
" " (Barracks), Lieut.-Colonel S. D. Cleeve	1901—1904
" " (Barrack Loans), Major S. Davidson	1902—1903
" " (Barracks), Lieut.-Colonel C. B. Mayne	1903—1905
" " (Barrack Loans), Major E. H. Hemming	1903—1905
Inspector of Submarine Mining Defences, Major R. M. Ruck	1891—1897

	Date of holding Appointment.
Inspector of Submarine Mining Defences, Major C. Penrose .. .. .	1897—1898
„ „ Major F. Rainsford-Hannay ..	1898—1901
„ „ Major H. N. Dumbleton ..	1901—1905
Assistant Inspector of Submarine Mining Defences, Captain C. Penrose .. .. .	1891—1896
„ „ Major P. R. Burn-Murdoch* ..	1897—1900
„ „ Major A. H. Randolph ..	1900—1902
„ „ Major H. V. Kent .. .. .	1902—1904
Inspector of Iron Structures, Captain J. H. L'E. Johnstone .. .. .	1895—1899
„ „ Captain C. H. H. Nugent ..	1899—1905

In 1904 many drastic changes were made in the organization of the Royal Engineer Headquarter Staff at the War Office, thus bringing to an end the system, which, as has been shown, had been in force for a long period, and had worked very satisfactorily. These changes were due to the report of a Committee, known as the War Office (Reconstitution) Committee, which was appointed by the Government in 1903 to advise as to the constitution of a Board, on the lines of the Board of Admiralty, to carry on the higher administrative business of the War Office, and to report as to the consequential changes involved thereby. Viscount Esher was the Chairman of the Committee, and the members were Admiral Sir J. Fisher, K.C.B., and Colonel Sir G. S. Clarke, K.C.M.G., R.E. (now Lord Sydenham of Combe). The Committee, in their Report dated January 11th, 1904, recommended the abolition of the appointment of Commander-in-Chief, and the establishment of an Army Council, consisting of four military and three civil members, with the Permanent Under-Secretary of State for War as Secretary.

The Report of this Committee was approved, and, by Letters Patent, dated February 6th, 1904, the First Army Council was constituted with the Secretary of State for War as President.

\* Name afterwards changed to Burn-Clerk-Rattray.

The administrative duties of the War Office were apportioned among the six members in the following manner:—

The first military member, called the Chief of the General Staff, took over the duties formerly entrusted to the Director-General of Military Intelligence and Mobilization, and also matters dealing with military training and education.

The second military member, the Adjutant-General, retained the work previously done by his department, with the exception of military training and education, and was also made responsible for army medical affairs.

The third military member, the Quartermaster-General, retained the work done by his department with the exception of the Army Pay Department; while, in addition, he was placed in charge of the provision of clothing and equipment, previously the duty of the Director-General of Ordnance.

The fourth military member, the Master-General of the Ordnance, took the place of the Director-General of Ordnance, and the work of the latter, with the exception of what had been transferred to the Quartermaster-General. He also took over a part of the duties of the Inspector-General of Fortifications, and the latter appointment was abolished.

The second civil member, the Parliamentary Under-Secretary of State, took over a part of the duties of the Inspector-General of Fortifications so far as lands and new barrack construction was concerned. To take charge of the latter a civilian, Mr. H. B. Measures, was appointed as Director of Barrack Construction.

The third civil member, the Finance Member, took the duties connected with finance, accounts, and contracts.

Outside the Army Council, an Inspector-General of the Forces was appointed, whose duties were to report on the training and efficiency of all troops, on the efficiency of fortifications and defences, and generally on the readiness and fitness of the Army for War.

This is not the place to consider the great changes thus made in the constitution of the War Office, except so far as the duties of the Royal Engineers were concerned, but it is impossible not to express regret that the title of Master-General of the Ord-

nance should have been revived and given to an officer, whose position and duties were very different to those of the Master-General of the Board of Ordnance, as the latter was a high political official, directly under the King, and not subordinate to any Secretary of State. It would have been more correct to have called the fourth military member of the Army Council Surveyor-General of the Ordnance, as his position under the Secretary of State for War corresponded much more nearly to that of this officer, while the duties entrusted to him were of a similar character. It would have been better if the War Office (Reconstitution) Committee, had studied the history of the Board of Ordnance, and had made themselves better acquainted with the duties of the different officers of the Board before they recommended that the time-honoured title of Master-General of the Ordnance should be given to a subordinate official.

It has already been shown how, under the regulations which had been in force up to 1904, practically all the duties of the Corps of Royal Engineers were under the supervision of the Inspector-General of Fortifications (see p. 4); but, in accordance with the recommendation of the Committee, while an important part of these duties were to be placed under a Director of Works, subordinate to the fourth military member of the Army Council, other of these duties were allotted to the departments of the Chief of the General Staff, the Adjutant-General, the Quartermaster-General, and the Parliamentary Under-Secretary of State, of whom the latter was to have charge of the newly-erected Barrack Construction Department, and the administration of lands. The duties of inspection of the regimental units was, at the same time, given to the Inspector-General of the Forces, under whom was an Inspector of Royal Engineers.

The Report of the War Office (Reconstitution) Committee was signed on January 11th, 1904, but, even before it had been promulgated, some steps were taken to carry out its recommendations. On January 5th, Colonel H. M. Lawson, A.D.C., was appointed Director of Works, with the temporary rank of Brigadier-General, although an Inspector-General of Fortifications was still in existence, and, on February 12th, the

Inspector-General, Major-General W. T. Shone, C.B., D.S.O., was removed from his appointment, and shortly afterwards, Brigadier-General Lawson was transferred to the department of the Quartermaster-General as Director of Movements and Quarterings.

Under the new organization of the War Office each member of the Army Council was allotted certain duties, and these again were subdivided, and placed under officers called Directors. In the case of the Master-General of the Ordnance the number of Directors was two, namely the Director of Artillery, and the Director of Fortifications and Works. To these was added in 1908 the Director of Barrack Construction, as the arrangement by which the department of this official was placed under the Parliamentary Under-Secretary of State was found not to work satisfactorily.

The duties of the Director of Fortifications and Works, as laid down by *King's Regulations* of 1912 were as follows:— "Military policy with reference to lands. Construction and maintenance of fortifications. Small new barrack and hospital services, other than those dealt with by the Director of Barrack Construction. Revetments and sea walls. Artillery and rifle ranges. Electric lighting. Aeronautics and aircraft factory. Establishment for Engineer Services." A comparison of these duties with those, which had been dealt with in the department of the Inspector-General of Fortifications (see p. 4) will show how the latter had been curtailed, many of them having been transferred to the departments of other members of the Army Council. For example, railways were placed under the Quartermaster-General, telegraphs under the Chief of the General Staff, and the custody of lands under the Parliamentary Under-Secretary of State.

The department of the Director of Works was further subdivided, the different branches being placed under three Assistant Directors of Fortifications and Works, an Inspector of Electric Lights, who took the place of the Inspector of Submarine Defences, an appointment which was abolished in 1905, and an Inspector of Iron Structures. Colonel R. M. Ruck, who had been Deputy Inspector-General of Fortifications under the old system, was given the appointment of Director of

Fortifications and Works, while Colonels W. J. Mackenzie, F. Rainsford-Hannay, and S. D. Cleeve were appointed Assistant Directors. The office of Deputy Inspector-General of Fortifications for Barracks was done away with, and that for Barrack Loans was also abolished in 1905, the work in progress under the Loans being handed over to the Director of Barrack Construction, whose department formed a branch of the office of the Parliamentary Under-Secretary of State.

The officers of the Royal Engineers, who have held the positions under the new organization of the War Office since 1904 were as follows:—

	Date of holding Appointment.
Director of Fortifications and Works, Brigadier-General R. M. Ruck .. .. .	1904—1908
„ „ Brigadier-General F. Rainsford-Hannay .. .. .	1908—1911
„ „ Major-General G. K. Scott-Moncrieff, C.B., C.I.E. .. .. .	1911—
Assistant Director of Fortifications and Works, Colonel W. J. Mackenzie .. .. .	1904—1905
„ „ Colonel F. Rainsford-Hannay .. .. .	1904—1905
„ „ Colonel S. D. Cleeve .. .. .	1904—1906
„ „ Colonel C. B. Mayne .. .. .	1905—1907
„ „ Colonel L. B. Friend .. .. .	1906—1908
„ „ Colonel G. K. Scott-Moncrieff, C.I.E. .. .. .	1906—1909
„ „ Colonel L. C. Jackson, C.M.G. .. .. .	1907—1910
„ „ Colonel J. H. Cowan .. .. .	1908—1912
„ „ Colonel F. J. Anderson .. .. .	1909—1913
„ „ Colonel A. M. Stuart .. .. .	1910—
„ „ Colonel E. H. Hemming .. .. .	1912—
„ „ Colonel W. R. Stewart .. .. .	1913—
Inspector of Electric Lights, Lieut.-Colonel W. Baker Brown .. .. .	1905—1908
„ „ Lieut.-Colonel E. C. Seaman .. .. .	1908—1912
„ „ Major A. H. Dumaresq .. .. .	1912—
Inspector of Iron Structures, Major T. H. Cochran, M.V.O. .. .. .	1905—1909
„ „ Major A. G. Stevenson, D.S.O. .. .. .	1909—1913
„ „ Captain R. Oakes .. .. .	1913—



Date of holding  
Appointment.

Assistant Adjutant - General.	Colonel R. C.	
Maxwell, C.B. . . . .	..	1902—1906
" " Colonel F. C. Heath . . . .	..	1906—1908
" " Colonel J. L. Irvine, C.B. . . .	..	1908—1910
" " Colonel G. H. Fowke . . . .	..	1910—1913
" " Colonel R. S. Curtis, C.M.G., D.S.O.		1913—
Inspector of Royal Engineers, Major-General G.		
Barker, C.B. . . . .	..	1904—1908
" " Brigadier-General F. C. Heath, C.B.		1908—1913
" " Brigadier-General G. H. Fowke		1913—

*Royal Engineer District Organization.*

The changes, which have been made in the organization of the Royal Engineer Staff in the districts at home and abroad since 1886, were not of the same drastic character, as in the case of the Staff at the War Office, and the alterations, which have been carried out from time to time, were due to changes in Army Organization rather than in the duties assigned to the officers of the Royal Engineers. It is, however, desirable briefly to place on record what has occurred since that date, not including India.

In 1886 the organization of the Corps for the execution of its duties in time of peace was as follows:—

In each military district at home and abroad, an officer, usually a colonel, was appointed on the staff of the General of the district, and entitled the District Commanding Royal Engineer, who, acting directly under the General, supervised the Engineer Services in the district, and controlled the body of Royal Engineer officers, and subordinate officials of the department. In districts of large extent or greater importance these Royal Engineer districts were divided into sub-districts, to each of which an officer was appointed as Commanding Royal Engineer, generally of the rank of lieutenant-colonel. In some cases, the district was completely divided into sub-districts, but, in others, a part of the area was left under the direct control of the District Commanding Royal Engineer. The Royal Engineer districts were thus of three classes; completely

divided districts, partially divided districts, and undivided districts.

In a completely divided district, the officer, holding the appointment of District Commanding Royal Engineer, occupied a threefold position.

1. As an officer of the General Staff.
2. As a Commanding Officer of Troops.
3. As an Inspecting Officer.

As an officer of the General Staff, the Commanding Royal Engineer was responsible to the General for all matters concerning Engineer Services, and acted as his representative in dealing with such questions as were not of sufficient importance to require the personal decision of the General.

As a Commanding Officer of Troops he was charged with the command of all Royal Engineers stationed in the district, and it was his duty to see that the officers and men of the Corps were employed to the best advantage, and were thoroughly acquainted with their military duties.

As an Inspecting Officer, he inspected the Royal Engineers, the Militia Royal Engineers, and the Volunteer Royal Engineers, belonging to the command.

He had also charge of lands and War Department property, and dealt with all transactions concerning property.

In a partially divided district, the District Commanding Royal Engineer had, in addition to the above, the responsibilities and duties of a Sub-District Commanding Royal Engineer for that portion of the command not allotted to a sub-district; while, in an undivided district, he had the duties of a Sub-District, as well as those of a District Commanding Royal Engineer.

The Sub-District Commanding Royal Engineers were responsible for the efficient and economical execution of all services carried out in their sub-districts, and for the administration and control of the funds voted by Parliament for these services. They had command of the Royal Engineers stationed in the sub-districts, except when special officers were appointed to command these. Their reports on Engineer questions were sent to the General through the District Commanding Royal

Engineer, and they were responsible for the preparation of estimates, the superintendence of works, the accuracy of bills put forward for payment, and the charge of Engineer stores in their sub-districts.

Each sub-district was, again, composed of divisions, over each of which was a Royal Engineer officer, termed the Division Officer, who was responsible to the Commanding Royal Engineer for the preparation of plans and estimates, the execution of works in his division, and the administration and control of the funds allotted for the purpose. Under the Division Officers there were, in some cases, junior officers, foremen of works, and other subordinates, varying in number according to the importance of the division; while directly under the Commanding Royal Engineer were one or more surveyors, who were responsible to him for the examination of estimates and specifications, for the measurement of buildings, and for checking the correctness of prices in bills.

When regimental units of the Royal Engineers were stationed in a district, the officers were usually employed as Division Officers, while the non-commissioned officers were engaged on fortification and other works, in addition to their military duties. This was an essential feature of the system, and it had the advantage of training both officers and men in the work which would be useful in time of war. It is necessary to refer specially to this, as, in recent years, an opinion appears to be gaining ground that the duties of the Royal Engineers in peace are of less importance than in war, and that their military efficiency will be increased by the neglect of the former, a dangerous view, totally opposed to the lessons taught by the history of the past. A large part of the duties of the Corps in time of war are of similar character to those carried out in peace, and there can be no doubt that the officer, who has been accustomed to carry out engineering and building works, and to take responsibility for their execution, is more likely to be efficient in war than one who has not had these advantages in time of peace.

It would occupy too much space to give the whole of the local organization of the Royal Engineers for district work in

1886, but the following is a *résumé* of the districts and sub-districts, and of the number of officers employed in each. The order of the districts has been arranged so as to compare conveniently with the distribution in 1912 (see p. 26).

*Aldershot (partially-divided district).*

District Commanding Royal Engineer ; Colonel on the Staff. Aldershot Camp Sub-District, Commanding Royal Engineer ; lieutenant-colonel.

Officers employed on district work ; one lieutenant-colonel, three majors, one captain, and two lieutenants.

Regimental units stationed at Aldershot ; A Pontoon Troop, Field Park, Field Depôt, 17th and 23rd Field Companies, N Depôt Company, and 1st Division, Telegraph Battalion. The officers attached to these units were ; one lieutenant-colonel, three majors, one captain, and twelve lieutenants, one quartermaster, and one riding master.

*Eastern District (undivided).*

District Commanding Royal Engineer ; Colonel at Colchester. Two majors employed on district work.

*South-Eastern District (partially divided).*

District Commanding Royal Engineer ; Colonel on the Staff at Dover. Sub-districts at Shorncliffe and Brighton, with lieutenant-colonels as Commanding Royal Engineers.

Officers employed on district work ; one major, one captain, one quartermaster.

Officers attached to the 26th Field Company, stationed at Shorncliffe ; one major, three lieutenants.

*Chatham District (partially divided).*

District Commanding Royal Engineer ; Colonel. Sub-districts at Sheerness and Gravesend with lieutenant-colonels as Commanding Royal Engineers.

Officers employed on district work ; one major and one captain.

In the Chatham District the regimental units were not under the Commanding Royal Engineer, but under the Commandant of the School of Military Engineering.

*Woolwich (undivided).*

District Commanding Royal Engineer ; Colonel. One major employed on district work.

*London District (undivided).*

District Commanding Royal Engineer ; Lieutenant-Colonel. Officers employed on district work ; one major and one captain. One major attached to the 3rd Fortress Company, stationed in London.

*Northern District (divided).*

District Commanding Royal Engineer ; Colonel, at York. Sub-Districts at York, Birmingham, Manchester, and Newcastle-on-Tyne, with lieutenant-colonels as Commanding Royal Engineers.

Officers employed on district work ; one lieutenant-colonel, three majors, four captains, three lieutenants, and two quartermasters, one lieutenant (Coast Battalion) at Liverpool.

*Southern District (divided).*

District Commanding Royal Engineer ; Colonel on the Staff, at Portsmouth. Sub-districts at Portsea, Gosport, Isle of Wight, and Weymouth with lieutenant-colonels as Commanding Royal Engineers.

Officers employed on district work ; seven majors and one captain.

Officers attached to the 2nd Fortress Company, stationed at Portsmouth, and the 28th Submarine Mining Company, stationed at Gosport ; two captains and four lieutenants.

*Western District (divided).*

District Commanding Royal Engineer ; Colonel on the Staff at Devonport. Sub-districts at Devonport (afterwards at Exeter), Plymouth, and Cardiff (afterwards at Pembroke Dock), with lieutenant-colonels as Commanding Royal Engineers.

Officers employed on district work ; five majors and one captain.

Officers attached to the 27th Submarine Mining Company at Devonport, and the 10th Railway Company at Plymouth ; one major, two captains, two lieutenants, and one lieutenant (Coast Battalion).

*The Channel Islands.*

Jersey. Commanding Royal Engineer ; Colonel.

Guernsey. Commanding Royal Engineer ; Lieutenant-Colonel.

*Scottish District (partially divided).*

District Commanding Royal Engineer ; Colonel on the Staff, at Edinburgh. Sub-district at Inverness (afterwards at Perth), with lieutenant-colonel as Commanding Royal Engineer.

Officers employed on district work ; three majors and one captain, one lieutenant (Coast Battalion) at Glasgow.

*Ireland.*

Commanding Royal Engineer in Ireland ; Colonel on the Staff.

The position of this officer was different from that of District Commanding Royal Engineer, as he was a Staff Officer, and, while exercising a general supervision over the Engineer services carried out in Ireland, had no executive responsibilities, except as regards War Department lands. Ireland was divided into four districts, Dublin, the Curragh, Belfast, and Cork, in each of which there was a District Commanding Royal Engineer, a position held by an officer of the rank of lieutenant-colonel. There were no sub-districts in Ireland.

The officers employed on district work were ; in Dublin District, three majors, one captain, one lieutenant and one quartermaster ; in Belfast District, one major ; in Cork District, two majors, one captain and one quartermaster.

The regimental units stationed in Ireland were ; in the Curragh District, the 29th Fortress Company with three lieutenants ; in Cork District, the 25th Fortress and 33rd Submarine Mining Company with one major and three lieutenants.

In 1886 the stations abroad were treated as undivided districts, and the Royal Engineers, stationed at each, were as follows :—

*South Africa.*

Cape Colony. Commanding Royal Engineer ; Colonel.

Officers employed on district work ; two lieutenants. The 32nd Fortress Company was stationed at Cape Town, with one captain and two lieutenants.

Natal. Commanding Royal Engineer ; Lieutenant-Colonel.  
Officers employed on district work ; one major, one captain,  
and one lieutenant.

*Bermuda.*

Commanding Royal Engineer ; Colonel.

Officers employed on district work ; one major.

The regimental units were the 6th Fortress Company, and sections of the 4th, 22nd, and 27th Submarine Mining Companies, with which were the following ; two captains and nine lieutenants.

*Ceylon.*

Commanding Royal Engineer ; Lieutenant-Colonel.

Officers employed on district work ; two captains and one lieutenant ; one lieutenant employed on submarine mining duties.

*China and the Straits Settlements.*

Commanding Royal Engineer ; Colonel on the Staff, at Hong Kong.

Two majors employed on district work at Hong Kong. One captain and three lieutenants with the 31st Fortress Company and a section of the 33rd Submarine Mining Company at Hong Kong.

Two lieutenants employed on district work at Singapore, and two lieutenants for submarine mining at that station.

*Cyprus.*

Employed on district work ; four captains and one quartermaster.

*Egypt.*

Commanding Royal Engineer ; Colonel on the Staff.

Officers employed on district work ; one lieutenant-colonel, one captain, and one quartermaster.

The regimental units stationed in Egypt were the 24th Field Company, the 11th Fortress Company, the 8th Railway Company, and a section of the Telegraph Battalion, and with these, and with the Frontier Field Force at Assuan and to the south, were five majors, fourteen captains and nine lieutenants.

*Gibraltar.*

Commanding Royal Engineer ; Colonel on the Staff.

Officers employed on district work ; one lieutenant-colonel and three majors.

Attached to the regimental units, consisting of the 1st, 5th, 9th, and 18th Fortress Companies ; three captains and seven lieutenants.

*Halifax.*

Commanding Royal Engineer ; Colonel.

Officers employed on district work ; one lieutenant-colonel.

Attached to the regimental units, consisting of the 20th Fortress Company and a section of the 4th Submarine Mining Company ; two captains and three lieutenants.

*Malta.*

Commanding Royal Engineer ; Colonel on the Staff.

Officers employed on district work ; one lieutenant-colonel, two majors and one lieutenant.

Attached to the regimental units, consisting of the 15th Fortress, and 34th Submarine Mining Companies ; one captain and five lieutenants.

*Mauritius.*

Commanding Royal Engineer ; Lieutenant-Colonel.

Officers employed on district work ; one captain and one lieutenant.

*St. Helena.*

Commanding Royal Engineer ; Lieutenant-Colonel.

One lieutenant employed on district work.

*Sierra Leone.*

Commanding Royal Engineer ; Captain.

One lieutenant employed on district work.

*The West Indies.*

Barbados and St. Lucia. Commanding Royal Engineer ; Major.

Two captains employed on district work.

Jamaica. Commanding Royal Engineer ; Major.

Two majors employed on district work, and one lieutenant in the submarine mining service.



The total number of Royal Engineer officers employed on district work at home and abroad, exclusive of those attached to the regimental units, was as follows :—

	United Kingdom.	Stations Abroad.
Colonels on the Staff .. ..	6	4
Colonels .. ..	5	3
Lieutenant-Colonels .. ..	25	8
Majors .. ..	32	15
Captains .. ..	13	12
Lieutenants .. ..	6	10
Quartermasters .. ..	5	2

The system of organization remained practically the same until 1902, but, during that period, there were certain changes of detail, of which the more important were the following :—

In 1887 the Aldershot District was made a completely divided district with two sub-districts, called the North Camp and the South Camp, each with a lieutenant-colonel as Commanding Royal Engineer. In 1889, the Northern District was divided into the North-Eastern, and North-Western Districts, the former having its headquarters at York, with sub-districts at York and Newcastle-on-Tyne, and the latter its headquarters at Chester, with a sub-district at Birmingham, afterwards moved to Liverpool. During the same year, 1889, the Straits Settlements were separated from the China command, and a district formed at Singapore.

In consequence of the large increase of work entailed by the passing of the Barracks Act in 1890 (see p. 162), additional officers were appointed to certain stations at home and abroad to superintend the building of the new, and reconstruction of the old barracks, provided for under the Act.

In 1892 the title of Commanding Royal Engineer in Ireland was changed to that of Chief Engineer in Ireland, thus reviving the title which had been in use prior to the abolition of the Irish Board of Ordnance in 1801, when the Irish Parliament was done away with, and Great Britain and Ireland were made a United Kingdom.

In 1894, Malta and Gibraltar, which had been undivided

districts, were divided ; two sub-districts, the East and the West, being formed at Malta, and two sub-districts, the North and South, at Gibraltar, each having a lieutenant-colonel as Commanding Royal Engineer.

The decision to occupy Wei-hai-Wei in 1898, and to form a naval and military station there, led to the establishment of a new Engineer district at that place with a Commanding Royal Engineer in charge. During the same year a new district was also formed at Salisbury Plain, with a Colonel on the Staff as Commanding Royal Engineer, to superintend the construction of the new barracks at Tidworth, near Ludgershall, the funds for which were provided in the Military Works Act of 1899 (see p. 166). In 1898, the Brighton Sub-District was abolished, and a new sub-district was formed at Dover. In 1899, a new sub-district was formed at Fermoy in Cork District.

The South African War of 1899—1902 naturally threw a great strain upon the district organization of the Royal Engineers at home and abroad, as in June, 1900, there were 212 Royal Engineer officers in South Africa, and the staff for the ordinary duties had necessarily to be diminished, although the work at that time was specially heavy in consequence of the building operations which were in progress under the Barracks Act of 1890, and the Military Works Acts of 1897 and 1899. But the deficiency was partly filled by making use of the services of officers of the Royal Engineers on the Reserve and Retired Lists, and also of officers of the Royal Engineer Militia, and Volunteers, who gladly assisted in carrying out the duties of the Corps at a period of more than usual difficulty. The circumstances had the advantage of showing the reserve of strength available when required, and also of uniting more closely the regular and auxiliary forces of the Royal Engineers.

After the conclusion of the war in South Africa in 1902, considerable changes were made in the military organization of the United Kingdom, and it was decided to amalgamate the existing districts into Army Corps Commands, the troops in each of which were to be so organized in peace, as to be able to supply an army corps in the event of war. The three first Army Corps Commands to be formed were the Aldershot, or

First Army Corps Command, which included Aldershot Camp and the country in its vicinity ; the Southern, or Second Army Corps Command, composed of the Southern, Western, South Eastern and Salisbury Plain Districts, with headquarters at Salisbury ; and the Irish, or Third Army Corps Command, including the whole of Ireland. The remaining military districts remained, for the time being, unaltered. The posts of Commanding Royal Engineer at Aldershot and Salisbury were given to officers of the rank of Major-General. But, at the same period, a considerable change was made in the position of Commanding Royal Engineers, as the staff of the Generals of the districts was divided into two categories, one called the General Staff, consisting only of officers of the Adjutant-General's Department, while the second, to which the name of Garrison and District Staff was given, included the officers of the Quartermaster-General's Department, the Officers Commanding Royal Artillery, the Commanding Royal Engineers, and the departmental officers.

But the system set on foot in 1902 did not continue long unchanged, as the alterations which were made in War Office administration in 1904, were followed by another reorganization of the military system in the United Kingdom, the main features of which were explained in a Special Army Order of January 6th, 1905, and this system still remains in force, but somewhat modified in its details by subsequent Army Orders.

Under the reorganization of 1905, the Army Corps System was given up, except as regards Aldershot, and the United Kingdom was parcelled out into seven Commands, each under a General Commanding-in-Chief, who was to be responsible for the administration of the Command, and the efficiency and training of the troops stationed therein. In each of these Commands, the majority of the field troops of the Regular Army were organized in divisions and brigades, or detailed for employment as army corps troops, or on the line of communication in war. Included in the Commands there were to be eleven divisions of the coast line of the British islands, called Coast Defence Areas, each under the command of an officer,

holding the same position relative to the General Commanding-in-Chief, as a divisional general of the field troops, and having the command of the garrison troops stationed in the area allotted to him. The names of the Commands, and of the Coast Defence Areas included in them, were as follows :—

The Aldershot Command, with headquarters at Aldershot.

The Eastern Command, with headquarters in London. The Coast Defence Areas in the Command were to be :—Harwich and the East Coast ; the Thames and Medway Defences, with headquarters at Chatham ; the South-East Coast Defences, with headquarters at Dover.

The Northern Command, with headquarters at York, including the North-East Coast Defences, with headquarters at Newcastle-on-Tyne.

The Southern Command, with headquarters at Salisbury. The Coast Defence Areas in the Command were :—The Southern, with headquarters at Portsmouth, and the South-Western, with headquarters at Devonport.

The Western Command, with headquarters at Chester. The Coast Defence Areas were :—The Western, with headquarters at Pembroke Dock, and the North-Western, with headquarters at Liverpool.

The London District formed an independent district, apart from the Commands.

The Scottish Command, including the Scottish Coast Defences, both with headquarters at Edinburgh.

The Irish Command, with headquarters at Dublin, including the North Irish Coast Defences, with headquarters at Londonderry, and the South Irish Coast Defences, with headquarters at Cork.

The Infantry Regimental Depôts in the United Kingdom were grouped in fourteen districts, three of which were included in the Northern and Southern Commands, while two were included in each of the other Commands, with the exception of Aldershot.

Under the new system, the Staff of the General-in-Chief of a Command was divided into two parts ; the first, called the General Staff, which dealt with the training of the troops,

and organization for war ; while the second, to which was given the name of the Administrative, Technical, and Departmental Staff, was placed under a Major-General or Brigadier-General, whose duty it was to take the place of the General-in-Chief in all matters concerning administration and finance, not involving questions of principle or of policy. The division of work in the Commands was thus intended to correspond with that adopted in the case of the Army Council at the War Office (see p. 9), as, while the General Staff in the Commands had to deal with the same subjects as those treated in the department of the First Military Member of the Council, the Administrative Staff was to settle such matters as were under the control of the other three Military Members, and the Civil Members of the Council.

The new arrangement caused a considerable change in the responsibility for the carrying out of Engineer duties, as these came under the Officer in Charge of Administration, under whom the Commanding Royal Engineers were placed, and who was given the powers as regards estimates, finance, etc., which, under the former system had been practically in the hands of the latter officers. At the same time, the titles of their appointments were changed, the senior officers in the different Commands, and in some of the Coast Defence Areas being called Chief Engineers ; while, as the sub-districts were now called districts, the Sub-District Commanding Royal Engineers became Commanding Royal Engineers.

The relative duties of Chief Engineers, and of Commanding Royal Engineers under the new system were defined in *King's Regulations* and in the *Regulations for Engineer Services*, and, as they differ in some important respects from those in force under the former system, they are summarized below, as described in the latest edition of the Regulations.

The Chief Engineer, or Commanding Royal Engineer, where there is no Chief Engineer, is the technical adviser of the General Officer Commanding on all military engineering questions, and the application of engineering science to war purposes ; he also affords such assistance in the training of troops in field engineering as commanders may require. Under the instructions of

the General Officer in Charge of Administration, he supervises and controls the Engineer services, as laid down in the *Regulations for Engineer Services*. In the Coast Defence Commands he is also responsible to the Commander of Coast Defences for the care and preservation of the permanent defence works, lights, and Engineer *matériel* in charge of the Royal Engineers in the Command. Under the direction of the Commander of Coast Defences he will prepare in peace plans of all field defences required during the precautionary period and in war, the method of construction being worked out in detail, and the working parties required arranged for in the defence scheme. The Chief Engineer is also responsible for—the employment of fortress units of the Royal Engineers to the best advantage; the distribution of the *personnel* among the districts in the Command; land questions and property transactions concerning the Regular Forces and Special Reserve.

A Commanding Royal Engineer is, in peace, the commanding officer of all units of the Royal Engineers in his command except those allotted to divisions. He carries out the administrative duties laid down in the *Regulations for Engineer Services*, and, where there is no Chief Engineer, is also responsible for duties assigned to the latter. The Commanding Royal Engineer is responsible for the selection of the larger maintenance services, settling the conditions of contracts, and supervising the execution of works, for which funds have been allotted.

Under the new regulations, the duties of Division Officers were more clearly defined than previously, and the officers attached to the regimental units were given distinct charges as Division Officers, the number of officers employed solely on district work, and not attached to the units being proportionately diminished. The Surveyors were also, in many instances, appointed Division Officers, and their title was changed to that of Inspectors of Works, while, at the same time, they were given honorary army rank.

The following was the distribution of the Royal Engineers for district work in the different Commands in 1912, and a comparison of it with the previous statement on p. 16, will show the various changes, which have been made since 1886.

*Aldershot Command.*

Chief Engineer ; Brigadier-General.

Four districts, North Aldershot, South Aldershot, Longmoor, and the Lands, each with a lieutenant-colonel as Commanding Royal Engineer.

Officers employed in the Command, and not attached to the regimental units ; two majors, one quartermaster and five inspectors of works.

Regimental Units in the Command : 1st Field Troop ; Field Depôt ; 5th, 11th, 23rd and 26th Field Companies ; 8th, 10th, and 53rd Railway Companies, 1st Bridging Train ; 1st and 2nd Divisional, and 1st Wireless Telegraph Companies ; A Signal Company and the Air Battalion. The officers attached to these units were ; one lieutenant-colonel, six majors, seventeen captains, twenty-seven lieutenants, two quartermasters, and one riding master.

*Eastern Command.*

Chief Engineer ; Brigadier-General.

Three districts, Colchester, Dover and Woolwich, with lieutenant-colonels as Commanding Royal Engineers.

*Eastern Coast Defences.*

Chief Engineer ; Colonel on the Staff.

Three districts, Chatham, Sheerness and Shoeburyness, each with a lieutenant-colonel as Commanding Royal Engineer.

Officers employed in the Command, and not attached to the regimental units ; one lieutenant-colonel, seven majors, six captains, three quartermasters, and six inspectors of works.

Regimental units, not including those at the Royal Engineer Depôt, and School of Military Engineering at Chatham : 3rd and 5th Field Troops ; 7th and 9th Field Companies ; 3rd, 21st, and 39th Fortress Companies ; 2nd Bridging Train, and 4th Divisional Telegraph Company, to which the following officers were attached ; three majors, five captains and fifteen lieutenants.

*Northern Command.*

Chief Engineer ; Colonel on the Staff.

York District : Commanding Royal Engineer, lieutenant-colonel.

North-Eastern Coast Defences and Newcastle-on-Tyne District. Commanding Royal Engineer; lieutenant-colonel, with local rank of colonel.

Officers employed in the Command; one major, two captains, two quartermasters and two inspectors of works. The 16th Coast Battalion Company with one captain and three lieutenants.

*Southern Command.*

Chief Engineer; Brigadier-General.

Salisbury District. Commanding Royal Engineer; lieutenant-colonel.

*Southern Coast Defences.*

Chief Engineer; Colonel on the Staff.

Four districts, Portsea, Gosport, Isle of Wight and Weymouth, each with lieutenant-colonel as Commanding Royal Engineer.

*South-Western Coast Defences.*

Chief Engineer; Colonel on the Staff.

Plymouth District. Commanding Royal Engineer; lieutenant-colonel.

Officers employed in the Command; one lieutenant-colonel, five majors, three captains, six quartermasters, and ten inspectors of works.

Regimental Units; the 56th and 57th Field Companies; 4th, 6th, 18th, 20th, 22nd, 30th and 42nd Fortress Companies, and the 3rd Divisional Telegraph Company, to which were attached; four majors, thirteen captains and twenty lieutenants.

*Western Command.*

Chief Engineer; Colonel on the Staff.

North-Western Coast Defences and Liverpool District. Commanding Royal Engineer; lieutenant-colonel, with local rank of colonel.

Western Coast Defences and South Wales District. Commanding Royal Engineer; lieutenant-colonel.

Officers employed in the Command; two majors, one captain, two quartermasters, and five inspectors of works.

The 35th Fortress Company with one captain and five lieutenants.



*London District.*

Chief Engineer ; Colonel on the Staff.

Officers employed in the Command ; two majors, one captain, and two inspectors of works.

*Scottish Command.*

Chief Engineer ; Colonel on the Staff.

Scottish Coast Defences and Edinburgh District. Commanding Royal Engineer ; lieutenant-colonel.

Perth District. Commanding Royal Engineer ; lieutenant-colonel.

Officers employed in the Command ; three majors, two quartermasters and two inspectors of works.

The 49th Coast Battalion Company with one major and one captain.

*The Irish Command.*

Chief Engineer ; Brigadier-General.

Dublin and Curragh Districts. Each with lieutenant-colonel as Commanding Royal Engineer.

North Irish Coast Defences and Belfast District. Commanding Royal Engineer ; lieutenant-colonel.

South Irish Coast Defences and Cork District. Commanding Royal Engineer ; lieutenant-colonel.

Fermoy District. Commanding Royal Engineer ; lieutenant-colonel.

Officers employed in the Command ; five majors, one captain, eight quartermasters and six inspectors of works.

Regimental Units : 4th Field Troop ; 12th, 17th, 38th, and 59th Field Companies ; 33rd Fortress Company ; 5th and 6th Divisional Telegraph, and K Telegraph Companies ; B Signal Company ; to which were attached six majors, thirteen captains, and twenty-three lieutenants.

*The Channel Islands.*

Guernsey and Alderney. Officer Commanding Royal Engineers ; Major.

Jersey. Officer Commanding Royal Engineers ; Major.

One captain of the Coast Battalion stationed in Alderney, and one inspector of works in Jersey.

## STATIONS ABROAD.

*South Africa.*

Chief Engineer ; Colonel on the Staff.

Four Districts : Pretoria, Potchefstroom, Orange Free State, and Cape Peninsula ; each with a lieutenant-colonel as Commanding Royal Engineer.

Officers employed in South Africa, not attached to regimental units ; three majors, three captains, two quartermasters and four inspectors of works.

Regimental Units in South Africa : 2nd Field Troop ; 54th and 55th Field Companies ; 47th Fortress Company, and 7th Divisional Telegraph Company ; to which were attached eight captains and nine lieutenants.

*Bermuda.*

Commanding Royal Engineer ; Lieutenant-Colonel.

Employed on district work ; one inspector of works.

The 27th Fortress Company with one captain and two lieutenants.

*Ceylon.*

Commanding Royal Engineer ; Lieutenant-Colonel.

Employed on district work, one major and one inspector of works.

The 31st Fortress Company with one captain and one lieutenant.

*China.*

Chief Engineer ; Colonel on the Staff.

South China (Hong Kong) District. Commanding Royal Engineer ; lieutenant-colonel. -

North China (Tientsin) District. Commanding Royal Engineer ; major.

Officers employed on district work ; one major, two captains, one lieutenant, one quartermaster, and one inspector of works.

Regimental Units ; the 25th and 40th Fortress Companies, to which one major, two captains and seven lieutenants were attached.

*Egypt.*

Chief Engineer ; Colonel.

Officers employed on district work ; one major, one captain and one quartermaster. The 2nd Field Company, with one major, one captain and two lieutenants.

*Gibraltar.*

Chief Engineer ; Colonel on the Staff.

Commanding Royal Engineer ; Lieutenant-Colonel.

Officers employed on district work ; one major, two quartermasters, and one inspector of works.

Regimental Units : The 1st, 15th, 32nd, and 45th Fortress Companies, to which three majors, one captain and eight lieutenants were attached.

*Jamaica.*

Commanding Royal Engineer ; Lieutenant-Colonel.

Employed on district work ; one quartermaster and one inspector of works.

The 44th Fortress Company, to which one captain and three lieutenants were attached.

*Malta.*

Chief Engineer ; Colonel on the Staff.

Two districts, No. 1 and No. 2, each with lieutenant-colonel as Commanding Royal Engineer.

Employed on district work ; one major, one captain, two quartermasters and two inspectors of works.

Regimental units : the 24th and 28th Fortress Companies, to which two majors, five captains, and seven lieutenants were attached.

*Mauritius.*

Commanding Royal Engineer ; Lieutenant-Colonel.

One major and one inspector of works employed on district work. The 43rd Fortress Company with one captain and one lieutenant.

*The Straits Settlements.*

Officer Commanding Royal Engineers ; Lieutenant-Colonel.

Employed on district work ; one major, one lieutenant, one quartermaster and one inspector of works.

The 41st Fortress Company, with one captain and two lieutenants.

*Sierra Leone.*

Officer Commanding Royal Engineers ; Major.

The 36th Fortress Company with one captain and three lieutenants.

The total number of Royal Engineer officers, employed on district work at home and abroad in 1912, exclusive of those who were attached to the regimental units, was as follows :—

		United Kingdom.	Stations Abroad.
Brigadier-Generals .. ..	..	4	—
Colonels on the Staff .. ..	..	7	4
Lieutenant-Colonels .. ..	..	29	13
Majors .. ..	..	30	12
Captains .. ..	..	17	8
Lieutenants .. ..	..	2	2
Quartermasters .. ..	..	23	11

A comparison of these figures with those given on p. 21 will show that while the number of officers in the senior ranks had considerably increased, the number of lieutenants had diminished. This was due to two causes ; first, because, under the new arrangement, inspectors of works, formerly surveyors, were in some cases appointed to act as Division Officers, and, secondly, because the number of officers, attached to the regimental units, many of whom took their share of district work, had been largely increased, in consequence of the additional units which had been formed since 1886. The number of officers attached to the units in the Commands at home and the stations abroad, but exclusive of those at the School of Military Engineering and Royal Engineer Depôt at Chatham and on the Ordnance Survey, for the two periods under consideration, were as follows :—

	1886.			1912.		
	At Home.	Abroad.	Total.	At Home.	Abroad.	Total.
Lieutenant-Colonels ..	1	—	1	1	1	2
Majors .. ..	5	5	10	19	8	27
Captains .. ..	5	17	22	51	25	76
Lieutenants.. ..	26	38	64	91	44	135
Quartermasters ..	1	—	1	3	1	4
Riding Masters ..	1	—	1	1	—	1

## CHAPTER II.

## THE REGIMENTAL UNITS.

The Regimental Units on January 1st, 1886—The Submarine Mining Service—Changes in 1887–1889—The First Balloon Section authorized in 1890—Additions to the Royal Engineer Auxiliary Forces—Electric Searchlights—The Regimental Units in 1899 prior to the South African War—Large Additions authorized in 1900—Changes made during the Progress of the War—The Royal Engineers, Regular and Auxiliary Forces, during the War—Reduction of the Corps in 1902—Abolition of the Submarine Mining Service in 1905—Changes in 1905–1907—New Distribution in consequence of the introduction of Army Commands—Reorganization of the Royal Engineers Auxiliary Forces—Changes in 1908–1911—Names and Strengths of the Regimental Units on January 1st, 1912.

THE history of the Regimental Units of the Royal Engineers, commencing from the formation in 1772 of the first company of Military Artificers for employment on the defences of Gibraltar, up to the end of 1885, has already been given in General Porter's *History of the Corps*, Vol. II., pp. 101–168; while a still fuller account of the period from 1772 to the close of the Crimean War, and to the abolition of the Board of Ordnance, is to be found in the *History of the Corps of Royal Sappers and Miners*, by the late Captain T. W. J. Conolly, who has admirably described therein the steady and continuous increase of the Corps, from the single company of 1772, composed of 68 non-commissioned officers and men, with one officer of the Royal Engineers in command, up to the 22 companies of 1855, with a total strength of 2,655 of all ranks, 18 of which were for service in the fortresses at home and abroad, and four for employment on the Ordnance Survey of the United Kingdom. This increase was principally due to the experience gained during the war in the Peninsula, when the Duke of Wellington found himself much hampered by the want of trained engineers, in consequence of which the losses at the

different siege operations were much greater than they would have been, had the engineer *personnel* been better trained for war.

The increase in the establishment proved, however, to be too small, as, during the Crimean War, 12 of the 18 fortress companies were sent to the scene of operations, leaving only six to carry on the engineer duties in other parts of the world; and, as this brought too great a strain on the resources of the Corps, four additional companies were raised during the war, and six more after it had come to an end, bringing the total number of companies up to 32.

In 1856, after the Board of Ordnance had been abolished, and its important duties transferred to the War Office, the title of the companies was changed from Royal Sappers and Miners to that of Royal Engineers, and the officers and men were, for the first time, definitely united into one Corps. Previous to this, the companies of the Royal Sappers and Miners had formed a separate military organization to that of the Royal Engineers, although always commanded by officers of the latter Corps.

As the continuation of the story of the Regimental Units from 1856 to 1885 has been given in General Porter's *History of the Corps of Royal Engineers*, already referred to, it is unnecessary to repeat what is contained therein, and the period dealt with in the present chapter will therefore commence with January 1st, 1886, and end with December 31st, 1911, a period during which there have been many changes of great importance, in consequence of the new and increased duties, which have devolved upon the Corps of Royal Engineers. Having regard to the numbers, now regarded as absolutely necessary to carry on these duties, it is interesting to call to mind that, when the Bill was introduced into Parliament in 1788, authorizing the embodiment of the new Corps of Military Artificers, Mr. Pitt had considerable difficulty in getting it passed, as it was denounced as unnecessary, and as laying the ground for the most alarming consequences. Yet all that he proposed was to authorize six companies of 100 men each.

On January 1st, 1886, the Regimental Units were constituted as follows:—

The Royal Engineer Troops, composed of A Pontoon Troop, and the Field Park and Depôt.

Six Field Companies, of which the 7th, 12th, 17th, 23rd, and 26th were stationed in England, and the 24th in Egypt.

The Telegraph Battalion, composed of two divisions, of which the 1st was stationed at Aldershot, with one section in Egypt, while the 2nd had its headquarters in London, and was employed on the Postal Telegraphs.

Fourteen Fortress Companies, of which the 2nd, 3rd, 25th, and 29th were in the United Kingdom, and the 1st, 5th, 6th, 9th, 11th, 15th, 18th, 20th, 31st, and 32nd were stationed in the fortresses and coaling stations abroad.

Eight Submarine Mining Companies, of which the 21st, 22nd, 27th, 28th, 30th, and 33rd were at home stations, with sections detached for service at Bermuda and Hong Kong. The 4th Company was at Halifax, with a section at Bermuda, and the 34th Company at Malta.

The Coast Battalion, which was organized in sections, and had charge and maintenance of the submarine mining defence, and the instruction of the Volunteer Submarine Miners at the commercial ports.

Two Railway Companies, the 8th, and 10th, both in England.

Four Survey Companies, the 13th, 14th, 16th and 19th, all in the United Kingdom.

Nine Depôt Companies, of which A, B, C, D, E, F, and G were at Chatham. M Company, the Depôt for the Submarine Miners, was also at Chatham, and N Company, the Depôt for the Field Companies, at Aldershot.

At that time the number of Royal Engineer officers serving with the regular regimental units was 134, while the number of warrant officers, non-commissioned officers and men, included in the establishment was 5,071.

The Auxiliary Forces of the Royal Engineers, serving in the United Kingdom, were constituted in the following manner:—

Two Militia Battalions, the Royal Anglesey, and the Royal Monmouthshire.

Four Militia Submarine Mining Companies, of which the 1st and 2nd (Hampshire) had their headquarters at Gosport; the 3rd (Devonshire) at Plymouth; and the 4th (Kent) at Chatham.

Fifteen Volunteer Battalions, including the Aberdeenshire, the Cheshire, the 1st and 2nd Gloucestershire, the Hampshire, the Lanarkshire, the 1st and 2nd Lancashire, the 1st London, the 1st Middlesex, the Newcastle-on-Tyne, the Northamptonshire, the Tower Hamlets, the 1st and 2nd Yorkshire. In each of four of these battalions, the 1st Gloucestershire, 1st Lanarkshire, 1st Lancashire, and Newcastle-on-Tyne, one company was trained in the duties of submarine miners, for the defence of the Severn, the Clyde, the Mersey, and the Tyne respectively.

The Engineer and Railway Volunteer Staff Corps. This was a body consisting entirely of Volunteer officers, who were some of the managers and engineers of the principal railway companies in the United Kingdom.

In India the Regimental Units of the Royal Engineers were as follows :—

The Bengal Sappers and Miners, with headquarters at Roorkee, composed of six companies and two depôt companies.

The Madras "Queen's Own," Sappers and Miners, with headquarters at Bangalore, composed of six companies and two depôt companies.

The Bombay Sappers and Miners, with headquarters at Kirkee, composed of four companies and one depôt company.

There were also some non-commissioned officers and men, employed under Royal Engineer officers, for work in connection with the submarine defences at Calcutta, Bombay, Karachi, and Rangoon, who were borne on the strength of the Indian Sappers and Miners.

The importance of the Submarine Mining Service as a branch of harbour defence was steadily increasing, and, during 1886, an additional company, the 35th, was embodied, thus raising the total number of submarine mining companies to nine. In the same year preparations were made for the submarine defence of Ceylon, Hong Kong, Mauritius, and Singapore, at each of which places a company was organized, principally



composed of natives, and in 1887 these were formed into the Eastern Battalion. A local company was also raised in Jamaica to take charge of the submarine defence of Port Royal and Kingston Harbour.

The additions to the Corps authorized in 1887 were two new field companies, the 37th and 38th, and a new fortress company, the 36th, raised to take the place of the 11th, which was converted into a field company. A second field park was also formed.

In 1888, two more submarine mining companies were formed, the 39th and 40th, and the strength of the Coast Battalion was increased.

Considerable changes were also made in the organization of the auxiliary forces of the Royal Engineers for the submarine mining service. The Royal Engineer Submarine Mining Militia, which had previously consisted of four companies, was reorganized in six divisions, stationed at Portsmouth, Plymouth, Chatham, (for the Medway and Thames) Harwich, and two divisions at Pembroke Dock, for Milford Haven and the Severn. The Volunteer Submarine Miners, which had, in the first place, been enrolled as companies in certain of the volunteer battalions, were formed into separate corps, and established as divisions for service at the commercial harbours, with headquarters at Cardiff, Dundee, Falmouth, Greenock, Hull, Leith, Liverpool, Middlesbrough, and North Shields. This was a more satisfactory arrangement, as the duties and terms of service for the submarine miners were different from those of the volunteer battalions.

Other changes made in 1888 were the following:—A second pontoon troop, B Troop, was raised, and a mounted detachment was organized for service with the Cavalry Division. The 24th Field Company, which was stationed in Egypt, was made a fortress company, thus reducing the total number of field companies to eight, of which four were on the higher and four on the lower establishment. The submarine mining companies at Ceylon, Hong Kong, Mauritius, and Singapore were made separate units, and the Eastern Battalion was done away with.

As the number of fortress companies had been considerably reduced by taking companies for the Submarine Mining Service,

it was decided in 1889 to increase the strength of the former by two, the 41st and 42nd, thus bringing the total number up to 17, of which 5 were required for duty at home and 12 at stations abroad.

In 1890 a regimental unit of a new description was authorized for service with military balloons. Experiments had been carried on with captive balloons since 1878 (see Vol. II., p. 189), and great improvements had been made in these useful instruments of war, and in the arrangements for the supply of gas in the field; but, although there was a balloon factory and school at Chatham, and balloons had been used in the Bechuanaland Expedition of 1884, and in the Sudan Campaign of 1885, no establishment was authorized until 1890, when the factory and school were removed from Chatham to Aldershot, and a balloon section and depôt were formed as permanent units, thus recognizing balloons as part of the equipment of the British Army. This was the beginning of a new branch of the work of the Corps, which afterwards received a considerable development. During the same year a West Indian native fortress company was embodied in Barbados, for service in that island and in Jamaica and St. Lucia, and the pontoon troops at Aldershot were formed into a bridging battalion.

No alterations were made in the designation of the British Regimental Units from 1890 to 1894, but sundry additions were made to the strength of the establishments, which, together with the augmentations already referred to, brought the total number of warrant officers, non-commissioned officers and men up to 5,928.

During the period from 1886 to 1894 the auxiliary forces of the Royal Engineers were strengthened by the addition of five volunteer battalions, the 2nd Cheshire, for work in connection with military railways, the Devon and Somerset, the 1st Durham, the 1st Flint, and 1st Sussex. Four additional Militia Submarine Mining Divisions were raised for service at Falmouth, the Needles, and on the Medway and Humber, while the number of Volunteer Submarine Mining Divisions was reduced from nine to seven, as their place was taken by the Militia at Falmouth and on the Humber. In 1891 the Indian Sub-

marine Miners were separated from the Sappers and Miners, and organized as a Corps, with headquarters at Poona, and sections at Calcutta, Bombay, Karachi and Rangoon, where natives of the different localities were enlisted, and, being accustomed to work on the water, proved useful recruits.

In 1895 an additional fortress company, the 43rd, was raised for service in Mauritius, as no company could be spared out of those already existing. The establishment of the Coast Battalion was increased and it was reorganized in 11 sections, for service in England, at Falmouth, and on the Humber, Mersey, Severn, Tees, and Tyne; in Scotland on the Clyde, the Forth, and the Tay; in Ireland at Dublin and Belfast. During the same year, the strength of the submarine mining companies was raised in consequence of the extension of the use of electric searchlights as an adjunct to the artillery and submarine defences of the different fortresses at home and abroad. In 1897 a new volunteer corps was organized to assist in the submarine mining service, especially with regard to the working of the electric lights. This was the Corps of Electrical Engineers, of which the officers were men of science and leading members of the electrical profession, who were prepared to assist in these important military duties; the rank and file were practical electricians or students of electrical engineering. Lord Kelvin was the first honorary colonel.

In 1899, prior to the commencement of the South African War, the Regimental Units on the British establishment were constituted as follows:—

The Mounted Detachment, afterwards called the Field Troop.

The Bridging Battalion, composed of two Pontoon Troops.

Eight Field Companies, four on the higher, and four on the lower establishment.

The Field Depôt, including two Field Parks and Training Depôt.

The Balloon Section and Depôt.

The Telegraph Battalion, consisting of two Divisions, one at Aldershot, and one in London, employed on the Postal Telegraphs.

Eighteen Fortress Companies.

The West Indian Fortress Company.

Eight Dépôt Companies.

Twelve Submarine Mining Companies, including one Dépôt Company.

The Coast Battalion, organized in eleven Sections.

Five Local Submarine Mining Companies at Ceylon, Hong Kong, Mauritius, Singapore, and the West Indies.

Two Railway Companies.

Four Survey Companies.

The Auxiliary Forces of the Royal Engineers were as follows :—

Two Militia Battalions.

Twelve Militia Submarine Mining Divisions, of which 10 were in the United Kingdom and 2 abroad, at Malta and Bermuda.

The Engineer and Railway Volunteer Staff Corps.

Twenty Volunteer Battalions.

Seven Volunteer Submarine Mining Divisions.

The Corps of Electrical Engineers.

Prior to 1899 there had only been one company stationed in South Africa, the 29th Fortress Company but when, in the early summer, the probability of a conflict with the Boers was increasing, it was decided to send the 7th and 23rd Field Companies to Natal, and the 8th Railway Company to Cape Town ; and, in September, the headquarters and one Section of the 1st Division of the Telegraph Battalion, together with the Balloon Section and two Survey Sections, were also sent to Natal.

The Boers declared war in October, 1899, when preparations were made for the despatch of an Army Corps, and the following Royal Engineer Units embarked for service in South Africa ; A Pontoon Troop, the strength of which was largely increased both in *personnel* and *matériel* ; the Field Troop ; a Telegraph Division ; four Field Companies, the 11th, 12th, 17th, and 26th ; the 1st Field Park ; the 2nd Balloon Section, which was embodied for the purpose ; the 10th Railway Company, and two Fortress Companies, the 6th and 20th, to assist in railway work, to which two additional fortress Companies were added shortly afterwards, the 31st from Gibraltar and the 42nd from

Malta, while a new unit, the 45th Company, was sent for duty with steam road transport. For some years previously, experiments had been carried on by the Royal Engineers at Chatham and Aldershot, and by Colonel J. B. Templer, the Superintendent of the Balloon Factory, in connection with the use of steam transport on roads, but this was the first time that a special unit was organized for this important duty.

In November, 1899, two additional infantry divisions were embarked in support of the Army Corps, and the 37th Field Company was attached to the 5th, and the 38th to the 6th Division. During the same month, the remainder of the men belonging to the Bridging Battalions, and all the existing pontoons were also sent to the Cape. The distribution of the Royal Engineer Regimental Units in South Africa at the commencement of the war is given in Chapter IV., p. 80, and it is unnecessary to repeat the details here.

The whole of the eight field companies on the establishment having thus proceeded on active service, two fortress companies, the 5th and 9th, were at once converted into field companies, and, of these, the 9th Company embarked with the 7th Infantry Division in January, 1900, and the 5th Company with the 8th Division in March. A newly-raised fortress company, the 47th, was sent out for duty on the lines of communication, and also large reinforcements for the Telegraph Division, and an additional survey section. Practically the whole of the Royal Engineer field troops had then proceeded to South Africa, leaving none available for other wars, if required.

Authority was therefore given by the Secretary of State to raise a large number of additional units, including the following :—

C and D Pontoon Troops.

Eight Field Companies, the 46th, 54th, 55th, 56th, 57th, 58th, 59th and 60th.

3rd and 4th Field Parks.

Four Balloon Sections, the 3rd, 4th, 5th, and 6th.

3rd Telegraph Division.

Five Fortress Companies, the 44th, the 49th, 50th, 51st and 52nd.

53rd Railway Company.

Besides the above, two Searchlight Sections were formed for service in South Africa, and a Balloon Repairing Factory was sent to the base at Cape Town to take charge of the repair and upkeep of the balloons, and to maintain the supply of hydrogen gas. An additional Submarine Mining Company, the 48th, was formed for service at Esquimalt, British Columbia. The provision of the new units was met by an increase in the establishment of the Corps by 65 officers and 1,970 non-commissioned officers and men. By June, 1900, the total number of the Royal Engineer regular troops serving in South Africa was 213 officers, 4,457 warrant officers, non-commissioned officers and men, a much larger force of Engineers than had ever previously been employed in any British campaign.

Early in 1900, the Auxiliary Forces of the Royal Engineers offered their services to assist in the war, and a section from each of the Militia Regiments, the Royal Anglesey, and the Royal Monmouthshire, embarked for South Africa, the section consisting of one officer and 25 other ranks. Sections of similar strength were also sent from the following Volunteer Engineer Battalions; the Aberdeenshire, the 1st Cheshire, the Devon and Somerset, the Durham, the 1st and 2nd Gloucestershire, the Hampshire, the Lanarkshire, the 1st London, the Middlesex, the Newcastle-on-Tyne, the Sussex, the Tower Hamlets (East London), and the 1st and 2nd Yorkshire. Of the above, the Militia sections were attached to the bridging corps, while, of the Volunteers, two sections were allocated to the field, and five to the fortress companies. The Corps of Electrical Engineers also sent out a searchlight unit, composed of eight officers, and 55 of other ranks, equipped with traction engines, dynamos, and all other appliances necessary for the working of searchlights in the field.

In June, 1900, the Royal Anglesey and Royal Monmouthshire Militia Regiments each provided a company of three officers and 100 non-commissioned officers and men for service on the lines of communication, and, in September, 1901, the Royal Monmouthshire sent a second company of the same strength. In 1901 additional sections were provided by the following Royal Engineer Volunteer Corps; the Aberdeenshire, 1st Cheshire,

Durham, Devon and Somerset, 2nd Gloucestershire, Hampshire, 1st London, Lanarkshire, 1st and 2nd Lancashire, 1st Middlesex, Newcastle-on-Tyne, Northampton, Sussex, Tower Hamlets, and 1st and 2nd Yorkshire, while the 2nd Cheshire (Railway Battalion) sent two sections. The Corps of Electrical Engineers provided further reinforcements in 1901 and 1902 for electric light duty, and for service on the telegraphs. The total number of troops provided by the Royal Engineer Auxiliary Forces during the progress of the war was—Militia, 11 officers and 350 other ranks; Volunteers, 52 officers and 1,151 other ranks.

It has already been stated that, prior to the South African War, there had only been one mounted detachment of the Royal Engineers, and this, afterwards named the 1st Field Troop, had embarked for service with the Cavalry Division in 1899; but, in consequence of the great need for mounted sappers during the military operations, three additional troops were organized in South Africa. Of these, the 2nd Field Troop was formed at Bloemfontein in April, 1900, and was composed of details taken from the field and fortress companies; the 3rd Field Troop was formed out of the 2nd Balloon Section after the relief of Ladysmith; and the 4th Field Troop was organized in the Transvaal in August, 1900, and was made up out of a section of the 1st Field Troop, strengthened by men taken from one of the searchlight sections. Another unit embodied in South Africa was the Railway Pioneer Regiment, which was raised in Cape Colony and did excellent service during the war (see Chapter IV., p. 106).

The 46th Field Company embarked for South Africa in March, 1901, and this was the last regimental unit sent out for service during the campaign. After its arrival, the force of Royal Engineers employed in the field reached its maximum strength, which, in May, 1901, was as follows:—

	Officers.	Other Ranks.
Royal Engineers .. ..	201	4,200
Royal Engineers Militia ..	10	173
Royal Engineers Volunteers ..	39	847
	<hr/> 250	<hr/> 5,220

The total number of those who took part in the war was considerably greater than the above, as the losses due to casualties, death by disease, and invalids sent home, included 61 officers, and 2,174 other ranks.

After the conclusion of peace, the larger part of the regimental units returned to England, and, by January, 1903, the force of Royal Engineers stationed in South Africa, was reduced to the following:—

The 2nd Field Troop.

Seven Field Companies, the 5th, 9th, 12th, 26th, 37th, 38th, and 46th.

One Section of the Telegraph Battalion.

One Searchlight Section.

The 20th and 47th Fortress Companies.

The 10th Railway Company.

In 1902, a new regimental unit, called the Colonial Survey Section, was organized for employment under the Topographical Division of the War Office, and embarked for Mauritius to carry out the survey of that island. (See p. 180).

On the termination of the war in South Africa considerable reductions were made in the number of regimental units, and the 4th Field Troop, D Pontoon Troop, the 60th Field Company, the 49th, 50th, 51st, and 52nd Fortress Companies and the Searchlight Sections were done away with, while the 3rd Division of the Telegraph Battalion and the 6th Balloon Section were reduced to cadres.

On the other hand, considerable additions were made to the *personnel* of the submarine miners, especially as regarded the electricians to work searchlights in the different fortresses, a service of which the importance was steadily increasing, and, for these duties, the number of electricians was increased by 263 between 1900 and 1904.

But in 1905, a change was made regarding the Submarine Mining Service, which led to a large decrease in the strength of the Corps. This was in consequence of the decision to take away the duties in connection with the submarine defence of the military and commercial ports from the Royal Engineers, and transfer them to the Royal Navy. The whole of the cir-



cumstances, connected with this radical change of policy, are ably described by Lieut.-Colonel W. Baker Brown, in his *History of Submarine Mining in the British Army*, a work in which he has given the details of the story from the first commencement in 1863 up to its close in 1905, a period of 42 years, during which a cheap and effective system of submarine defence had been gradually built up, and placed on a thoroughly satisfactory footing. All the important nations of the world regarded, and still regard, submarine mines as an important adjunct to the defence of fortified harbours, and it is difficult to understand the reasons, reasons which have never been fully explained, that induced the British Government, by a stroke of the pen, to abolish a system, which had been elaborated with so much care, and was so well organized.

But, whatever these reasons may have been, it was decided by the Government, on the recommendation of the Committee of Imperial Defence, to take the charge of the submarine mines from the Royal Engineers, while leaving with them the duty of working the electrical searchlights at the different ports. It was arranged that the buildings, submarine mining stores, steamers, etc., were to be handed over to the Royal Navy, which, under the new arrangement, was to be responsible for defence, so far as the water was concerned. At the same time, the force of Royal Engineers was to be largely reduced, but leaving sufficient to man the searchlights for use in connection with the artillery defence, and to carry out the other electrical duties at the fortresses, such as those in connection with telegraphs and telephones, which, up to that time, had been in the hands of the submarine mining companies. This decision necessitated a complete reorganization of the fortress regimental units, as the submarine mining companies became fortress companies, and of them a certain number were allotted for electric light duties at the larger fortresses, while, at the smaller, these duties formed part of the work of the fortress companies. The total number of fortress companies thus became 31, of which the 1st, 4th, 28th, 30th, 40th and 45th were specially employed on electrical duties.

Other changes made in 1905 were as follow :—The A, B, and

C Pontoon Troops were called the 1st, 2nd, and 3rd Bridging Companies; the units of the Telegraph Battalion were called the 1st, 2nd, 3rd (cadre), and K Telegraph Companies, the last being that employed on the Postal Telegraphs, and the term Telegraph Battalion was abolished; the Searchlight Section was revived under the name of the 1st Searchlight Company; and the Balloon Corps was formed with five companies, the cadre of a sixth company, and a dépôt and school.

In 1906, the local companies for submarine mining duties at Hong Kong, Ceylon, Mauritius, Singapore, and the West Indies were abolished and the local fortress company at Sierra Leone was also done away with. The Balloon Corps was again reorganized, and the establishment was reduced to the position of a school only, which was supposed to be able to furnish two companies for peace manœuvres, and three companies in time of war. This was a return to the system which had been in force prior to 1890, and which had proved inefficient at the time of the South African War.

The Coast Battalion, which was established originally in 1886 for the submarine mining defence of the commercial ports, and to assist in the instruction of the volunteer submarine miners, was reorganized in 1906. The 16th Survey Company was changed into a Coast Battalion Fortress Company, and was composed of the sections stationed at Liverpool, North Shields, Middlesbrough, and at Paull-on-Humber. The Liverpool Section was afterwards merged into the 35th Fortress Company, of which the headquarters were at Pembroke Dock. The sections in Scotland were formed into a new company, the 49th Coast Battalion Fortress Company, and the remaining sections of the Coast Battalion were amalgamated with the 6th, 18th, 33rd, and 35th Fortress Companies.

In 1907 many alterations of considerable importance were made in order to bring the Royal Engineers Field Units into line with the new organization of the Army for service abroad. Two new Field Troops were raised, the 4th and 5th, and, of the five Field Troops, one was definitely allotted to each of the four brigades of the Cavalry Division, while the 2nd Field Troop was left as part of the garrison in South Africa. The three

Bridging Companies were converted into three Bridging Trains, which were cadres only, to be expanded in case of war. Of the 17 Field Companies, two were allotted to each of the six Infantry Divisions at home, three were left in South Africa, while two, the 37th and 46th, were abolished.

The four Field Parks were done away with. The Telegraph Companies were entirely reorganized with the exception of K Company, which continued to be employed on Postal Telegraph work. Under the new arrangement there were seven Divisional Telegraph Companies, of which one was allotted to each of the six Infantry Divisions, while the seventh was in South Africa.

In addition to these, two Airline Companies, two Cable Companies, and two Wireless Telegraph Companies were raised for service with Army Troops. The number of the fortress companies was left unaltered, but their strength and that of the dépôt companies was considerably diminished. The net result of the numerous changes in the Regimental Units from 1905 to 1907 was a reduction in the establishment of the Corps of 1,074 non-commissioned officers and men.

In consequence of the abolition of the submarine mining service already referred to, the Royal Engineers Submarine Mining Militia Divisions at home and at Bermuda were disbanded in 1907, but the Malta Division was retained for electric light work. Six of the seven Volunteer Submarine Mining Divisions were converted into Electrical Engineers, while the seventh, the Tay Division, was disbanded, as the use of electric searchlights in connection with the defence of the Tay had been given up. The Corps of Electrical Engineers was converted into the London Division of the Electrical Engineer Volunteers.

In 1908 extensive changes were made in the organization of the Auxiliary Forces of the Royal Engineers, in consequence of the abolition of the Militia and Volunteers, and the formation of the Special Reserve and Territorial Force for home defence. The two Militia regiments, the Royal Monmouthshire and Royal Anglesey, were converted into Royal Engineers Special Reserve, while the Volunteer County Battalions were transferred to the Territorial Force, and reorganized under the heads of Divisional

Engineers, Engineers for service with Army Troops, and Fortress Engineers. The companies of the Special Reserve were allotted as Siege Companies, Railway Companies, and Dépôt Companies, while the details of the new organization of the Royal Engineers Volunteers was as follows :—

1. *Divisional Engineers*.—The Divisional Engineers were arranged in fourteen divisions, the titles of which were the same as those of the Infantry Divisions of the newly constituted Territorial Army, each being composed of two field companies and one telegraph company.

2. *The Engineers for service with Army Troops* were organized in five groups of Telegraph Units, one for each of the Army Commands, the London District, Northern, Southern, Western and Scottish. The Telegraph Unit consisted of a Wireless Telegraph Company, a Cable Telegraph Company, and an Airline Telegraph Company. There were also for service with Army Troops the Cheshire Railway Battalion with headquarters at Crewe.

3. *Fortress Engineers*.—These were composed of Works Companies and Electric Lights Companies, which were grouped to form divisions with local names ; these were—the City of Aberdeen, one works company ; the Cinque Ports (formerly Kent), one electric lights company ; Cornwall, two works, and one electric lights companies ; Devonshire, three works, and two electric lights companies ; Dorsetshire, one electric lights company ; Wiltshire, one works company ; the City of Dundee, one works company ; the City of Edinburgh, one works, and one electric lights company ; Essex, one electric lights company ; Glamorganshire, two works and one electric lights companies ; Hampshire, three works, and four electric lights companies ; Kent, three works and two electric lights companies ; Lanarkshire (afterwards Renfrewshire), one works company ; Lancashire, one works and three electric lights companies ; Northumberland, three works and one electric lights companies ; of these the works companies were called the Durham, and the electric lights company was merged in the Tyne Electrical Engineers ; Sussex, one works company ; Renfrewshire, one electric light company ; Yorkshire East Riding, one works

and one electric lights companies ; Yorkshire North Riding, one electric lights company. The total number of volunteer fortress companies was 24 works, and 21 electric lights companies.

4. *Electrical Engineers.*—There were two corps of Electrical Engineers, the London Division composed of eight companies, and the Tyne Division of five companies. The constitution of the Engineer and Railway Staff Corps was not changed under the organization of the Territorial Army.

In 1909, the 58th Field Company, which was stationed in South Africa, was brought home and disbanded at Chatham, and the 2nd Fortress Company, stationed in Egypt, was converted into a Field Company. The 1st and 2nd Wireless Telegraph Companies were amalgamated into one unit as the 1st Wireless Telegraph Company, and attached to the Cavalry Division. The establishment of the Depôt Companies was increased.

In 1910 the 3rd Bridging Train was abolished and the organization of the telegraph companies was changed ; the 1st Airline and 1st Cable Companies were amalgamated and designated A Signal Company, and the 2nd Airline and 2nd Cable Companies were amalgamated and called B Signal Company. These were to be expanded into four units on mobilization.

The Aeronautic Corps was again reorganized in 1911. The Balloon Companies were done away with, and a new unit, called the Air Battalion, was established, which was composed partly of officers and men of the Royal Engineers, and partly of officers taken from other branches of the Army. The Telegraph Services were also reorganized and given the name of the Army Signal Services, and the divisional companies were increased by the addition of officers, with the exception of the 7th Divisional Company, which was stationed in South Africa.

During the years under review considerable changes were made in the Indian regimental units of the Royal Engineers. The name of the Bengal Sappers & Miners was changed to that of the First King George's Own Sappers & Miners, and the battalion was composed of six companies and a depôt company, a mounted detachment and balloon section, together with detached sections, stationed at Calcutta and Karachi. The Madras Sappers & Miners were called the Second Queen's

Own Sappers & Miners, and its strength was raised to seven companies and a dépôt company, with a detached section at Rangoon. The Bombay Sappers & Miners had become the Third Sappers & Miners, and were organized in seven companies and a dépôt company, with sections at Bombay and Aden. Two railway companies had been added to the Indian establishment, together with four divisional signal companies, and one wireless signal company. In addition to the above, there was one independent company, H Company, stationed at Simla.

The following are the details of the Regimental Units as existing on the British Establishment on January 1st, 1912. The numbers of officers given are those actually serving with the units on that date, and do not include the officers, who were to be added to complete the establishment in time of war. The numbers of warrant officers, non-commissioned officers and men are those authorized on the peace establishments, but the actual numbers with the units were not always the same as these.

Nature of Unit.			Officers with the Units on January 1st, 1912.	Warrant Offi- cers, Non- Commissioned Officers and Men on the Peace Estab- lishments.
<b>I. Regular Forces.</b>				
5 Field Troops .. .. .	..	..	16	345
15 Field Companies .. .. .	..	..	56	2,133
2 Bridging Trains .. .. .	..	..	—	20
Training Dépôt for Field Units ..	..	..	1	267
7 Divisional Telegraph Companies ..	..	..	13	388
2 Airline and Cable Signal Companies ..	..	..	13	402
1 Wireless Telegraph Company ..	..	..	5	99
K Telegraph Company (Postal Telegraphs)	..	..	8	165
1 Searchlight Company .. .. .	..	..	2	88
Air Battalion (Royal Engineers) ..	..	..	7	176
31 Fortress, Works and Coast Battalion Companies .. .. .	..	..	117	2,677
3 Railway Companies .. .. .	..	..	10	229
3 Survey Companies and Colonial Survey Section .. .. .	..	..	5	346
9 Dépôt Companies .. .. .	..	..	18	911
Special Reserve (Regular Establishment)	..	..	4	46
Total Regular Forces ..			275	8,292

Nature of Unit.	Officers with the Units on January 1st, 1912.	Warrant Off- cers, Non- Commissioned Officers and Men on the Peace Estab- lishments.
2. <i>Special Reserve.</i>		
2 Regiments (Royal Anglesey and Royal Monmouthshire) .. ..	37	1,200
Motor Cyclists .. ..	10	112
Total Special Reserve ..	47	1,312
3. <i>Royal Engineers Militia.</i>		
Malta Division .. ..	—	92
Channel Islands Militia, Engineer Sec- tions .. ..	8	190
Total Militia .. ..	8	282
4. <i>Territorial Force.</i>		
Headquarters of Divisions .. ..	—	84
Headquarters of Divisional Engineers ..	14	140
28 Field Companies .. ..	168	5,768
14 Divisional Telegraph Companies ..	28	798
15 Telegraph Companies, Army Troops	80	2,180
Motor Cyclists with Telegraph Units ..	—	172
1 Balloon Company .. ..	3	62
1 Railway Battalion .. ..	18	513
42 Fortress Companies .. ..	136	4,094
2 Divisions, Electrical Engineers ..	36	800
Post Office Telegraph Corps .. ..	23	—
Engineer and Railway Staff Corps ..	60	—
Total Territorial Force ..	566	14,611

In addition to the above there were the Permanent Staff of the Militia and Territorial Force Units, and the non-Europeans of the 36th and 40th Fortress Companies at Hong Kong and Sierra Leone.

If the above details are compared with those given at p. 35, of the organization of the Regimental Units of the Royal

Engineers in 1886, it will be seen that the changes which have been made were very considerable, and that the number of officers and men with the units have been largely increased. The alterations have been introduced with the object of making the Corps more efficient for service in war, and ready at all times to perform the multifarious duties which devolve upon it. One may reasonably expect that the manner in which the Regimental Units will carry out those duties will be as satisfactory and as honourable in the future as in the past.



## CHAPTER III.

## THE SUDAN CAMPAIGNS, 1885—1899.

The Abandonment of the Sudan in 1885—Advance of the Dervishes—The Battle of Ginnis, December 30th, 1885—Defeat of the Dervishes near Sarras—Expedition to Suakin in 1885—Affairs at Suakin, 1885—1888—The Invasion of Egypt by Wad en Nejumi—The Battle of Toski—Preparations for the Re-Conquest of the Sudan—The Advance begun in March, 1896—The Sudan Military Railway—The Re-Occupation of Dongola—Rapid Progress of the Railway—Capture of Abu Hamed in August, 1897—The Occupation of Kassala—Battle of the Atbara, April 8th, 1898—The Advance from Berber to Khartum—The Battle of Omdurman, September 2nd, 1898—Occupation of Khartum—The French Expedition to Fashoda—Defeat of the Dervishes at Suk Abu Sin—Defeat and Death of the Khalifa on November 24th, 1899—Restoration of Peace in the Sudan.

THE history of the Egyptian campaign of 1882, and of the Sudan campaigns which took place in 1884–5, has been given in Volume II., p. 64, up to June, 1885. The capture of Khartum by the Mahdists in January and the death of General Gordon in the city he had so gallantly defended, led to a complete change in the scheme of military operations, because, after the return of the desert and river columns to Korti on the Nile, the whole country to the south had fallen into the hands of the Dervishes, and its reconquest would have required a large force, and a long campaign.

After careful consideration of the circumstances, the British Government arrived at the conclusion that no further military operations were to be taken in hand, and that the Sudan was to be definitely abandoned. This decision was communicated to Lord Wolseley on May 11th, 1885, and he gave instructions for the withdrawal of the Nile expeditionary force from all stations south of Dongola. On June 15th Dongola itself was given up, and the retreat was continued to Akasheh, the end of the railway from Wady Halfa, much to the dismay of the loyal

inhabitants, who had been definitely promised protection, and who naturally resented being handed over to the tyranny of the Dervishes. Many of them desired to leave the country with the British troops, but this was only possible for a limited number, in consequence of the want of means of transport.

The Nile Expedition of 1884-5 may be regarded as having been concluded by the evacuation of the Province of Dongola, and the results of the campaign were summed up in Lord Wolseley's final despatch of June 15th, which has been referred to in Volume II., p. 83, where the names of the Royal Engineer officers, who distinguished themselves, have been given, and the honours and promotions awarded to them have also been mentioned.

After the departure of Lord Wolseley from Egypt in June, 1885, the command of the British army of occupation was resumed by General Sir F. Stephenson, while the command of the force, to which was allotted the duty of defending the new frontier of Egypt, south of Wady Halfa, was given to Major-General F. Grenfell, who had succeeded General Sir Evelyn Wood, as Sirdar, or Commander-in-Chief of the Egyptian Army. This frontier garrison was composed principally of Egyptian troops, strengthened by a certain proportion of British, and, with the exception of the latter, the whole of the British army was withdrawn from the Nile by the end of August, 1885.

The probability that an invasion of Egypt by the Dervishes might shortly be expected was, at that time, very considerable, as they were naturally much elated by the capture of Khartum, and the somewhat hasty withdrawal of the Nile expeditionary force; and, had it not been for the fact that the Mahdi, Mohamed Achmed, was wanting in initiative, and was content to rest for a time after he had taken possession of Khartum, the passage of the British troops down to Wady Halfa might have been considerably hampered.

But, in June, 1885, Mohamed Achmed was poisoned by one of his wives, and his place, as commander of the Dervishes, was taken by the Khalifa Abdullah et Taashi, who had succeeded in getting the Mahdi to nominate him as his successor, and who,

immediately after the death of the latter, began to put in action the plans for the invasion of Egypt. In accordance with this scheme, the Emirs Abd el Mejid and Mahomed el Kheir were to move through Dongola on Wady Halfa, and to cover the advance of a large force under Wad en Nejumi, destined for the proposed invasion of Egypt; while another column was to cross the Nubian Desert from Abu Hamed to Korosko, and capture Assuan. Abd el Mejid reached Dongola in August, and proceeded to assemble the force required for the attack on Wady Halfa.

The Anglo-Egyptian frontier garrison was fully acquainted with the Khalifa's scheme of attack and the necessary preparations had been made to meet it. At that time, the Royal Engineer officers, attached to the frontier force, were distributed as follows:--Major Hepper was in command of the Engineers at Assuan; Colonel E. P. Leach had charge of the important post of Korosko, where the desert road from Abu Hamed debouched on the Nile; Lieut.-Colonel D. A. Scott, who was in command of the 8th Railway Company, was engaged on the railway from Wady Halfa to Akasheh, and other officers were stationed at various points on the Nile between Assuan and Akasheh. The line of railway, which had been constructed for 87 miles southwards of Wady Halfa, was protected at several points by fortified positions as far as Akasheh; and, still further to the south, there were forts at Mograkeh and Kosheh on the Nile.

The advancing Dervishes were first sighted on November 29th, and, on December 2nd, the post at Ambigol Wells, where Captain Ferrier, R.E., was in command, was attacked, and fighting continued for three days, when a force was sent from Wady Halfa to drive the enemy back. Shortly afterwards the fort at Mograkeh was attacked, and the villages of Ginnis and Kosheh, which were not far distant, were occupied by the Dervishes. As the situation was becoming serious, General Sir F. Stephenson, who was accompanied by Colonel Ardagh, R.E., as Chief Staff Officer, proceeded from Cairo to Wady Halfa, and took command of the Anglo-Egyptian force, which was concentrated at that place to check the Dervish advance;

Major Hepper and part of the 11th Company, Royal Engineers, came up from Assuan to assist in the operations.

Sir F. Stephenson moved his force to the head of the railway, and, on December 29th, 1885, the column bivouacked between the forts at Mograkeh and Kosheh, and marched on the following day to attack the Dervish position on the Nile at Ginnis. After a brilliant action the enemy were completely defeated, and a large number of them were killed, wounded, or taken prisoners. The fugitives were pursued as far as Absarat by Captain Smith-Dorrien, who commanded the cavalry, when many boats, and a considerable quantity of stores were captured.

Notwithstanding the very successful result of the action at Ginnis, which had cleared the Dervishes out of the Nile Valley up to the Province of Dongola, it was decided by the British Government to make a further retreat, to give up the line of railway, and to fix the southern frontier of Egypt at Wady Halfa, abandoning all the posts to the southward of that place. It was also decided to entrust the defence of the frontier to the Egyptian army under General Grenfell, and all the British troops were withdrawn from Wady Halfa in May, 1886, including the 8th Railway Company, which had done so much by its work on the Sudan Railway to assist in the advance of the Nile Expedition and the subsequent operations. A small British force, including part of the 11th Company, R.E., was left at Assuan.

This further retreat of the British was regarded as a triumph for the Dervishes, and was the occasion for rejoicing at Khartum, while, at Berber, Wad en Nejumi, who was styled the Commander-in-Chief of the army for the invasion of Egypt, continued to prepare his force for his advance northwards down the valley of the Nile.

During the summer of 1886 the Emir Nur el Kanzi moved forward to Akasheh and commenced the destruction of the Sudan Railway between that point and Wady Halfa; he was however checked in his operations by Colonel Chermiside, R.E., who had been given command of the frontier force, and who moved out with the Egyptian cavalry and camel corps, whereupon the Dervishes retired to Akasheh, and remained quiet for some months.

In April, 1887, Nur el Kanzi again advanced from Akasheh and occupied Sarras and Gemai; Chermside decided to attack this body of the enemy at once before they could be reinforced, and marched a column to Abka and Sarras on the night of April 27th. He assaulted the Dervish position on the following day with very satisfactory results, as the enemy were completely defeated, and their leader, Nur el Kanzi, was killed. This action was especially important in one respect, because it was the first occasion when the soldiers of the new Egyptian army had attacked and defeated the Dervishes without being supported by British troops, which showed that their training under British officers had been successful.

Notwithstanding this check, the Khalifa continued his preparations for the invasion of Egypt, and sent considerable reinforcements to Dongola and Sarras. Colonel Wodehouse, R.A., who had succeeded Colonel Chermside in command of the Wady Halfa garrison, had several fights with the Dervishes, and checked their further progress for some months, but they caused a good deal of trouble by making raids upon the villages situated on the Nile between Wady Halfa and Korosko, and by carrying off the possessions of the inhabitants. In August, 1888, a serious attack was made on Fort Khor Musa, an outpost of Wady Halfa, but the Dervishes were repulsed with considerable loss, and, after this, matters were fairly tranquil on the frontier until the following year.

Leaving for the moment the course of events upon the Nile, it is necessary to describe briefly the progress of affairs on the Red Sea coast from 1885 to 1889.

When the news of the fall of Khartum in January, 1885, was received in London, the British Government decided to send an Anglo-Indian force to Suakin, under the command of General Sir Gerald Graham, in order to defeat the Dervishes in the Eastern Sudan, and, when this had been accomplished, then to protect the construction of a line of railway, which it was proposed to make from the Red Sea to Berber on the Nile, in order to open up a second line of communication with Lord Wolseley's Army. There were several actions between the British force and the Dervishes, of which the most important

was that fought at Tofrik, a place not far from Suakin, usually known as the Battle of McNeil's zeriba. An account of this battle, and a list of the names of the Royal Engineer officers who took part in the campaign are given in Volume II., pp. 80—85.

After the defeat of the Dervishes the construction of the railway from Suakin to the Nile Valley was commenced and carried inland for a distance of 19 miles. But, at this stage, the British Government changed its mind, and decided to abandon the railway, and to withdraw the greater part of General Graham's force, leaving only the Indian brigade, under the command of Major-General Hudson, as a garrison for Suakin. This decision had a disastrous effect through the whole of the Eastern Sudan, as the Dervishes naturally believed that the British did not advance because they could not; and, just as the withdrawal of the British troops from Suakin in 1884 led to the fall of Berber, and the cutting off of communications with Khartum, so Kassala, which had held out as bravely as Khartum, was forced to surrender to the Dervishes in July, 1885. Colonel Chermiside, R.E., the Egyptian Governor of the Red Sea Littoral, had been in negotiation with King John of Abyssinia, with a view to this monarch sending a force to the relief of Kassala, but Ras Alula, the Abyssinian General, although he defeated the Dervishes with great slaughter at the Battle of Kufit, was not able to save the Egyptian garrison of Kassala, which, including its brave commander, Ahmed Effat, was massacred by Osman Digna, who had succeeded in escaping from the Abyssinians.

After the withdrawal of the British troops from Suakin in June, 1885, the country in the vicinity of the port remained peaceful for some time, but the districts outside were in the hands of the Dervishes who tyrannized over the Arab tribes, and compelled them to be, at least outwardly, followers of the Mahdi. Colonel Chermiside, R.E., was succeeded as Governor by Colonel Sir C. Warren, R.E., who remained a very short time, as he was appointed Chief Commissioner of Police in London, and was succeeded by Major Watson, R.E. At this time the Indian Brigade was withdrawn and replaced by Egyptian

troops, as the British Government had decided that British soldiers were not to be employed in the Sudan garrisons. But this was a period of comparative peace at Suakin as the Arab tribes were becoming well disposed to the Government, because they were tired of the war and wanted to return to their former occupation as camel drivers on the road from Suakin to Berber. But they could not break openly from the tyranny of the Dervishes and felt keenly the action of the British Government in abandoning them to the tender mercies of Osman Digna and his followers. The rebel leader, however, lost much of his influence, and went to Omdurman to complain to the Khalifa of the disloyalty of the tribesmen; soon after his departure the well-disposed Arabs captured his camp at Tamai and killed those of his adherents who were left there.

In September, 1886, Colonel Kitchener, R.E., was appointed Governor at Suakin where nothing of importance occurred until the end of 1887, when Osman Digna, who had received intelligence that the Egyptian garrison was reduced in numbers, assembled a force of about 5,000 men, and established a camp at Handub, 8 miles from Suakin, on the road to Berber. Here he once more made himself master of the country and caused much annoyance to the town by firing into it. Many of the tribesmen, who had hitherto been well disposed to the Government again joined him, which was only natural, as Osman Digna was able to terrorize them, while, on the other hand, the Government gave them no assistance against him.

In order to put an end to this unsatisfactory state of affairs, on January 17th, 1888, Kitchener took a force out of Suakin to capture Osman Digna's camp at Handub, and succeeding in occupying it, but the wily Emir made his escape as usual. Unfortunately Kitchener was severely wounded and was invalided to Cairo. On his recovery he was appointed Adjutant-General of the Egyptian Army, and was succeeded as Governor at Suakin by Lieut.-Colonel Holled Smith, 60th Rifles, who, on his arrival, found that the Dervishes were preparing for a serious attack on the town. He telegraphed to Cairo for reinforcements, and arrangements were immediately made to send a force composed of British and Egyptian troops, under the

command of General Grenfell, the Sirdar of the Egyptian Army. Major Settle, R.E., went as Chief Staff Officer of this force, which, including the Suakin garrison, consisted of 750 British, and about 4,000 Egyptian and Sudanese troops. The latter were organized in two brigades, of which the Egyptian brigade was commanded by Colonel Holled Smith, and the Sudanese brigade by Colonel Kitchener.

General Grenfell decided to assault the Dervish position, and was completely successful, the enemy being routed with great loss, while the casualties of the Anglo-Egyptian troops were comparatively small. The loyal tribesmen were greatly encouraged, as they believed that at last the Government was prepared to advance and pacify the country; but their hopes were dashed to the ground when they heard that the British troops had re-embarked and that no further action was to be taken. On the other hand Osman Digna and his followers were greatly pleased, as he was able to return to Handub, from which place he removed, some months afterwards, to Tokar, which was situated in a fertile country. But no further attempt was made upon the garrison of Suakin.

Meanwhile the Emir Wad el Nejumi was making great preparations for the invasion of Egypt by way of the Nile, and, early in 1889, a force of more than 8,000 Dervishes was assembled in the Province of Dongola with this object in view. The Emir Abd el Halim was ordered to occupy Sarras with an advance guard of about 1,000 men, and fighting between the Dervishes and the Egyptian garrison of Wady Halfa recommenced.

The scheme of invasion was based on the plan that Abd el Halim was to keep the Egyptian troops occupied on the Nile, while Wad el Nejumi, with the main body, was to march north by the desert road west of the river, and make its way toward Egypt.

Colonel Wodehouse, R.A., who was in command at Wady Halfa, took up a position with 2,000 men at Argin, a village  $3\frac{1}{2}$  miles from Halfa. Here he was attacked by the Dervishes under Abd el Halim, whom he defeated with great loss, the larger part of them being killed, wounded, or captured. Abd



el Halim, who was wounded, was severely reprimanded by Wad el Nejumi for exceeding his instructions, as the object of the latter was to avoid serious fighting as much as possible, and only to detain the Egyptians, while the main army was advancing towards Egypt.

As it was evident that this was the most serious attempt at invasion that had yet been made, and, as the Egyptian garrison was not of sufficient strength to attack Wad el Nejumi's Army with a certainty of success, General Grenfell proceeded to the frontier with reinforcements, including a brigade of British troops. While his force was being organized at Assuan, Wad el Nejumi, with his column of Dervishes, advanced slowly along the west of the Nile, but with considerable difficulty, as they were badly provided with provisions, and many of them, especially the camp followers, were in a state of semi-starvation. General Grenfell wrote to Wad el Nejumi, pointing out the hopeless nature of his attempt at invasion, and urging him to surrender for the sake of the women and children with his army, but the Dervish Emir sent a defiant reply and stubbornly continued his advance.

General Grenfell, to whom Lieut.-Colonel Settle, R.E., acted as Chief Staff Officer, completed his preparations early in August. The Anglo-Egyptian force under his command was organized in the following manner. The British brigade, which was commanded by Major-General the Hon. R. de Montmorency, was composed of three infantry battalions, a squadron of cavalry, a battery of artillery, and a section of the 24th Company, Royal Engineers, under Captain Foley; Major Clayton held the post of Commanding Royal Engineer. The Egyptian troops were organized in two columns, the first commanded by Colonel Wodehouse, R.A., and the second by Colonel Kitchener, R.E.

A reconnaissance was made by the mounted troops on August 3rd, with the view of compelling Wad el Nejumi to delay his advance northwards, but he refused to fight and began to move into the desert. General Grenfell therefore decided to attack the Dervishes at once with his whole force, and sent the mounted troops under Colonel Kitchener to check the head of

the enemy's column while the Egyptian infantry and artillery, the latter under Lieut. W. Gordon, R.E., attacked some rising ground which was held by the Dervishes. After a severe fight the latter were totally defeated and their leader, Wad el Nejumi, killed, with many of his followers, while about four thousand of the latter were taken prisoners.

The few Dervishes, who escaped from the battle, fled to Dongola, and the Nile Valley was freed from the enemy for many miles south of Wady Halfa. The Battle of Toski was the greatest blow given to Mahdism since the fall of Khartum, and completely put an end to the Khalifa's plans for the invasion of Egypt.

In March, 1892, General Grenfell resigned the command of the Egyptian Army, and was succeeded in the appointment of Sirdar by Colonel Kitchener, R.E., who was given the rank of Brigadier-General in the British Army. The first four years of his command were comparatively peaceful, as the Dervish raids in the Nile Valley were of a somewhat feeble character, and were kept in check without much difficulty, so that Kitchener was able to devote his energies to perfecting the organization of the Egyptian Army and preparing it for the time when the re-occupation of the Sudan was to become a question of practical politics. It was not, however, until early in 1896, that the British Government decided to allow Egypt to commence a move southwards from Wady Halfa and once more to take possession of the country along the Nile, which had been left in the possession of the Dervishes since the withdrawal of the Nile Expeditionary Force in 1885. Possibly the defeat of the Italians by the Abyssinians in March, 1896, may have had something to do with this change of policy on the part of the British Government, but whatever the reason for it may have been, the decision was certainly a wise one.

Some difficulty was at first experienced by the Egyptian Government in providing the funds required for the campaign, in consequence of objections being raised to the allocation of money for the purpose, but the matter was settled by the British Government making an advance of £800,000, and, on

March 12th, 1896, Sir Herbert Kitchener received instructions to commence the advance from Wady Halfa to the south.

Kitchener commenced operations by ordering Colonel Hunter (now General Sir A. Hunter, G.C.B.) to take possession of Akasheh at the head of the Sudan railway, which, as already related, had been destroyed by the Dervishes. The latter, on this occasion, did not wait for the Egyptians to attack but retreated to Ferket without fighting, and, on March 20th, Hunter occupied Akasheh and formed an entrenched position at that place.

The greater part of the Egyptian army in Egypt proper was then concentrated on the frontier, and the troops from Suakin were also brought to Wady Halfa to take part in the expedition, the Egyptian garrison at Suakin being relieved by a brigade sent from India under the command of Colonel Egerton, C.B. The Nile expeditionary force was assembled at Wady Halfa, and the repair of the railway from that place to Akasheh was taken in hand by the Royal Engineers, at first under Lieut. Stevenson, and then under Lieut. Girouard. The work was carried on rapidly, as the line was urgently required to keep up the supplies of stores to the front, because, on account of the cataracts, communication by the Nile was difficult. At the same time a line of telegraph was established to Akasheh by Lieut. Manifold, R.E.

By the beginning of June, 1896, the railway had been repaired as far as Ambigol Wells, and Kitchener concentrated a force of 9,000 men at Akasheh with the view of attacking the position at Ferket, held by the Dervishes. The latter had remained strangely quiet and had made no effort to check the advance of the Egyptians to Akasheh; but their leader, the Emir Hamuda, was a man of little ability and showed no wish to imitate the example of the bold Wad el Nejumi. Hamuda was about to be superseded by order of the Khalifa, when, on June 7th, Kitchener marched from Akasheh to take possession of Ferket. The operation was carried out with complete success, the Dervishes being driven out of their position with considerable loss in killed and wounded, including many of their leaders. The fugitives were pursued as far as Sarra and retired to

Dongola. This may be regarded as the first step towards the recovery of the Sudan.

The Dervishes were so discouraged that it would then have been possible to push on to Dongola, but, as the railway was not completed, it would have been difficult to keep up the supplies, and the Nile was still too low to bring the gunboats over the cataract. Kitchener wisely decided to remain until the river had risen and the railway had advanced further, and he camped his force at Ferket and Sarra, there to wait until sufficient stores could be accumulated to justify a further advance.

The railway was completed as far as Kosheh, 116 miles from Wady Halfa, by August 4th, 1896, and all seemed going well, when a serious and unforeseen disaster occurred. Although in this part of the Nile Valley rain was unusual, a violent storm commenced on August 25th accompanied by heavy rain, which lasted for three days and caused such floods that 12 miles of the railway were destroyed in a few hours. But Girouard and his assistants, Lieuts. Blakeney and Cator, proved equal to the occasion, and, by the greatest exertions, restored the line in about a week, so that traffic could be resumed.

During the same month a severe epidemic of cholera broke out among the troops, which caused the death of several officers, including Lieut. Polwhele, R.E., and about 900 non-commissioned officers and men.

As soon as the railway was in working order, the advance was continued, and, by September 16th, the whole force was concentrated at Fereig, a short distance above the Kaibar Cataract. The British contingent consisted of one battalion of the North Stafford Regiment, and a battery of Maxim guns, while the Egyptian troops included eight Egyptian and five Sudanese battalions, three batteries, eight cavalry squadrons and a camel corps. Five gunboats and three other steamers had been brought up the Nile to assist in the operations for the recovery of the Province of Dongola.

Every preparation had been made for a serious fight, but, as events proved, no great resistance was encountered. On September 19th, the gunboats shelled Hafir and drove out the

Dervishes, who retreated up the Nile and made no attempt to defend Dongola, abandoning the whole province to Kitchener, who occupied it as far as Merowi, and restored the administration.

Among the officers who received promotion and reward for the short and satisfactory campaign were the following Royal Engineers :—

Brigadier-General Sir H. H. Kitchener, R.C.M.G., was promoted to the rank of Major-General, and was given the K.C.B.

Captains W. F. H. S. Kincaid and W. S. Gordon were promoted Brevet Majors.

Lieuts. E. P. C. Girouard and G. F. Gorringe received the D.S.O.

The conclusion of the campaign and occupation of Dongola brought no cessation of work to the Royal Engineer officers, as Lieut. Girouard and his assistants had at once to take in hand the extension of the Nile Railway from Kosheh to Kerma, a distance of 100 miles, and this was completed by May, 1897. This work was of great importance, as, during low Nile, the army was dependent for its supplies upon the railway; the duty of keeping up the supplies, and at the same time pushing forward the construction of the railway required much skill in organization, and the manner in which it was performed, reflected great credit on the railway officers.

Before the line had been completed as far as Kerma, an important decision was come to with regard to the further prolongation of the railway. When this Sudan line was originally designed in the reign of the Khedive Ismail, it was intended to follow the east bank of the river as far as Koheh, there to cross the Nile by a bridge, and thence to follow the west bank through Dongola to Ambukol. From Ambukol the great bend of the river was to be avoided by taking the railway across the Bahiuda Desert to Metemmeh above Berber, by the road which was followed by Sir Herbert Stewart's column in 1885.

For the purpose of Kitchener's advance, the original scheme had two disadvantages; first that it would have been necessary to build a long and expensive bridge at Koheh; and, secondly,

that, as the country between Ambukol and Metemmeh was in the hands of the Dervishes, the construction of the line might have been attended with difficulty. He, therefore, decided to investigate the question of the possibility of making a railway across the Nubian Desert from Wady Halfa to Abu Hamed, thus avoiding the necessity of building a bridge, and keeping altogether on the east side of the Nile.

With this object in view, a survey of the country was made by the Royal Engineers at the end of 1896, and it was found that there were no great difficulties in the way of railway construction, and that water could be obtained by sinking wells at certain points. This of course, was a matter of great importance, as if water had not been found on the line it would have been necessary to bring all that was required in tanks from Wady Halfa.

The new line was commenced early in 1897, and soon afterwards Lieut. Cator, R.E., died of enteric fever at Wady Halfa. In May, when the railway along the Nile had been taken to Kerma, the construction staff was transferred to the desert line, which was pushed forward with great vigour, and made rapid progress, as the desert, through which it passed, was level, and but little banking or cutting was required; in one place it was possible to lay 45 miles of line without putting in a curve.

By the end of July, 1897, 115 miles of the desert railway, or about half the total distance from Wady Halfa to Abu Hamed, had been completed, and, as it was now approaching a district still occupied by the Dervishes, Sir H. Kitchener decided to take possession of Abu Hamed before continuing the construction of the line. At Abu Hamed was a force commanded by the Emir Mohamed ez Zein, and, in order to capture the place, Colonel Hunter (now General Sir A. Hunter, G.C.B.) was ordered to march along the Nile from Merowi with a column, consisting of one Egyptian and three Sudanese battalions, a troop of cavalry and a battery of artillery. He started from Kinnegar, a village near Merowi, on the evening of July 29th, and arrived at Wady Gerub, two miles west of Abu Hamed, on the morning of August 7th, the distance

being 131 miles. This was a good march, and it is interesting to compare the time taken over it with the time taken by the river column in 1885, which ascended the same portion of the Nile in the whale boats. The river column started from Hamdab, 10 miles beyond Kinnegar, on January 24th, 1885, and reached Huella, 25 miles short of Abu Hamed, on February 23rd. It therefore took 30 days to accomplish in the whale boats a considerably shorter distance than that which Colonel Hunter and his Egyptian force marched over on foot in nine days and a-half. It should also be remembered that while the British column moved in January and February, the winter months, Hunter carried out his march in August, the hottest month of the year.

Immediately on his arrival at Wady Gerub, Hunter sent Major Kincaid, R.E., forward to reconnoitre the Dervish position at Abu Hamed, and he was received with a volley from the village. The column was at once ordered to assault and the place was captured after some severe fighting, the majority of the Dervishes being killed or taken prisoner. Among the latter was the leader, Mahomed ez Zein. The Egyptian loss was comparatively small, but unfortunately among those killed were two British officers, Major Sydney, of the Duke of Cornwall's Light Infantry, who commanded the 10th Sudanese Battalion, and Lieut. Fitzclarence, of the Dorsetshire Regiment.

After the capture of Abu Hamed Colonel Hunter pushed on to Berber which was occupied without resistance on September 3rd, the Dervish garrison having retired to Metemmeh. The Suakin-Berber road was re-opened and Lieut. Manifold, R.E., built a line of telegraph to Suakin.

As soon as Abu Hamed had been captured, the construction of the railway from Wady Halfa was recommenced, and Girouard carried out the work so expeditiously that it reached Abu Hamed, 234 miles from Halfa, on October 31st. The line was then continued along the east bank of the Nile in the direction of Berber.

In accordance with an arrangement made between the British and Italian Governments, the important town of Kassala in the Eastern Sudan, from which Italy had expelled the Dervishes

in 1894, was to be held by Italian troops until Egypt was in a position to reoccupy it; and, after the occupation of Berber, and the re-establishment of the Government in the Eastern Sudan, it was agreed that the time had come for the transfer to be carried out. Colonel Parsons, R.A. (now Major-General Sir C. Parsons, K.C.M.G.) was therefore sent to Massowah in command of an Egyptian force, and marched thence to Kassala, where he arrived in December, 1897. The formal transfer of the place was made with due ceremony on Christmas Day, after which the Italian troops were withdrawn, and replaced by the Egyptians under Colonel Parsons.

Intelligence was received by Sir H. Kitchener towards the end of 1897, that the Khalifa Abdullah was about to send an army from Omdurman to Shendy with the object of driving the Egyptians out of Berber and restoring that place to Mahdist rule. It was therefore decided to assemble a considerable force at Berber to oppose the intended advance of the enemy, and, as the Dervish army was large and serious fighting might be expected, Kitchener requested that a brigade of British troops might be sent from Cairo to strengthen the Egyptian Army in the coming struggle.

His wishes were met by the dispatch of a brigade from Cairo, under the command of Major-General Gatacre, which was composed of four infantry battalions, an artillery detachment with Maxim guns, and a section of the 2nd Company, R.E., under Lieut. J. P. Moir. The British brigade reached the head of the railway at a point about 20 miles south of Abu Hamed in January, 1898, and, in order to facilitate the work of supply, was kept in camp there, until all was ready for the movement against the Dervishes. The Egyptian force, assembled at Berber, consisted of three brigades of infantry, containing in all 11 battalions, eight cavalry squadrons, and four artillery batteries.

Kitchener had completed his preparations early in March, and, by the 15th of that month, the Anglo-Egyptian Army was concentrated between Berber and the river Atbara, ready for the conflict with the Dervishes. The latter, under the command of the Emir Mahmud, a man in whom the Khalifa had



great confidence, occupied Shendy on February 28th, and marched from thence to the river Atbara, where they constructed a zeriba on the north bank, about 30 miles above the point where the river joins the Nile. On March 21st, the Anglo-Egyptian force moved to Ras el Hudi, a place about 14 miles from the Dervish zeriba and waited for the enemy to develop his scheme of attack. During the interval of waiting the gunboats made several expeditions up the Nile, and drove the Dervishes out of Shendy. It would have been satisfactory if Mahmud had decided to attack, but he feared to do this, and a reconnaissance in force on April 5th, although it led to some fighting, failed to draw out the main body of the Dervishes. Kitchener therefore decided to take the zeriba by assault, and marched his army on the night of April 7th, taking up a position half a mile north of the zeriba before dawn on the morning of the 8th. In the formation for attack the Egyptian division of three brigades was placed on the right, the British brigade on the left, and the cavalry on the left flank, ready to cut off the retreat of the Dervishes. Two artillery batteries were placed on the extreme right, and two others between the British and Egyptian infantry.

The attack was commenced by the artillery which opened fire on the zeriba at sunrise, and, after an hour's bombardment, the infantry were ordered to assault, and forced an entrance into the zeriba, the British and Egyptians vying with each other to be the first to cross the obstacles which lay in their path. The Dervishes fought with great determination but their attempts at resistance were soon overcome and in half an hour all was over. About 3,000 of them were killed, while the Emir Mahmud and many of his followers were taken prisoners. Some few succeeded in escaping from the zeriba, but of these a considerable number were killed by the Arab tribesmen of the country who were glad to take revenge for the cruelty with which they had been treated for many years by the Khalifa. The casualties of the Anglo-Egyptian force amounted to 570 killed and wounded, including among the former five British officers.

Although the victory of the Atbara had completely anni-

hiliated the Dervish force, which had been sent by the Khalifa to recapture Berber, a more difficult task still remained for Sir H. Kitchener, as there was an army of 50,000 men at Omdurman, determined to resist to the last, and to destroy the Egyptians, if they dared to attack the headquarters of Mahdist rule. He therefore decided, before making a further advance, to wait for the rise of the Nile, when the river would become navigable for steamers, and the gunboats could be brought up to assist in the final struggle.

As it would be four months before the Nile was sufficiently high, the Anglo-Egyptian Army formed standing encampments, there to wait until August, the time fixed for the forward movement. But this period of waiting gave no leisure to the officers employed on the construction of the railway, as this had to be completed up to the Atbara before the general advance commenced. By the exertion of great energy Girouard succeeded in accomplishing the task by the beginning of July, when he handed over the responsible charge of the Sudan Railway to Lieut. G. B. Macaulay, R.E., and returned to Cairo to take up his duties as President of the Egyptian Railway Administration, as he had been selected as the best man who could be chosen for this responsible position.

As it was considered desirable to increase the number of gunboats on the Nile, prior to the advance on Omdurman, a naval yard was established at Abadieh, near Berber, under the superintendence of Major W. S. Gordon, R.E., and three gunboats were brought up in sections from Cairo by rail, and there put together and prepared for service. Four other gunboats were brought up from Dongola, over the cataracts, when the Nile rose, so that, by the beginning of August, there were ten gunboats and five other steamers at Berber, ready to support the army in the final attack on the Dervish stronghold.

As the battle in front of Omdurman was expected to be the most serious of the campaign, Sir H. Kitchener requested that the British contingent might be increased in strength, and, in compliance with his wish, a second infantry brigade, under the command of Brigadier-General the Hon. N. G. Lyttleton, was sent by rail from Cairo to Berber, together with the 21st Lancers,

two field batteries, and the 2nd Company, R.E., under Major L. A. Arkwright. Majors the Hon. M. G. Talbot and L. B. Friend, R.E., were attached to the Intelligence Department, and Major A. E. Sandbach, R.E., was appointed to the Staff.

As soon as the Nile had risen sufficiently to allow of the steamers passing safely through the cataracts, a general advance was commenced, and, by August 24th, 1898, the whole Anglo-Egyptian army, 22,000 strong, was concentrated at Wad Hamed, a place on the west bank of the river, a little below Shabluka, at the sixth cataract. The gunboats, one of which, the *Melik*, was commanded by Major Gordon, R.E., and the other steamers were moored near the camp; while, on the east bank of the river, a large force of friendly tribesmen were collected under the command of Major E. Stuart Wortley, 60th Rifles, who had accompanied Colonel Sir C. Wilson, R.E., on his perilous journey from Gubat to Khartum in January, 1885.

It was somewhat strange that the Dervishes made no attempt to dispute the passage of the cataracts, and that they had abandoned the batteries, constructed on both sides of the Nile, but the Khalifa appeared to consider it wiser to concentrate his whole force for the great fight at Omdurman, and to make no effort to harass the Anglo-Egyptian army on its advance up the river.

Sir H. Kitchener ordered the army to leave its camp at Wad Hamed and move up the Nile on August 24th, and, by the 29th, the column arrived at Om Teref, half-way to Omdurman. The following day they marched to Egeiga, a village on the Nile, ready for battle at any moment, and halted at this point, about 6 miles from the Mahdist capital. Here, on September 1st, an entrenched camp was formed, with its rear on the river, and its front facing west towards the desert. The gunboats moved up the Nile and cleared the villages on the east bank, and there the howitzer battery was landed and shelled Omdurman, causing heavy loss among the Dervishes and silencing their batteries. The fire had such an effect that the Khalifa moved out of the town with all his troops and decided to fight in the open country and attack the Anglo-Egyptian camp.

In this history it is not necessary to give the details of the

battle, which are well known and have often been described. Suffice it to say that, soon after sunrise on September 2nd, 1898, the great army of the Dervishes advanced and made a bold effort to capture the position ; but, though their bravery was beyond all praise, they had not calculated on the destructive effect of modern weapons, and were mowed down by thousands, without being able to get within 500 yards of the zeriba. By 8 a.m. the assault had failed and Kitchener decided to advance on Omdurman.

Some severe fighting followed, but, before noon, the battle was over, the Dervishes who still survived had retreated, and Kitchener and his staff rode victoriously into Omdurman. About 20,000 of the Mahdists were killed and wounded, but their leader, the Khalifa Abdallah, seeing that all was lost, mounted his horse and fled to Kordofan. Khartum was occupied on the following day, and the Mahdist rebellion was practically at an end.

In the *London Gazette*, which enumerated the honours and promotion given for the Sudan Campaign of 1898, the names of the following Royal Engineer officers were included :—

Major-General Sir H. H. Kitchener was created a peer, with the title of Baron Kitchener of Khartum and Aspal, and was given the G.C.B.

Majors the Hon. M. G. Talbot, A. E. Sandbach, and W. S. Gordon were promoted Brevet Lieutenant-Colonels.

Lieut. G. B. Macaulay was promised a Brevet Majority on promotion to the rank of Captain.

Lieuts. A. G. Stevenson, H. L. Pritchard, R. Blakeney, H. A. Micklem, G. C. M. Hall, and E. R. Midwinter were awarded the D.S.O.

During the time that the Egyptian Army was engaged upon the reconquest of the Sudan, a small French expedition had been despatched in 1896 from the French Congo under the command of Captain Marchand, with the object of marching across Africa towards Abyssinia. After a long and difficult journey, Marchand had arrived at Fashoda on the White Nile in July, 1898, just at the time that Kitchener was making the arrangements for the advance against Omdurman. The news that the French had occupied Fashoda, and had constructed a fort at

that place, was brought to Omdurman shortly before its capture, by a steamer which had been sent up the White Nile by the Khalifa to collect grain, and which had been fired at by the French garrison at Fashoda.

Lord Kitchener, on his arrival at Khartum, heard of the French expedition, and, as the matter was evidently serious, he decided to proceed up the White Nile and investigate the question in person. Starting from Khartum on September 8th, with five steamers and a considerable force, he arrived at Fashoda on the 18th, and hoisted the British and Egyptian flags on the old Egyptian forts. Having made it plain to Captain Marchand that the matter was one which could not be settled locally, but must be referred to the British and French Governments, he left a garrison at Fashoda, and returned to Khartum, giving passage to a French officer to communicate with his own government.

Negotiations between the two governments ended in an amicable conclusion being arrived at, and in the recall of the Marchand Expedition to France, and the acknowledgment on the part of that country that Fashoda was outside the sphere of French influence. This satisfactory result was in great part due to the tact and discretion shown by Lord Kitchener and the officers under him, in dealing with a delicate question, which, if less carefully handled, might have led to serious international difficulties.

Although the main body of the Khalifa's army had been annihilated at the Battle of Omdurman, parties of Dervishes still held out in the remoter districts, and of these one of the most important was the army commanded by the Emir Ahmed Fedil, a staunch supporter of the Khalifa, who was stationed in the district of Gedaref, between the Blue Nile and the Atbara.

At the time of the advance of the Anglo-Egyptian army, Ahmed Fedil was marching to the assistance of the Khalifa with a force of 8,000 men, and had reached Rufa'a on the Blue Nile, when he heard the news of the capture of Omdurman and halted to decide upon his further action.

Meantime Colonel Parsons, R.A., who, as has already been mentioned, was in command of the garrison at Kassala, and

who had heard on September 5th, 1898, of Lord Kitchener's victory, decided to take advantage of the absence of Ahmed Fedil and his army, and to capture Suk Abu Sin, the principal place in the Gedaref district, by a *coup de main*. He therefore formed a flying column of 1,400 men and started from Kassala for the Gedaref district on September 7th. The force consisted of 450 Egyptian soldiers, a local Arab battalion, which had been taken over from the Italians when the transfer was made in the preceding year, and a body of Arab irregulars, under the command of Major H. M. Lawson, R.E., who had joined the Kassala garrison in the preceding April, and had been severely wounded in a skirmish with the Dervishes on the Atbara.

Colonel Parsons' column reached the Atbara at El Fasher on September 9th, and found the river in flood and 400 yards in width, so that it was no easy matter to effect a crossing; but boats and rafts were skilfully improvised, and, as soon as the whole force had passed over, the march on Gedaref was resumed. The Dervish outposts were sighted on September 21st, and it was then ascertained that, instead of a small garrison, Ahmed Fedil had left 3,500 men, more than double the strength of the Egyptian column.

Colonel Parsons decided that the wisest course was to attack at once, and, after a severe action, which was admirably conducted, he completely defeated the Dervishes and captured Suk Abu Sin. The village was immediately put in a state of defence in anticipation of an attack by Ahmed Fedil, who had returned with his main army on hearing the news of Colonel Parsons' advance. The attack was made on September 28th, but was successfully repulsed and the Emir retreated some distance. A relieving force, under Colonel Collinson, was despatched from Khartum to reinforce Colonel Parsons, and Ahmed Fedil, seeing that there was no further chance of reoccupying Gedaref, retreated southwards with the intention of crossing the White Nile and joining the Khalifa in Kordofan. After some weeks' hesitation, he attempted to cross the Blue Nile near Rosaires on his westward journey, where he was completely defeated by Colonel Lewis on December 26th, and succeeded with difficulty in escaping with a few followers.

For his services in the Gedaref Campaign Major Lawson, R.E., was given a Brevet Lieutenant-Colonelcy.

In January, 1899, an arrangement was made between the British and Egyptian Governments that the Sudan was to be ruled conjointly by the two powers, and that the chief of the executive authority was to be a Governor-General, who was to be appointed by the Khedive on the recommendation of the British Government. The first Governor-General nominated under the new *régime* was Lord Kitchener, who, at the same time, continued to occupy the position of Sirdar of the Egyptian Army.

Although the greater part of the Sudan had been restored to peace as a result of the Battle of Omdurman, the Khalifa Abdallah, who was supported by Ahmed Fedil and other Emirs, continued to hold out in Southern Kordofan, and had collected a force of about 10,000 Dervishes. As it was of great importance that this last spark of the rebellion should be crushed out as soon as possible, Lord Kitchener ordered Colonel Sir F. Wingate, R.A., in the autumn of 1899 to take command of a column of 3,500 men and march into Kordofan against the Khalifa and his army. Lieut.-Colonel Talbot, R.E., was attached to the column as Director of Military Intelligence, and Major Gorringe, R.E., had the command of an irregular Sudanese battalion. Both these officers were highly commended in despatches for the manner in which they fulfilled their duties.

Sir F. Wingate and his column left Fachi Shoya on November 21st, and soon came in contact with the Dervishes. On the following day Ahmed Fedil's camp was captured, but he, with the bulk of his force, retreated, and joined the Khalifa. Wingate immediately started in pursuit, and, on November 24th, attacked and completely defeated the Dervishes, of whom 1,000 were killed and wounded, and the greater part of the remainder were taken prisoners.

As the end of the battle was very dramatic, it is better to relate it in Wingate's own words :—

"The Khalifa, having failed in his attempt to reach the rising ground where he had forestalled him, had then endeavoured to make a turning movement which had been crushed

by our fire. Seeing his followers retiring, he made an ineffectual attempt to rally them, but, recognizing that the day was lost, he had called on his Emirs to dismount from their horses, and, seating himself on his *furwa* or sheepskin—as is the custom of Arab chiefs, who disdain surrender—he had placed Khalifa Ali Wad Helu on his right, and Ahmed Fedil on his left, whilst the remaining Emirs seated themselves round him, with their bodyguard in line some twenty paces to their front; and in this position they had unflinchingly met their death. They were given a fitting burial, under our supervision, by the surviving members of their own tribes."

So ended the Sudan Rebellion, a rebellion that had lasted 18 years, and that had caused an incalculable amount of misery and death, in consequence of not having been grappled with effectually in the early stages. The one bright spot in the upward progress of that rebellion was the heroic defence of Khartum by the late General Gordon, an officer of the Royal Engineers, who, for ten months, kept back the advance of the Dervishes, and saved Egypt from invasion.

And it was in great part due to his brother officers of the Royal Engineers, that, 14 years after his death, the rebellion was finally suppressed and the country, for the sake of which he died, was at last restored to peace and security. Lord Kitchener, of course, by the skill and determination with which he conducted the operations to a successful termination, deserves the principal credit for the happy conclusion of the campaign. But it must not be forgotten that a large part of the work was carried out by other officers of the Royal Engineers, especially those who had charge of the construction and maintenance of that railway, without which, it is fair to say, the campaign could not have been conducted at all.



## CHAPTER IV.

## THE SOUTH AFRICAN WAR, 1899--1902.

Origin of the South African War—The Plan of Campaign—Details of the Force of Royal Engineers sent to South Africa—Distribution of the British and Boer Forces—Distribution of the Royal Engineers in October, 1899—The Campaign in Natal—The Siege of Ladysmith—Attempts to relieve Ladysmith—Advance of the Boers into Cape Colony—Investment of Kimberley—British Advance to the Modder River—The Operations in Cape Colony—Capture of the Bridges on the Orange River—Renewed Attempts to relieve Ladysmith—Spion Kop—The Relief of Ladysmith—Lord Roberts' Advance through the Orange Free State—The Relief of Kimberley—Paardeberg—Occupation of Bloemfontein—Work on the Railways in South Africa—The Telegraph Service—The Rebellion in Cape Colony—Additions to the Force of Royal Engineers in 1900—The Defence of Wepener—The Advance to Pretoria—Concentration of British Troops in the Transvaal—The Occupation of Pretoria—The Brandwater Basin—Advance to Komati Poort—Lord Kitchener appointed to succeed Lord Roberts—The Column System of Warfare—Blockhouses—End of the South African War—List of Royal Engineer Officers decorated and promoted for their Services in the War.

In the following short account of the work done by the Royal Engineers during the War in South Africa, it is of course impossible to give a detailed history of the campaign, and the general operations will only be referred to in so far as is necessary in order to explain the part taken by the Royal Engineers; but, even of this, only a *résumé* can be given, as the work covered so wide a field, and occupied so long a time that volumes, rather than a single chapter, would be required to do it justice.

For some years previous to the commencement of the war, which led eventually to the occupation and annexation of the two Boer Republics, political affairs in South Africa had been

in an unsatisfactory condition, especially after the unsuccessful raid from Bechuanaland into the Transvaal in January, 1896.

From that date onward, many of the Boers were of opinion that a war with Great Britain was inevitable, sooner or later, and preparations for it were made by the Transvaal Government, especially by the importation of large quantities of arms and ammunition, an importation which was unchecked either by the British or the Cape Government, although the object for which the arms were intended could never have been doubtful. The British Government, on the other hand, made little or no preparation for the coming struggle, and, in consequence, was not ready when hostilities actually commenced; it was also hoped that, even if war with the Transvaal could not be avoided, the Orange Free State would remain neutral, an expectation that was not fulfilled.

In June, 1899, when an attempt to arrive at a *modus vivendi* between the British and Transvaal Governments failed, the total garrison in South Africa was less than 10,000 men, of whom 4,000 were stationed in Cape Colony, and 6,000 in Natal. At that time Colonel W. G. Morris was Chief Engineer at the Cape, and Lieut.-Colonel W. F. N. Noel was Commanding Royal Engineer in Natal, while the only regimental unit in the Colonies was the 29th Fortress Company, commanded by Captain E. F. Taylor, which was stationed at Cape Town, and had been organized and equipped to act as a Field Company in case of war. As, however, such a force of Engineers was wholly insufficient even for the comparatively small British Army then in South Africa, the 23rd Field Company, under Major S. R. Rice was embarked for Natal on June 10th, and was followed by the 7th Field Company under Bt. Lieut.-Colonel W. F. H. S. Kincaid, and the 8th Railway Company under Captain W. R. Stewart, which sailed for the Cape in July. These companies were the advance guard of the great British army, which, as events proved, was shortly to be sent to South Africa. On its arrival in Natal, the 23rd Company proceeded to Ladysmith, where the bulk of the British troops was stationed, as it was at the point of junction of the line of railway, leading north through Natal, with the branch line, which crossed the

Drachensberg Mountains to Harrismith in the Orange Free State.

The failure of the Bloemfontein Conference to effect a settlement, and the unsatisfactory correspondence between the two Governments, which followed in July and August, 1899, brought the crisis nearer, and, in September, considerable reinforcements were sent to South Africa, including a force of 5,500 men from India, who disembarked at Durban, and 5,000 from England and the Mediterranean, of whom 3,000 were landed at the Cape, while the remainder joined the Natal garrison. Among the troops sent to Natal were the headquarters, and one section of the Telegraph Battalion, commanded by Major W. F. Hawkins, and the 2nd Balloon Section, under Major G. M. Heath, both of which landed at Durban just before the commencement of the war.

On September 27th, President Kruger ordered the mobilization of the Boer forces in the Transvaal, and the same day President Steyn informed Sir A. Milner, the British High Commissioner in South Africa, that the Volksraad of the Orange Free State had decided to join the Transvaal in case of hostilities. The British Government, on the other hand, made arrangements, during the month of September, to send a complete Army Corps to South Africa, under the command of General Sir Redvers Buller, while General Sir George White, then Quartermaster-General, was selected for the command of the army in Natal. The general plan of campaign proposed was, that while Sir G. White defended Natal from a Boer invasion, Buller, with the Army Corps, was to advance through Cape Colony along the line of railway, and, crossing the Orange River at Norval's Pont, to move on Bloemfontein and Pretoria. It was also decided to send a large force to the Cape, in addition to the Field Army, to take charge of the line of communications, and to strengthen the garrison already in the Colony, a necessary step, as it was known that many of the Dutch colonists sympathized with the Boers, and were likely to give trouble, as they actually did, and to an extent much greater than had been anticipated.

The Royal Engineers, who were detailed for service with the

expeditionary force, and the names of the officers commanding the regimental units were as follow :—

*Chief Engineer.*—Colonel (local Major-General) E. Wood, c.B.;  
*Staff Officer.*—Lieut.-Colonel E. H. Bethell; *A.D.C.*—Major R. S. Curtis.

#### CAVALRY DIVISION.

*Field Troop.*—Brevet Major A. G. Hunter-Weston.

#### FIRST INFANTRY DIVISION.

*Commanding Royal Engineer.*—Lieut.-Colonel C. K. Wood.  
*17th Field Company.*—Major H. H. Massy.

#### SECOND INFANTRY DIVISION.

*Commanding Royal Engineer.*—Lieut.-Colonel J. B. Sharpe.  
*11th Field Company.*—Major G. F. Levenson.

#### THIRD INFANTRY DIVISION.

*Commanding Royal Engineer.*—Lieut.-Colonel A. C. Foley.  
*12th Field Company.*—Major A. Graham Thomson.

#### ARMY CORPS TROOPS.

*Commanding Royal Engineer.*—Lieut.-Colonel C. A. Rochfort-Boyd.

*Bridging Battalion, A Troop.*—Major J. L. Irvine.

*1st Telegraph Division.*—Captain E. G. Godfrey-Faussett.

*1st Balloon Section.*—Captain H. B. Jones.

*26th Field Company.*—Major W. F. H. Stafford.

*1st Field Park.*—Captain R. N. Harvey.

#### LINES OF COMMUNICATION.

*Colonel on Staff.*—Colonel H. H. Settle, c.B., d.s.o.

*Director of Railways.*—Brevet Major (local Lieut.-Colonel) E. P. C. Girouard, d.s.o.

*Director of Telegraphs.*—Lieut.-Colonel R. L. Hippisley.

*10th Railway Company.*—Captain G. S. McD. Elliot.

*6th Fortress Company.*—Captain H. Broke.

- 20th Fortress Company.*—Captain C. S. Wilson.  
*31st Fortress Company.*—Captain F. G. Fuller.  
*42nd Fortress Company.*—Captain G. M. Kirkpatrick.  
*45th Fortress Company.*—Captain G. P. Scholfield.

Of the Fortress Companies sent out for service on the Lines of Communication, the first four were in support of the Railway Companies, while the 45th Company was detailed for Steam Road Transport, a new branch, of which Lieut.-Colonel J. L. B. Templer, 7th Battalion King's Royal Rifles, who was Chief of the Balloon Factory at Aldershot, had been appointed Director.

Besides the officers whose names are given above, and those attached to the regimental units, a large number of additional officers were sent to assist in the various duties, and, by December 1st, 1899, the total force of Royal Engineers in South Africa had been raised to 151 officers, and 3,279 non-commissioned officers and men.

On October 7th the orders for mobilization of the Army Corps, and of the troops for the Lines of Communication were issued, and the reserves were called out. Two days later, an ultimatum was forwarded by President Kruger, and concurred in by President Steyn, in which the British Government were called upon to withdraw all troops that had been sent to South Africa since the preceding 1st June, to land no more reinforcements, and instantly to remove all troops stationed on the borders of the two Boer Republics. It was also demanded that a reply should be sent within two days, and that questions in dispute should be referred to international arbitration. This was really a declaration of war, disguised under the appearance of a desire for peace, and it was sent at a time when the Boers were ready to fight, while the British preparations were still far from complete, so that the chance of gaining an initial success was on the side of the former.

At that time the Boer forces were distributed as follows :—General Joubert was close to Laing's Nek on the northern frontier of Natal with 11,500 men, while Meyer had about 3,000 men on the north-east of Natal, and 9,500 men of the Orange Free State Army were ready to advance from the

west on Ladysmith through the passes of the Drachensberg Mountains. On the western side of the Boer Republics, 7,000 men of the Free State, and 1,400 Transvaal burghers were approaching Kimberley, while 7,000 of the latter, under Cronje, were preparing to capture Mafeking. The remainder of the Orange Free State Army were guarding the southern frontier of the State from Orange River Station to Basutoland, and the rest of the Transvaal forces were distributed along the northern and eastern borders. The total strength of Transvaal burghers in the field was about 27,000, and of Free State burghers about 21,000, but it is difficult to fix the number exactly. The Boer plan of campaign was to invade Natal, capture Ladysmith, Pietermaritzburg and Durban, and to seize the important towns of Kimberley and Mafeking, while checking the advance of the British Army Corps into the Orange Free State.

Immediately before the outbreak of hostilities the British forces, on the other hand, were considerably less. In Natal, under Sir G. White, were 13,000 British troops, of whom the majority were in Ladysmith; 4,000 men, under Major-General Sir W. P. Symons were at Dundee in the north of Natal, and the remainder at Pietermaritzburg and other places south of Ladysmith; in addition to these were about 2,800 local troops, which brought up the total strength in Natal to 15,800. Of the Royal Engineers, the 23rd Field Company was at Ladysmith, with the exception of one section, under Lieut. E. V. Turner, which was attached to the advance guard at Dundee, and the Telegraph and Balloon Sections reached Ladysmith on October 27th, just before the communications were interrupted. In Cape Colony, under Lieut.-General Sir F. Forestier Walker, there were 5,200 British, and a small number of Colonial troops, with which he had to arrange for the defence of the frontier, many hundred miles in length, and to restrain the Dutch in the Colony from rising to assist their friends in the Boer Republics. All that could be done, under the difficult circumstances, was to place garrisons in Kimberley and Mafeking, to hold the railway bridge crossing the Orange River near Hopetown, and to occupy the important railway junctions at De Aar, Naaupport, and Stormberg.

The small force of Royal Engineers, then in Cape Colony, was distributed as follows:—The 7th Field Company was sent to Orange River Station, with one section of 50 men, under Lieut. R. L. McClintock, detached to Kimberley, where it rendered very valuable service during the siege. The 29th Company was divided, the headquarters and two sections being at Naauwport Junction, one section at De Aar, and the fourth section at Stormberg. The 8th Railway Company, which had landed on August 5th, and had utilized the two available months by working on the Cape Government railways, was concentrated at De Aar Junction, and manned two armoured trains, which had been constructed in the shops at Cape Town, and were used for patrolling the line. The company was reinforced by about 400 employés of the Orange Free State Railway, who had refused to join the Boers, and who took service under Captain Stewart for work on the British railways.

The Boer ultimatum expired at 5 p.m. on October 11th, and, the following morning, the advance guard of General Joubert's Army crossed the frontier into Natal, while, on the same day, Cronje commenced the investment of Mafeking, and cut off its communication with Cape Town. On October 14th, the railway to Kimberley was also cut, and the siege of this town, which was held by Colonel R. G. Kekewich, with a garrison of about 4,500 men, commenced a few days later. Of this garrison only 640 were British troops, including the section of the 7th Field Company already mentioned. Captain W. A. J. O'Meara, who had charge of the Intelligence Department, and was Director of Telegraphs, and Lieut. D. S. McInnes, who superintended the Engineer operations for the defence, were employed on the staff of Colonel Kekewich, who spoke, in his despatches, in the highest terms of the manner in which these officers carried out their respective duties, and, in the evidence which he gave before the Royal Commission on the South African War, described Lieut. McInnes as the most capable junior officer he had ever met.

Ladysmith, which occupied so important a place in the early part of the war, had been originally selected in 1897 as the station for part of the Natal garrison, because it occupied a

convenient position at a railway junction. There seems, however, to have been no idea of making it defensible, and no steps had been taken to construct any kind of fortifications round it; indeed, judging from the evidence upon the subject, no one seems to have thought there was any probability of its ever being attacked. But, during the months preceding the outbreak of hostilities, great quantities of stores and food supplies had been collected there, and, when the reinforcements arrived in Natal in September and October, 1899, the larger part of the troops were sent to Ladysmith, which thus became, one might say almost by accident, the most important military station in the Colony.

The 23rd Field Company, commanded by Major S. R. Rice, arrived in Ladysmith on July 14th, and was employed on work in connection with the military cantonment and hospitals until the declaration of war, when the exposed position of the place became evident, and preparations for putting it in a state of defence were commenced. No. 1 Section, under Lieut. E. V. Turner, which was with General Symons' force at Dundee, took part in the Battle of Talana Hill, and in the retreat to Ladysmith, rejoining the company on October 26th. After the Battle of Lombard's Kop on October 30th, the British force was concentrated in and close to the town, which was surrounded by the Boers, communication with the outside world being cut off on November 2nd. From that date until the relief of the place on February 28th, 1900, the 23rd Company was continuously employed in constructing and strengthening the works of defence. Major Rice was appointed Commanding Royal Engineer, and an officer of the company was placed in charge of each section of the defences.

In consequence of the heavy artillery fire kept up by the Boers, work had to be carried out almost entirely by night, and under most unfavourable conditions, as the ground was difficult, and the supply of tools inadequate. As the siege went on the sappers became so weak from sickness and want of food that they had to be taken to their work in waggons, but such determination and self-sacrifice were displayed by all as to receive the highest praise from Sir George White. A large



number of batteries, magazines and bombproofs were constructed, and lines of abattis and wire entanglements were made, especially round the positions of Waggon Hill and Cæsar's Camp, to the south of Ladysmith, which were the key of the defences on that side of the town. Electrical and mechanical mines were improvised, while roads had to be made to various points, and two bridges were built over the Klip River.

The 2nd Balloon Section, under Major G. M. Heath, did excellent work during the siege. A balloon was filled on October 30th, and, on that day, was usefully employed during the Battle of Lombard's Kop, especially in directing the artillery fire. Two balloons were sent up on the 31st, both of which were hit by fragments of shell, but no serious damage was done. During the month of November the balloons were frequently used, and gave good information with regard to the position and movements of the Boers, who particularly disliked this new implement of war. Unfortunately, as the siege went on, it became impossible to obtain gas of suitable quality, and work with the balloons had to be given up, after which the section was employed on the defence works, especially at Waggon Hill and Cæsar's Camp.

As the artillery fire of the Boers was very harassing to the garrison, on the night of December 7th Major-General Sir A. Hunter made an attack on Gun Hill, 3 miles east of Ladysmith, where the enemy had mounted a 6-in. Creusot gun, and a 4·7-in. howitzer. The small British force captured the position and drove off the Boers while Captain G. H. Fowke, and Lieut. Turner, with a few sappers, destroyed the guns with gun cotton. Three days later, Lieut. R. T. Digby Jones, who accompanied a column which made a night attack on Surprise Hill, succeeded in destroying another 4·7-in. howitzer. On this occasion there was some severe fighting and the British lost five officers and 59 men killed and wounded.

The first attempt, which Sir Redvers Buller made on December 15th to relieve Ladysmith, was unsuccessful, and the garrison learned that they could not expect assistance from without for a considerable time. But they held on with

great determination, and, as the Boers were afraid to attack the place, nothing of importance occurred up to the end of the year. The Boer artillery fire, however, caused the loss of 14 officers and 59 men, while the number of sick, especially from enteric fever, rapidly increased, until, on December 30th, there were 1,650 officers and men in hospital and the death rate had risen to 23 per week.

Early in January, 1900, Sir Redvers Buller determined to make another attempt to relieve Ladysmith, and the Boers, having had information of this, decided to endeavour to capture the place before help could reach it, and arranged to make a vigorous attack on Waggon Hill on January 6th. With this object a force of about 5,000 burghers was collected south of the position during the night of the 5th, of whom 2,000 were to form the storming column, which was intended to seize the crest of the hill before daylight. On Waggon Hill there was a small garrison of the Imperial Light Horse, and also a detachment of the 23rd Field Company, with a working party of Gordon Highlanders and sailors, under Lieut. Digby Jones, who had come to construct emplacements for two guns on the summit of the hill. Lieut. G. B. B. Denniss, who had charge of this section of the defences, was also on the ground.

About 2.45 a.m. the Boers advanced to the attack, when Digby Jones called to his men to stand to their arms, opened fire, and checked them. Both the officers of the Imperial Light Horse were wounded, and Jones was in command until 5 a.m. when part of the Gordon Highlanders arrived in support, and by 10.15 a.m. the attack ceased and the Boers appeared to have been beaten off. But, early in the afternoon, the Free State Boers determined to make another attempt on Waggon Hill, and a party, led by Commandant de Villiers, succeeded in reaching the crest at a point when the sappers were having their dinners. Digby Jones seized a rifle, rushed on the Boers, and shot de Villiers. He then proceeded to encourage the infantry, who had been shaken by the sudden attack, and, while so engaged, was shot, and Denniss was also killed a few minutes afterwards. Some severe fighting followed, and at length the Boers gave up the attempt to capture the hill and retired.

The Royal Engineers had lost two officers and six men killed, and five men wounded, out of the detachment 33 strong.

The gallantry of Lieut. Digby Jones, on this occasion, was so conspicuous, that, as stated in the *London Gazette* of April 19th, 1901, he "would have been recommended for the Victoria Cross had he survived, on account of his conspicuous bravery and gallant conduct in leading the force which reoccupied the top of the hill at a critical moment." Although Jones unfortunately did not survive to receive the much-valued Cross himself, it was given to his relatives by command of His Majesty King Edward.

During the months of January and February, 1900, the Boers, disheartened by the failure of their attempt to capture Waggon Hill, confined themselves to the investment of Ladysmith, in the hope that sickness and starvation would bring about the surrender of the garrison. They had also to devote much of their energy to resisting the efforts of Sir Redvers Buller to relieve the place, efforts which finally succeeded on February 28th, when the advance guard of Buller's force joined hands with the garrison, and brought the siege to an end, a siege which had caused a total loss to the defenders of 100 officers and 1,391 men, killed, wounded and died of disease.

During the progress of the Siege of Ladysmith serious events had taken place in the Cape Colony. On November 1st, 1899, the Boers of the Orange Free State seized the railway bridges over the Orange River at Norval's Pont and Bethulie, and then invaded British territory. Sir Redvers Buller, who had just landed at Cape Town, decided to make no attempt to check the Boer advance, and ordered the garrisons at Naauwport and Stormberg to fall back on De Aar Junction and Queenstown, thus abandoning a large district in the north of Cape Colony to the enemy. This was rather an unfortunate decision, as, at that time, the greater part of the Orange Free State forces were occupied with the investment of Ladysmith and of Kimberley, and President Steyn was half-hearted with regard to the policy of invading Cape Colony. The Boers, when they crossed the frontier, moved slowly, and did not reach Colesberg until November 14th, when they halted. Naauwport was

reoccupied by the British on the 19th, and Major-General French took command of the Naauwport district. To the eastward, the Boers who had crossed the Orange River at Bethulie and Aliwal North, took possession of Burghersdorp on November 15th, and of Stormberg Junction on the 26th, thus cutting the railway communication between French and Major-General Sir W. Gatacre, who was in command of the British troops at Queenstown.

During the month of November the greater part of the Army Corps arrived in South Africa. This force, as has already been mentioned, was originally intended to have advanced across the Orange River to Bloemfontein, but the course of events led to the abandonment of the plan of campaign, and Sir Redvers decided to give up the scheme of marching north into the Free State, and to confine his attention, for the time being, to the relief of Ladysmith and of Kimberley, taking personal command of the former operation, which he regarded as the most pressing, while Lieut.-General Lord Methuen, who commanded the First Division, was put in charge of the force destined for the relief of Kimberley and Mafeking.

Sir Redvers Buller pointed out to the Secretary of State for War the necessity for sending out more troops, and, in consequence, another infantry division, under the command of Lieut.-General Sir C. Warren, was embarked at the end of November. As the troops in Ladysmith were regarded as forming the Fourth Division, that commanded by Sir C. Warren was numbered as the Fifth Division. Lieut.-Colonel G. H. Sim was appointed Commanding Royal Engineer, and the 37th Field Company, under Captain W. A. Cairns, was attached to the division, and landed in Natal on December 23rd.

As the operations, which were commenced for the relief of Ladysmith and of Kimberley, were quite independent of each other, it is necessary to describe them separately, and Lord Methuen's advance towards the latter place will be taken first. He arrived at Orange River Station on November 12th, and there organized the column of about 10,000 men, which was detailed to raise the siege of Kimberley. Lieut.-Colonel J. B. Sharpe was appointed Commanding Royal Engineer, and the regi-

mental units which were attached were the 7th and 11th Field Companies, the 8th Railway Company, the 31st Fortress Company, and a Telegraph Section.

The move northwards commenced early on November 21st, and, by the afternoon of the following day, the division arrived within 2 miles of Belmont Railway Station, where the Boers had decided to make their first stand on a range of hills commanding the railway. From this position they were driven on November 23rd, and the advance was continued, the Royal Engineers repairing the railway, which had been considerably damaged by the Boers before they retreated. On November 25th they made a further stand at Graspan (where the 8th and 11th Companies assisted in bringing the naval guns into action), and then retired to the Modder River, pursued by the British. On the 28th, the 7th Company was pushed on with an escort to endeavour to save the railway bridge over this river and were greeted by a salvo from the Boer artillery, which had taken up a position on the north bank, and it was found that the bridge had been destroyed. Major-General Pole-Carew, however, succeeded in crossing with a small force near Rosmead to the west of the bridge and attacked the Boers. Major Levenson accompanied him with a party of 300 officers and men of the 8th, 11th and 31st Companies who took an active part in the fight. The following day the main body crossed the river, and the Engineers devoted themselves with great energy to the construction of a temporary bridge to take the place of that which had been destroyed by the Boers. It was no light task but was satisfactorily completed by December 10th.

As the work on the line of railway between the Orange and Modder Rivers was very heavy, the 29th Company was ordered up from De Aar to assist, and, on December 9th, the 1st Balloon Section, under Captain H. B. Jones, joined the division, just in time to take part in the Battle of Magersfontein on the 11th, when Lord Methuen made an attempt, which unfortunately failed, to break through the Boers and relieve Kimberley. On this occasion, the 7th Company was attached to the Brigade of Guards and 12th Lancers in the right attack, and the Balloon

Section was usefully employed in observing the enemy's positions, while the Telegraph Section kept up the communication with the different columns. It is recorded in the Official History of the War, that, " thanks to the help of the balloons, the howitzer battery obtained the range of the Boer ponies, concealed behind the ridge, and accounted for more than two hundred of them."

After the failure of the attack on the Boer position at Magersfontein, the British force returned to their camp, and, shortly afterwards, Lord Methuen received a telegram from Sir Redvers Buller, directing him to return to the Orange River, if he did not feel strong enough to advance to Kimberley. But Lord Methuen decided to hold his ground, and to wait further developments at the Modder River, a decision which proved very fortunate, having regard to Lord Roberts' campaign in February, 1900.

It is now necessary to return to the operations in the eastern part of Cape Colony, where, as has already been explained, General French had taken command at Naauwport on November 20th, while Sir W. Gatacre had arrived at Queenstown on November 18th. The spheres of operation of these two generals, though comparatively near to one another geographically, were completely separated strategically, in consequence of the Boers holding Stormberg Junction on the line of railway which connected them; and, while French was in direct railway communication with Cape Town, Gatacre had to use as his base East London, a port 600 miles to the eastward. His position was one of considerable difficulty. He had started from England in command of the Third Infantry Division, but, on the breaking up of the Army Corps by Sir Redvers Buller, the greater part of the division was sent to Natal, while Gatacre, its general, was left with only one of his own battalions. Including this, his total force consisted of about 2,000 British, and 1,000 Colonial troops, while, in front of him, the Boers, in considerable strength, held the country from Stormberg eastwards, threatening his right flank and his line of communication with East London.

On December 3rd, Lieut.-Colonel Foley, Commanding Royal

Engineer of the Third Division, and the 12th Field Company, under Major Graham Thomson, landed at East London and proceeded at once to Sir W. Gatacre's headquarters at Putterskraal between Queenstown and Sterkstroom, where the general was making preparations to drive the Boers out of Stormberg. The greater part of the 12th Company was detailed to take part in the operation and went by train to Molteneo on the afternoon of December 6th, as it was arranged that the British force was to make a night march from that place and surprise the Boers at Stormberg. Owing to various causes, the attack failed, and the British troops retired to Sterkstroom, where the 12th Company did good work in constructing defences at that place, and at advanced positions in front of it.

Major Cedric Maxwell, who had been sent from Cape Town to join Sir W. Gatacre, was appointed Commanding Royal Engineer of the Colonial Division under General Brabant on February 10th, 1900, and organized a detachment of the 12th Company under Company-Sergeant-Major Field, for service as a mounted troop, and they did excellent service with the division, which acted on the right flank of the British force at Sterkstroom. Brabant, who had about 1,800 men, marched on Dordrecht and captured it on February 16th, when the Boers retreated to a strong position at Laberschagrin Nek between Dordrecht and Jamestown.

Moving northwards, Brabant attacked this position on March 4th with two columns, Maxwell commanding the right one, which had the largest share in the fight. By a rapid night march Maxwell captured Spitz Kop, the key of the position, at daybreak, and held it vigorously, notwithstanding great efforts on the part of the enemy to dislodge him. The fight continued all that day, and until the following morning, when Maxwell ordered Captain A. L. Schreiber to attack the Boer trenches with a squadron of the Border Horse, which had just arrived from Queenstown. After a sharp struggle, in which Schreiber was wounded, the Boers gave up the contest, and retreated northwards, leaving their laager, with large numbers of cattle, in the hands of the British. The effect produced on the minds of the inhabitants of the district was most

satisfactory, as they had not believed it possible that the Boers could have been driven from so strong a position as Laberschagrin Nek. Taking advantage of this success General Brabant pursued the Boers to the Orange River, and seized the bridge at Aliwal North on March 10th.

After the successful action in front of Dordrecht, Sir W. Gatacre moved forward from Sterkstroom and occupied Stormberg on March 6th. The advance guard reached Bethulie on the 10th, when the Boers retreated over the Orange River, destroying the railway bridge as they retired. They had made preparations to blow up the road bridge also, but their attempt was frustrated, and Captain P. G. Grant, R.E., and Lieut. Popham, of the Derbyshire Regiment, removed the dynamite charges. The saving of this bridge was a matter of great importance, as it had to be used as a temporary bridge for the trains for some time until the railway bridge could be restored.

When General French took over the command at Naauwport Junction on November 20th, 1899, he found that the Boers were holding a position at Arundel, on the railway south of Colesberg, too strong to be attacked with the small force at his disposal. But, by December 7th, reinforcements had arrived, bringing up the total strength to about 2,000, when an advance was made to Arundel, which was captured and made the headquarters instead of Naauwport. During the month of December, the Field Troop, under Major Hunter-Weston, a Telegraph Section, under Lieut. H. L. Mackworth, a Section for Photographic Reconnaissance, under Lieut. C. H. Foulkes, and the 26th Field Company, under Major W. F. H. Stafford, joined General French's force at Arundel, the company finding detachments for work at Orange River, De Aar, and Hanover Road Stations. After the abandonment of Rensburg by the Boers on December 27th, the British headquarters were moved forward to that place, and then General French began to make arrangements for turning the enemy out of Colesberg, which was strongly held. A force of cavalry, with a section of the Field Troop under Captain C. O. Bowen, was sent forward on December 31st to occupy the hills west of the town, and suc-



ceeded in establishing a defensive position which was immediately garrisoned by part of the Berkshire Regiment, and connected by telegraph with Rensburg.

Early in January, 1900, Slingsfontein, north-east of Rensburg, was occupied by the cavalry, and, on the 11th, a bold attempt made by Major Hunter-Weston to cut the railway between Norval's Pont and Colesberg just failed to succeed in consequence of the arrival of Boer reinforcements from the Free State.

Fighting round Colesberg continued until February 2nd, when the Field Troop was brought together at Rensburg, and moved to Orange River Station to make preparations for the Cavalry Division, which was to be concentrated there in order to take part in Lord Roberts' advance to Bloemfontein. General French followed shortly afterwards, taking the greater part of his force with him, and was succeeded in the command at Rensburg by Major-General Clements, who, with his reduced strength, could not continue the active operations against Colesberg, and fell back on Arundel. The 26th Company was also sent to Orange River Station, and was replaced by the 47th Fortress Company, commanded by Major P. R. Burn-Murdoch, which had just come out from England, and had reached Naauwport on February 26th.

The advance of Lord Roberts from the Modder River to Paardeberg led to the withdrawal of the Boers from the places south of the Orange River, and, when they evacuated Colesberg, General Clements advanced to Norval's Pont, where it was found that the bridge had been destroyed, and Major Burn-Murdoch was ordered to make arrangements for bridging the Orange River. Fortunately C Troop of the Bridging Battalion, under Captain G. A. Travers, had arrived with a supply of pontoons and other material, and the bridge was completed on March 15th by the Troop and the 47th Company, and General Clements with his column crossed into the Orange Free State. The work was arduous, as the river was more than 250 yards in width, and the number of pontoons was insufficient, and had to be supplemented with trestles and barrel piers.

Before describing the Engineer operations in connection with Lord Roberts' march to Pretoria, it is necessary to return to Natal to relate the part taken by the Royal Engineers in the campaign for the relief of Ladysmith. When that place was invested by the Boers in November, 1899, the greater part of the British troops then in the Colony were shut up within its defences, and the remainder, about 4,000 in all, British and Colonial, were wholly insufficient for the protection of the southern part of Natal. Of these there were about 2,300 men under Brigadier-General Wolfe Murray at Estcourt on the line of railway, 30 miles south of Ladysmith, and there were small garrisons at Pietermaritzburg, the capital, and Durban, the seaport.

As it appeared very probable that the Boers, while holding the Ladysmith garrison in check, would cross the Tugela, and advance on Pietermaritzburg, it became a matter of pressing importance to put this town in a proper state of defence. Colonel W. F. N. Noel was Commanding Royal Engineer, and with him were Lieut.-Colonel H. E. Rawson, Lieut. R. E. Meyricke, and three foremen of works; but there were no sappers available, as the 23rd Field Company was shut up in Ladysmith. A Pioneer Corps was therefore organized from the employes of the Natal Public Works Department, which rendered admirable service, and Lieut.-Colonel Sir Albert Hime, K.C.M.G., the Prime Minister of Natal, who had himself been a Royal Engineer officer, did everything possible to assist in the important work. A strongly entrenched position was constructed round the military cantonment, and earthworks were thrown up on commanding points, and connected by telephone with headquarters. Mines were laid out, and searchlights improvised, so that Pietermaritzburg was, in a short time, made capable of resisting any attack, but it was not put to the test, as the Boer leaders came to the conclusion that their forces were not strong enough both to besiege Ladysmith and invade Southern Natal.

The critical period came to an end on November 11th, when part of the Army Corps, which had been diverted from the Cape, began to arrive in Natal, and reinforced the garrison of

Estcourt. On November 26th the British headquarters advanced to Frere, where it was proposed to concentrate the force destined for the relief of Ladysmith. Shortly afterwards Lieut.-Colonel C. K. Wood, who had been appointed Chief Engineer of the relieving force, A Pontoon Troop, and the 17th Field Company arrived and had heavy work in connection with the cantonment of the troops, the question of water supply being especially serious. Searchlights were installed, and these proved of great value in communicating with the Ladysmith garrison by means of cloud-signalling.

Sir Redvers Buller, who had arrived at Cape Town on October 31st, 1899, and had decided to take personal charge of the operations for the relief of Ladysmith, reached Durban on November 25th, and, after remaining for a short time at Pietermaritzburg, went on to Frere, and assumed the command of the British force of over 19,000 of all ranks, which had been concentrated at that place. On the other hand, the Boer commandos, barring the road to Ladysmith, and stationed on the hills north of the Tugela in the vicinity of Colenso, where the railway crossed the river, were estimated at a total strength of from 6,000 to 8,000 men. The first attack on the Boer position was made on December 15th, but failed in its object. During the advance, the 17th Field Company was divided, the headquarters and one section being attached to the 2nd Brigade (Major-General Hildyard's) in the centre, and two sections to the 5th Brigade (Major-General Hart's) on the left flank. Lieut. Meyricke succeeded in reaching the road bridge at Colenso under heavy fire, and found that it was intact and had not been ruined by the Boers, and was available for use. But notwithstanding this, none of the British troops crossed the Tugela, as General Buller came to the conclusion that the Boer position on the north of the river was too strong to carry with the force at his disposal, and retired to Frere to wait for the Fifth Division, which arrived in the latter part of December, including the 17th Field Company, and a Section of the Telegraph Division under Lieut. R. J. Jelf. As there was no Balloon Section available, some balloons and gas tubes were borrowed from Cape Town, and a detachment was extemporized by Captain

G. E. Phillips, which did good service during the subsequent operations.

By January 8th, 1900, the British force at Estcourt and Frere had been raised to a strength of about 30,000 men, and Sir Redvers considered that he had a sufficiently large force to justify him in making another attempt to relieve Ladysmith. On this occasion, however, he decided not to attack the Boer position at Colenso in front, but to outflank it, by crossing the Tugela, in the vicinity of Potgieter's Drift, a point about 16 miles west of Colenso, from which a road led to Ladysmith round the right flank of the hills held by the Boers. Two divisions were detailed for the service, the Second commanded by Major-General Clery, and the Fifth by Lieut.-General Sir C. Warren. The 37th Field Company was attached to the former, and the 17th Field Company with A Pontoon Troop to the latter.

The roads from Frere through Springfield to Potgieter's Drift were bad, and crossed several streams, which had to be bridged with pontoons and trestles to enable the transport waggons to pass, so that, notwithstanding strenuous efforts, progress was slow, and the Boers, having learned the intentions of the British, had plenty of time to move their forces to the right, and form new entrenchments. On arriving at Potgieter's Drift, Buller decided that the enemy's position was too strong to attack in front, and ordered Sir C. Warren to move with his division to Trichard's Drift, four miles further west, where the latter arrived early on January 17th, and ordered Major Irvine to make preparations for bridging the Tugela. The place was a difficult one, as the banks were high and the stream ran swiftly, but careful arrangements had been made in advance to have all the required stores ready, and the bridge was completed within three hours of commencing work. A second bridge for the heavy traffic was at once put in hand, and completed by evening. By the following day, the whole of the Fifth Division and its transport had crossed the Tugela and established itself between the river and the hills, ready for advance. Meanwhile the 37th Field Company had established a ferry at Potgieter's Drift, by means of which part of the

Second Division crossed to the north side of the Tugela, and all was ready for the flank march to Ladysmith.

During the following four days attempts were made to drive the Boers from their positions on the hills opposite Trichard's Drift, but without success, and, on the evening of January 23rd, Sir C. Warren issued orders for the capture of Spion Kop, a projecting spur which commanded the Boer line of defence. Major Massy, with part of the 17th Field Company, was detailed to accompany the column, and, after a night march, reached the summit at 3.30 a.m. on the 24th, when the Boer picquet was driven off. The construction of entrenchments was immediately commenced, but the work was difficult, as the hill was rocky, and there was no suitable material with which to form the parapets. Shelter trenches were laid out in front and occupied by infantry. Soon after daylight the Boers opened fire from the hills around, and there were many casualties during the day, among whom were Major-General Woodgate, who was in command, and Major Massy, who was killed while rallying the infantry in the front trench, while Lieut. C. G. Falcon of the 17th Company was severely wounded. The situation became very critical, but reinforcements arrived, and the position was held all day under a very heavy fire. During the succeeding night Lieut.-Colonel G. H. Sim was sent with the rest of the 17th Company to make a road up the hill, and to construct epaulments for some naval 12-pounder guns, but, before they had arrived at the summit, Colonel Thornycroft, who had succeeded to the command, came to the conclusion that Spion Kop was untenable, and ordered all the troops to retire and abandoned the hill to the Boers.

On hearing of the failure at Spion Kop, Sir Redvers Buller decided to abandon the attempt to outflank the Boer position opposite Trichard's Drift and instructed Warren to withdraw the Fifth Division across the Tugela. Major Irvine was ordered to construct a new pontoon bridge, which was completed by A Troop on the morning of January 26th, while the 17th Company made the roads leading to it, and, after the whole of the Fifth Division had retired across the river, the bridge was rapidly dismantled, and A Troop proceeded to Potgieter's

Drift to prepare for bridging the Tugela at that place. Major Irvine was highly complimented by Sir Redvers Buller for the admirable manner in which the bridging operations had been carried out. The 17th Company also marched to Potgieter's Drift, and was there employed with the 37th Company in making a road for the transport of naval guns up Swart Kop, a commanding position south of the Tugela, opposite Vaalkrantz on the north bank, over which it was proposed to make another attempt to break through the Boers to Ladysmith.

On February 1st A Troop built two bridges over the Tugela, one at Potgieter's Drift, and another a little further east, under Swart Kop; the latter was at a difficult place as the banks were between 30 and 40 ft. in height and very steep. The orders for the attack on Vaalkrantz were given on February 5th, when a third bridge was built under heavy fire, but, notwithstanding this, it was completed in three-quarters of an hour, with a loss of eight sappers wounded. Major-General Lyttleton's Brigade then crossed the Tugela and captured the heights of Vaalkrantz after some severe fighting. The following day, the second bridge was taken down, and a fourth bridge was built immediately under the Vaalkrantz Ridge by A Troop.

The Boers continued to resist, and, on February 7th, Sir Redvers Buller came to the conclusion that it was impossible to approach Ladysmith by way of Vaalkrantz, and ordered the whole British force to retire to Chieveley Camp between Frere and Colenso. After all the troops and transport had crossed to the south bank of the Tugela, the bridges were dismantled, the pontoons and other stores packed, and A Troop and the two Field Companies marched back to Chieveley.

The attempt to get to Ladysmith by the roads west of Colenso having thus failed, Sir Redvers decided to try to force his way over the hills east of that place, and, as a preliminary measure, ordered the capture of Hlangwhane Hill, south of the Tugela, and it then became necessary, once more, to make arrangements for crossing to the north bank. Major Irvine selected a place where the river was about 100 yards wide, and a heavy bridge was built by A Troop under the artillery fire of the Boers, where the infantry crossed and attacked the heights

held by the enemy. Fighting went on with little intermission for four days, and it was then decided to remove the bridge to a point lower down the river. The bridge was dismantled during the night of February 26th, carried with great difficulty over the hill and re-erected on the new site in less than three hours on the morning of the 27th. The attack was then renewed and the Boers retreated, leaving the approach to Ladysmith open, when the relieving force marched in, and the siege was brought to a conclusion on February 28th, 1900.

During the time that the operations for the relief of Ladysmith were in progress, important events had taken place in the western zone of war. The news of the unsuccessful actions at Stormberg, Magersfontein, and Colenso, which have been referred to above, produced a great impression in England, and the British Government decided to send out Field Marshal Lord Roberts, as Commander-in-Chief in South Africa, with Major-General Lord Kitchener as Chief of Staff, and Colonel Sir W. G. Nicholson, K.C.B., R.E., as Military Secretary, while two additional Infantry Divisions were mobilized for service in South Africa. The Royal Engineers attached to these divisions were as follow :—

#### SIXTH INFANTRY DIVISION.

*Commanding Royal Engineer.*—Lieut.-Colonel P. T. Buston.  
*38th Field Company.*—Major A. W. Roper.

#### SEVENTH INFANTRY DIVISION.

*Commanding Royal Engineer.*—Lieut.-Colonel R. C. Maxwell.  
*9th Field Company.*—Major H. J. W. Jerome.

Lord Roberts arrived at Cape Town on January 10th, 1900, and, while leaving the operations in Natal to Sir Redvers Buller, began to make preparations for an advance into the Orange Free State. He decided, however, not to carry out the original plan of crossing the Orange River at Norval's Pont and proceeding along the line of railway to Bloemfontein, but to base his operations on the western railway at Modder River, where Lord Methuen was already established, and thence to march

across country to Bloemfontein, a distance of a little more than 100 miles, using waggons for transport. This change of plan naturally required the collection of a large number of vehicles, and it was not until February 10th that the Army Corps was organized and everything was in readiness for the start. The force was composed as follows :—

*Cavalry Division.*—Commanded by Lieut.-General J. P. D. French, consisting of three brigades of Cavalry ; two brigades of Mounted Infantry ; seven Royal Horse Artillery batteries ; the Field Troop and C Pontoon Troop, Royal Engineers.

*First Infantry Division.*—Lieut.-General Lord Methuen ; 26th Field Company.

*Sixth Infantry Division.*—Lieut.-General Kelly Kenny ; 38th Field Company.

*Seventh Infantry Division.*—Lieut.-General Tucker ; 9th Field Company.

*Ninth Infantry Division.*—Lieut.-General Sir H. E. Colville ; 7th Field Company.

The Ninth was a new division, formed out of troops in South Africa, and the 7th Company, which was attached to it, was one of the two Field Companies, already at Modder River under Lord Methuen. The Telegraph Division and 1st Balloon Section were also attached to the Army Corps.

The British force was concentrated along the railway from Graspan Station to the Modder River by February 10th, and on the 12th, the Cavalry Division marched by Ramdam to the Riet River, the Field Troop and C Pontoon Troop being with the centre brigade. It had been intended to cross at Waterval Drift, but this was found to be strongly held by the Boers, and the cavalry crossed at De Kiel's Drift, five miles higher up the river. They were followed by the Seventh Division, which arrived in the evening. The next morning, the cavalry started for the Modder River, and reached Klip Drift after a march of 36 miles. The Field Troop crossed the Modder, and accompanied the cavalry in the rapid march for the relief of Kimberley, which was reached late on February 15th after a skirmish north of Klip Drift, where the Boer position was carried by a cavalry charge, one of the brilliant episodes of the war.



C Pontoon Troop and the 38th Field Company arrived at the Modder with the Sixth Division on the 14th.

Kimberley having been thus relieved after a siege of four months, Lord Roberts devoted his attention to the Boer army under General Cronje, which had stopped Lord Methuen's advance, and which was, at this time, attempting to make good its retreat to Bloemfontein, along the north bank of the Modder River. Cronje succeeded in getting past the British force at Klip Drift, and formed a laager near Paardéberg Drift on the north bank of the river, while the British took up a position with the infantry on the south, and the cavalry on the north of the Modder and east of the Boer laager, so as to cut the road between Cronje and Bloemfontein. The Field Troop remained with the cavalry, while with the infantry were the 7th, 9th and 38th Field Companies, and the Balloon Section.

An attempt was made to capture the laager on February 18th, but it was not successful, and Lord Roberts, who had been away from the force at the time, decided, on his return, to reduce the Boers to submission by investment. Trenches were commenced and pushed on towards the laager both from east and west, the work on the east side being carried out by Lieut.-Colonel R. C. Maxwell with the 9th and 38th Field Companies, and that on the west by Lieut.-Colonel Kincaid and the 7th Field Company. By February 26th, the 19th Infantry Brigade and the 7th Company had made a trench nearly 500 yards long on the right bank of the Modder, and another trench on the left bank, and the approaches had got so close to the Boer entrenchments that it was decided to make a night attack on the latter. The assault was made by Major-General Smith-Dorrien with the 19th Brigade, of which the Royal Canadian Regiment and a detachment of the 7th Field Company under Lieut.-Colonel Kincaid formed the vanguard. The latter got within 100 yards of the Boer trenches without being observed, and then, about 3 a.m., a heavy fire was opened upon them, and the sappers with some of the Canadians succeeded in entrenching themselves close to the enemy's lines. By 5 a.m. the trench was completed, and fire was opened at short range on the Boers, who, after defending

themselves for a time, made proposals for surrender. Shortly afterwards, a white flag was hoisted over the main laager, and Cronje submitted unconditionally, feeling that resistance was no longer possible, and gave himself up to Lord Roberts, followed by the whole of his force, about 4,000 fighting men, who were sent as prisoners to Cape Town. The action of the 7th Company in this battle was highly commended by Lord Roberts, who inspected them the same day and congratulated them on their gallant conduct.

During the investment of Paardeberg, the Balloon Section had proved very useful, as ascents were constantly made, and the officers were able to sketch the Boer positions, and to direct the artillery fire upon the laager. The balloons were hit several times, but not seriously damaged.

The crushing defeat of Cronje on February 27th, followed by the relief of Ladysmith on the following day, completely turned the fortunes of the war, and greatly depressed the spirits of the Free State Boers when they found that the sphere of hostilities was transferred from the British colonies to their own country. But it was not possible for Lord Roberts to follow up his victory immediately and advance on Bloemfontein, as fresh supplies had to be collected in consequence of the capture of a large convoy, and the cavalry horses, which had been almost worked to death, stood in need of a rest before moving forward. During the halt, certain modifications were made in the organization of the British force, which had been strengthened by the arrival of the Guards' Brigade from Modder River Station, and other reinforcements, and had thus been raised to a total of about 32,000 men. The Boer Army, which had been collected to resist the advance, was estimated at about 14,000, and was believed to have taken up a position at Poplar Grove, on the south of the Modder River, 16 miles east of Paardeberg. As Lord Roberts was anxious to cut the communication of the Boers with Bloemfontein, the Cavalry Division was ordered to cross the river, and, on March 5th, the Field Troop constructed a raft to ferry the guns over, while the cavalry passed at a ford. The Balloon Section and part of the Telegraph Division were attached to

the Cavalry Division during the advance. The duty of watching the north bank of the river was allotted to the Ninth Infantry Division, and the 7th Field Company marched with the Highland Brigade on the right flank of the division. The 38th Company remained with the Sixth Division, while the 26th Company, which had been brought up from Modder River Station joined the Seventh Division, taking the place of the 9th Company, while the latter was detailed for work with the Corps Troops.

All was ready for an advance on March 6th, and, the following morning, the Cavalry Division started on its march round the left flank of the Boer position, while the Sixth Infantry Division attacked it in front, and, after some hard fighting, the enemy were compelled to retreat, but de Wet, who was in command, succeeded in re-forming them at Abraham's Kraal and Dreifontein, having managed to get away from Poplar's Grove before the cavalry could cut off his communications. After some further fighting the Boers retreated in disorder, and dispersed, leaving the way to Bloemfontein open to the British Army. General French then pushed on with the 1st Cavalry Brigade, with which were the 2nd and 3rd Sections of the Field Troop, and the 1st Section of the Telegraph Division, and, on the afternoon of March 12th, Lieut. J. R. E. Charles was sent forward with a small party to cut the railway south of Bloemfontein near Ferreira Spruit siding. The same evening Major Hunter-Weston was entrusted by General French with the task of cutting the railway north of Bloemfontein a dangerous duty, as it was necessary to ride round the east of the town through the Boer lines. Taking with him Lieut. Charles and three sappers of the Field Troop, together with Sergt. Englehart and two pioneers of the 10th Hussars, Hunter-Weston started at 1 a.m., and, after eluding the Boer patrols, and cutting the telegraph line, reached the railway at 4.30 a.m. and destroyed the lines with dynamite charges. The duty having been successfully accomplished, the party withdrew as quietly as possible, but came across a Boer patrol, which opened fire upon them. Hunter-Weston ordered his men to charge the enemy, and they succeeded in forcing their way through, but with considerable difficulty. This daring and successful exploit proved of great

importance, as it led to the capture of 35 locomotives, and over 100 carriages and waggon, which the Boers had been unable to remove on account of the break in the line.

There was little further resistance on the part of the Boers, and, on March 13th, Lord Roberts entered Bloemfontein with the British Army. The following day Lieut. C. R. Brown, of the Field Troop, was ordered to make a reconnaissance of the railway from Bloemfontein towards the Orange River to ascertain how far the line was intact, and also to obtain information as to the movements of the Boers in the southern part of the Free State. Taking an engine he passed through the British outposts, and reached Bethanie, 40 miles distant, where he learned that there was a strong force of the enemy at Edenberg, a few miles further south. Having telegraphed this information to headquarters, Brown continued to advance cautiously until within sight of Edenberg where the line was cut to prevent its use by the Boers. A small force was then sent from Bloemfontein to capture Edenberg, which surrendered and the following day Major-General Pole-Carew, who was in command, went on to Springfontein Junction, where he got into touch with Major-General Clements, at Norval's Pont, and Sir W. Gatacre at Bethulie. The whole line of railway was then in the hands of the British from Cape Town to Bloemfontein and became the line of communication for Lord Roberts' Army.

Some allusion has already been made to the work done by the Royal Engineers in connection with the railways in South Africa, but it is necessary to describe more fully the system under which the railways were maintained and worked during the war, as this formed a very important part of their duties, and the manner in which these duties were carried out added largely to the success of the military operations.

Prior to the war there were 4,628 miles of railway working in direct intercommunication with one another, of which 3,267 miles were in British South Africa, 388 miles in the Orange Free State, 918 miles in the Transvaal, and 55 miles in Portuguese territory. In Cape Colony the lines were in three sections, of which the western started from Cape Town, and passing by De Aar Junction, Orange River and Kimberley, joined the

Rhodesian Railway at Vryburg, and continued to Bulawayo. The Midland Section started from Port Elizabeth, and had two branches which united at Rosmead Junction, then, passing Naauwpoort Junction, where a branch line connected it with the Western Section at De Aar, the Midland Section reached the Orange River at Norval's Pont, where it joined the Orange Free State Railway, leading to Bloemfontein, and the Transvaal. The last, or Eastern Section of the Cape railways led from East London to Stormberg, where it connected with the Midland Section by a branch to Rosmead, reached the Orange River at Bethulie, and joined the Orange Free State Railway at Springfontein. In Natal, the main line ran from Durban, by Pietermaritzburg, Ladysmith and Newcastle, joining the Transvaal railway system at Charlestown, while a branch led from Ladysmith west to the Orange Free State.

As it was evident that the South African railways would be of the greatest importance during the war, it was decided by the British Government, when the despatch of the Army Corps was arranged, to form a Department of Military Railways, to take charge of the railway system, and Major E. P. C. Girouard, D.S.O., who had constructed the railway during the Sudan Campaign, and was President of the Egyptian Railway Administration, was appointed Director of Railways for the South African Field Force, while a number of other Royal Engineer officers were selected to serve as Assistant Directors and as staff officers in various capacities. It has already been mentioned that the 8th and 10th Railway Companies, and the 6th, 20th, 31st, and 42nd Fortress Companies were sent out to assist in the railway work.

Major Girouard landed at Cape Town on October 23rd, 1899, and at once took steps for the organization of the new department, in which he was cordially assisted by the officials in charge of the Cape Government railways. The work was divided under the following heads :—

1. The control and working of the railways in British territory.
2. Arrangements for the rapid repair of lines damaged by the enemy.

3. The control and working of the lines in Boer territory.  
These lines, when taken possession of, were known as the Imperial Military Railways.

In November, 1899, a considerable part of the Cape Colony railways were in the hands of the Boers, who had command of the Western Section from the Orange River to Gaberones, north of Mafeking, and who, by their occupation of Stormberg Junction, cut off the eastern from the midland and western systems. There had also been a considerable loss of locomotives and rolling stock, which were in the Boer States when war was declared, or were shut up in Kimberley and Mafeking.

The general arrangements for the control and working of the railways in Cape Colony were as follows :—Captain V. Murray was appointed Assistant Director of Railways to co-operate, as regards the working of the civil and military traffic, with the General Traffic Manager of the Cape Railways, and the following officers were nominated as Deputy Assistant Directors for the different sections :—Captain H. C. Nanton for the Western Section, with headquarters at De Aar ; Captain W. V. Scudamore for the Midland Section ; Captain J. M. Burn for the Eastern Section ; Lieut. E. H. M. Leggett at Cape Town. Under these officers again there were railway staff officers to deal with the traffic, a very arduous duty.

A separate organization was adopted for the repair of the railways damaged by the enemy. While the maintenance of the lines in the more peaceful parts of Cape Colony was left in the hands of the civil employes of the Cape Railway Administration, the lines within the sphere of military operations were divided into two sections, of which the Western was in charge of Captain W. R. Stewart, with headquarters at De Aar, and the Midland, under Captain J. H. Twiss, had its headquarters at Naauwpoort Junction. To the former were allotted the 8th Railway, and 31st Fortress Company, and to the latter the 10th Railway, and 20th and 42nd Fortress Companies. As these companies did not afford sufficient numbers for the work, it was decided, in December, 1899, to raise a Railway Pioneer Regiment from the miners and other artisans, who had been employed in Johannesburg before the war, and the command

was given to Major J. E. Capper, while Captain E. D. Swinton was appointed Adjutant. Mr. L. I. Seymour and Mr. G. A. Goodwin, who had been leading engineers on the Rand, and who had suggested the enrolment of the Corps, were appointed as Majors, and were largely instrumental in raising it. The regiment, which had a total strength of 35 officers and 1,000 men, was brought together at Naauwport Junction on March 3rd, 1900, and did admirable work during the campaign, some incidents of which will be referred to later.

The Military Railway Department proved of great importance in the concentration of the force with which Lord Roberts marched from the Modder River to Bloemfontein, and, as the railway had been repaired during and after Lord Methuen's advance, everything was ready, by January 21st, 1900, for the movement of troops and stores to the different places on the line north of the Orange River. During the three weeks from January 21st to February 10th, the work included the despatch of 27,025 men, 13,590 horses and mules, and 24,168 tons of stores, a remarkable achievement, considering that the lines were single, and had never been intended for so heavy a traffic.

After the retreat of Cronje to Paardeberg, and the relief of Kimberley on February 15th, the repair of the railway to the latter town from Modder River was at once taken in hand and completed by February 19th, when the Midland Field Section returned to Naauwport, and restored the line to Norval's Pont as General Clements advanced. A temporary bridge over the Orange River was completed by Lieut. H. A. Micklem on March 27th, while Major Capper, with part of the Railway Pioneer Regiment, took in hand the restoration of the permanent railway bridge, which had been destroyed by the Boers, and, by great exertions, had it ready for traffic by May 30th. Major Goodwin and the remainder of the Pioneer Battalion proceeded to Bethulie, and repaired the railway bridge across the Orange River at that place.

As soon as the bridge at Norval's Pont had been restored, Major Girouard took over the Free State railways to Bloemfontein and organized the staff for controlling and working it.

In Natal the system of working the railways was different

from that in Cape Colony, as the lines in the former were left more completely in the hands of the Natal Government Railway Department, and repairs were carried out by them, aided by Major G. S. McD. Elliot, Assistant Director of Military Railways, and by the officers and men of the Royal Engineer Companies.

Another very important branch of Royal Engineer duties during the war was that in connection with the Telegraphs, which, as in the case of the railways, had a general organization distinct from the field units, and were under the charge of Lieut.-Colonel R. L. Hippisley, who had succeeded, as Director of Telegraphs, to Major A. E. Wrottesley, unfortunately drowned on the voyage out to South Africa. It has already been mentioned that a section of the Telegraph Battalion, under the command of Major W. F. Hawkins, had arrived in Natal, just before the investment of Ladysmith, and was in that place during the siege. In September, 1899, when the Army Corps was mobilized, a complete Telegraph Division, under Captain E. G. Godfrey-Faussett, was detailed for service, and landed in Cape Town on November 12th, followed by a party of 100 line-men and telegraph operators under Captain J. S. Fowler. One section of the Telegraph Division, under Lieut. R. J. Jelf, was sent on to Natal, and joined Sir Redvers Buller's force, engaged in the operations for the relief of Ladysmith. This section had extremely hard work, and Jelf carried out his duties in a manner which received the highest praise; but the strain proved too great for him, and, after the relief of Ladysmith, his health broke down, and he died on the passage home to England.

Immediately after its arrival at Cape Town, the Telegraph Division went on to De Aar Junction and established a central depôt at that place. Arrangements were made with the Postmaster-General that all telegraphic work within the "fighting area" in Cape Colony, or beyond the frontier, was to be carried on by the Telegraph Division, while the Civil Staff dealt with "safe districts" within the Colony. This principle was adhered to generally throughout the war, though, in several instances, the Civil Staff also rendered most useful assistance within the "unsafe area." De Aar was made the junction between the civil and military railway systems, and, beyond



that point, the existing lines were placed in charge of the Director of Military Telegraphs. When Lord Methuen commenced his advance in November, 1899, for the relief of Kimberley, one section of the division, under Lieut. J. P. Moir, was detailed to accompany him and repaired the lines, which had been wrecked by the Boers, as fast as the column marched forward, and took part in the operations at Modder River. Another section, under Lieut. H. L. Mackworth, was sent to join General French at Naauwport, and rendered excellent service during the fighting round Colesberg, keeping up the communication between Rensburg and the advanced positions captured by the British.

When the preparations were being made for Lord Roberts' march to Bloemfontein, the Telegraph Division was concentrated at De Aar, and Captain Godfrey-Faussett was placed in executive charge of the telegraphic arrangements for the advance. Communication was kept up by cable and air line as the army moved forward, and, in his evidence before the Royal Commission on the South African War, Lord Roberts said: "The main line telegraph was extraordinarily well done, and the way repairs were made, lines renewed, and new lines started was quite admirable throughout."

As soon as Kimberley was relieved, the line of telegraph from that place to Modder River was restored, and, after the occupation of Bloemfontein, the Boer line to Kimberley was repaired, Lieut. Mackworth and Sergt. Cadell riding through the hostile districts to Boshof, to locate the faults and put the telegraph in working order. Communication with Bloemfontein by Norval's Pont was restored by March 17th, 1900. Three additional Telegraph Sections arrived from England on March 23rd, under the command of Captain H. B. H. Wright, and, of these, two were sent to Kimberley, and one to Bloemfontein.

Although by the rapid advance of Lord Roberts across the Free State, the Boers had been compelled to withdraw from the eastern part of Cape Colony, there were signs of a rebellious spirit in the north-western districts of the Colony, which had to be suppressed. Prior to the arrival of Lord Roberts in South

Africa, Major-General Elliott Wood, the Chief Engineer of the Army Corps, had charge of the line of communication with Lord Methuen, his headquarters being at De Aar Junction, while the force under his command, about 11,000 men, were distributed along the railway from De Aar to Honey Nest Kloof Station. In December, 1899, a commando of Boers crossed the Riet River some miles to the west of Modder River Station, and established a laager at Sunnyside near Douglas, with the view of exciting rebellion, and enlisting recruits among the Dutch of Cape Colony. On December 31st General Wood sent Lient.-Colonel Pilcher with a force of 1,600 men to drive out the Boers, who were defeated with considerable loss, and evacuated Douglas. Shortly afterwards, Wood sent a column across the Orange River at Zoutspan Drift, and established a fortified post in the Free State, the first ground to be occupied in the enemy's territory. When General Wood took up the duties of Engineer in Chief with Lord Roberts' Army, he was succeeded in the command at De Aar by Brigadier-General H. H. Settle, Commanding Royal Engineer on the Line of Communications.

Soon after Settle had taken charge at De Aar, a force of Boers, with some artillery, crossed the Orange River below its junction with the Vaal, and, having occupied Prieska, proclaimed this part of Cape Colony as Free State territory. Here they were joined by many Dutch sympathizers, and the rebellion spread rapidly, extending south and west, and endangering the British communications with Cape Town. Lord Roberts therefore ordered Settle to take steps for the pacification of the country with all available troops, and columns were sent in various directions, which compelled the Boers to retire across the Orange River. Garrisons were then placed in Prieska, Kenhart, Uppington, and other towns, to overawe the disloyal colonists.

After his successful march to Bloemfontein, Lord Roberts found it necessary to halt for a time, in order to reorganize his force, and replenish the supplies before continuing the advance into the Transvaal. He had applied to the War Office for

another Infantry Division in January, 1900, and this, the Eighth Division, reached South Africa soon after the occupation of Bloemfontein; it was commanded by Major-General Sir H. M. Rundle, K.C.B., D.S.O.; Colonel T. R. Main was appointed Commanding Royal Engineer, and the 5th Field Company under Major B. E. Morony, was attached to the division. The following additional Royal Engineer units embarked for service in South Africa early in 1900:—

*3rd Balloon Section.*—Major R. B. D. Blakeney, D.S.O.

*1st Searchlight Section.*—Captain A. H. Dumaresq.

*2nd Searchlight Section.*—Captain F. L. Lloyd.

*1st Survey Section.*—Captain C. F. Close, C.M.G.

*2nd Survey Section.*—Captain P. H. du P. Casgrain.

In December, 1899, and January, 1900, the Auxiliary Forces of the Royal Engineers freely offered their services for the war in South Africa. The Corps of Electrical Engineers provided a detachment (the 2nd Searchlight Section) and supplied it with traction engines, dynamos, and the other necessary appliances. The two Militia Battalions, the Royal Monmouthshire, and the Royal Anglesey, each provided a section, afterwards raised to a company, for work on the Lines of Communications, while the Royal Engineers Volunteer Battalions supplied 15 sections. By June, 1900, the total strength of the Corps serving in South Africa had reached a strength of:—

Royal Engineers, 212 officers, 4,490 non-commissioned officers and men.

Royal Engineers Militia, 8 officers, 250 non-commissioned officers and men.

Royal Engineers Volunteers, 23 officers, 407 non-commissioned officers and men.

Total: 243 officers, 5,147 non-commissioned officers and men.

After crossing the Orange River on March 15th, as described at page 93, Major-General Clements' column marched through the Free State, by way of Philippolis and Fauresmith to the Riet River, and thence to Bloemfontein, which was reached on April 4th. The 47th Company also accompanied the column

to that place, and was then transferred to the Third Infantry Division in place of the 12th Field Company, which was attached to the Eleventh Infantry Division, a new division formed in South Africa under the command of Lieut.-General R. Pole-Carew, C.B.

Sir W. Gatacre, after passing the Orange River, advanced to Springfontein, where the Third Division was concentrated on March 17th, with the exception of two battalions at Bethulie, and the Colonial Contingent under General Brabant, which was further to the east at Aliwal North. Sir W. Gatacre was ordered to take charge of the southern part of the Free State, and to occupy Smithfield, Wepener, and Dewetsdorp. Meanwhile the Boers, finding that the British were not advancing from Bloemfontein, plucked up heart, and began to collect in considerable numbers in the eastern part of the Free State between Brandfort and Basutoland. A column that had been sent from Bloemfontein to Thaba'nchu, was obliged to retire, and met with a serious reverse at Sannah's Post, while the force that had been sent by Sir W. Gatacre to Dewetsburg, and had been ordered to retire to Bethanie, was repulsed at Reddersburg. De Wet, who was in command of the Boers, then turned eastwards, in order to attack the small British detachment, which was occupying Wepener, on the Caledon River, close to the frontier of Basutoland.

Major Cedric Maxwell, who was in command, took up a position west of the Caledon, a short distance from Wepener, and put it in a state of defence. The force, about 1,800 strong, consisted principally of Colonial troops, with a company of mounted infantry, six guns, and some mounted sappers. The Boers appeared before the place on April 4th, and summoned the garrison to surrender, an invitation which Maxwell naturally declined. On the following day Lieut.-Colonel Dalgety arrived and took command of the British force, which was attacked by De Wet, with about 8,000 men and 12 guns, on April 9th. A vigorous assault was made, which was repulsed, and then De Wet kept up a bombardment for sixteen days, which caused a loss of 14 officers, and 155 men killed and

wounded. As soon as Lord Roberts heard of the attack on Wepener, he ordered two columns, one from Aliwal North, and the other from Dewetsdorp, to concentrate for its relief. This was too much for the Boers, who retreated to Thaba'nchu. The brilliant defence of Wepener is thus described in the Official History of the War :—" The successful defence of the Jammersberg Bridge position by 1,800 men against four or five times as many of the enemy, whose artillery was far better than their own, did credit both to the courage and staunchness of the Colonial Division, and to the skill with which Major Maxwell designed the works, held by Colonel Dalgety's troops."

By the beginning of May, 1900, Lord Roberts had completed his preparations for the invasion of the Transvaal and gave orders for the advance. The general scheme of operations was as follows :—On the west, the Tenth Division, commanded by Lieut.-General Sir A. Hunter, K.C.B., was to move northwards from Kimberley to the Vaal River at Fourteen Streams, and enter the Transvaal at its south-western extremity, while Lord Methuen, with the First Division, was to march through the Free State by way of Boshof and Hoopstad to the Vaal. The main column, commanded by Lord Roberts himself, composed of the Cavalry Division, and the Seventh and Eleventh Infantry Divisions, was to follow the line of railway from Bloemfontein to the Vaal at Vereenigen, while a strong column of Mounted Infantry, followed by the Ninth Division, were to march parallel to the railway on the east. The Sixth Division was to form the garrison of Bloemfontein, and to protect the railway, while the Eighth Division was to occupy the eastern part of the Free State, and the Third Division was to hold the southern part of the State from Bloemfontein and Dewetsdorp to the Orange River. Major-General Sir H. Chermiside, K.C.B., R.E., who had commanded the 14th Brigade, had been promoted to the command of the Third Division in succession to Sir W. Gatacre. The Natal Army, under Sir Redvers Buller, was to move northwards through Newcastle, and join the army of Lord Roberts in the Transvaal. At this time the distribution of the Royal Engineer units in South Africa was as follows :—

## IN THE ORANGE FREE STATE AND ON LINE OF COMMUNICATION.

*With Corps Troops.*—2nd Field Troop.

C Pontoon Troop.

9th Field Company (Headquarters and 2 Sections).

1st Field Park.

1st Balloon Section.

1st Telegraph Division, and part of 2nd.

8th and 10th Railway Companies.

Railway Pioneer Regiment.

6th, 20th, 29th, 31st, 42nd, and 45th

Fortress Companies.

2nd Searchlight Section.

2nd Survey Section.

Photo-Reconnaissance Section.

*With Cavalry Division.*—1st Field Troop.

*With Third Infantry Division.*—47th Fortress Company.

*With Sixth Infantry Division.*—38th Field Company.

*With Seventh Infantry Division.*—26th Field Company.

*With Eighth Infantry Division.*—5th Field Company.

*With Ninth Infantry Division.*—7th Field Company.

*With Eleventh Infantry Division.*—12th Field Company.

*With 21st Brigade.*—9th Field Company (one Section).

The 21st Brigade, under the command of Major-General B. M. Hamilton, was not attached to a division.

## AT KIMBERLEY.

*With First Infantry Division.*—11th Field Company.

*With Tenth Infantry Division.*—9th Field Company (one Section).

3rd Balloon Section.

## IN NATAL.

*With Corps Troops.*—3rd Field Troop (formerly 2nd Balloon Section).

A Pontoon Troop.

2nd Telegraph Division.

*With Second Infantry Division.*—17th Field Company.

*With Fourth Infantry Division.*—23rd Field Company.

*With Fifth Infantry Division.*—37th Field Company.

On May 3rd, 1900, the advance of the Ninth and Eleventh Infantry Divisions from Bloemfontein commenced. It was known that the Boers were in considerable strength on the Zand River, at Kroonstadt, and on the Vaal River, while, to the east of the railway, there was a large force under De Wet, between Thaba'nchu and Ladybrand, and other commandos between Senekal and Ventersburg. Brandfort was occupied by the British on May 3rd, and the railway repaired up to that place; on the 5th the Boers were driven from their position on the Vet River, but they succeeded in blowing up the railway bridge before retreating. During the advance, the 12th and 26th Field Companies marched with their respective divisions, and had much work improving the roads and assisting in the repair of the railway. The 7th Field Company, which was attached to the Highland Brigade, marched with General Ian Hamilton's force on the east of the railway, and, on May 6th, reached Winburg, which was at once put in a state of defence. On May 8th, the Cavalry Division, composed of four brigades, which had left Bloemfontein later than the infantry, reached the Vet River, and took up its position in front of the army, to cover the advance. The 1st Field Troop was necessarily divided; the Headquarters and No. 2 Section, under Captain C. O. C. Bowen, were attached to the 4th Brigade; No. 1 Section, under Lieut. C. H. Foulkes, to the 1st Brigade; and No. 3 Section, under Lieut. J. R. Charles, to the 3rd Brigade. The passage of the Zand River was seized by the cavalry, on May 9th, and, the following day, after some fighting, the Boers retreated to Kroonstadt. This was an important place, as it had been made the seat of the Free State Government after the capture of Bloemfontein, and it was believed that President Steyn would defend it vigorously. Lord Roberts therefore ordered General French to surround it with the cavalry, and to capture the Boer Government by cutting the railway to the north.

With the view of carrying out this operation, Major Hunter-

Weston, with Lieut. Charles, and eight mounted sappers, accompanied by an escort of 50 cavalry, under Captain Yardley, of the Inniskilling Dragoons, and Mr. F. R. Burnham, a famous scout, left camp on the evening of March 11th, and, moving west of the railway, got through the Boer lines without attracting notice, and taking some prisoners *en route*. As soon as the Boer lines had been successfully passed, Hunter-Weston advanced with Charles and 11 men, leaving the remainder of the command to await his return. Just before dawn, the party reached the railway, and found the enemy in large numbers, but Hunter-Weston pushed on with Burnham and succeeded in fixing the dynamite charges, and destroying the rails. The retreat was then carried out with as great difficulty as the advance, but so judiciously that the whole party returned to camp with only one man wounded, Sapper Collins. Unfortunately this brilliant exploit had not the good effect it deserved, as the Boers had evacuated Kroonstadt during the night, and the last train had steamed northwards just before Hunter-Weston demolished the line. The Boer seat of government was then transferred to Lindley, 45 miles to the east, and shortly afterwards to Frankfort.

Lord Roberts marched into Kroonstadt with the Eleventh Division on May 12th, and here he had to halt for a few days, as the cavalry horses were exhausted, and the Boers, in their retreat from Bloemfontein, had done an enormous amount of damage to the railway, and had destroyed four large, and many smaller bridges. The work thrown upon the Military Railway Administration was therefore very considerable, and the 12th and 26th Field Companies, C Pontoon Troop, and the Railway Pioneer Regiment all assisted in making the railway again fit for use, and in constructing deviation lines across the different rivers, when it would have taken too long to repair the larger bridges.

Meanwhile General Ian Hamilton continued his advance on the right flank, and, occupying Lindley on May 17th, reached the Rhenoster River on the 20th, by which day the main column was again ready to move forward. The Cavalry Division reached the Vaal River on May 24th, and crossed by the Parys



and Lindsquee Drifts, at the latter of which the Field Troop had hard work to make it passable for the ammunition waggons and transport vehicles. This successful flank movement of the cavalry caused the retreat of the Boers who feared that their communications would be cut off, and retired across the Vaal, destroying the bridge. The British crossed on the 27th at Vereeniging, with the help of a pontoon ferry, worked by the 9th and 12th Field Companies.

The next operation undertaken by Lord Roberts was the capture of Johannesburg, and, on May 29th, General Ian Hamilton's column, which had crossed from the left to the right of the British main advance, prepared to attack Doornkop, a hill 12 miles west of the town, where the Boers had taken up a strong position. This was captured after some severe fighting, the brunt of which fell on the 19th Infantry Brigade, to which a section of the 7th Field Company, commanded by Lieut. E. E. B. Wilson, was attached, and the 21st Brigade, with which was a section of the 9th Field Company, commanded by Lieut. Llewelyn Evans. Meanwhile the Cavalry Division threatened the right flank of the Boers who withdrew to Johannesburg but did not hold it long, as the place surrendered on May 31st. This was followed by the surrender of Pretoria on June 5th, when the British flag was once more hoisted over the capital of the Transvaal after an interval of 19 years since it had been hauled down in 1881.

While the main army under Lord Roberts was advancing from Bloemfontein to Pretoria, the two divisions, the First and the Tenth, which had been organized at Kimberley, under Lord Methuen and Sir Archibald Hunter, were carrying out their part of the general scheme. On May 4th, the Tenth Division, to which No. 1 Section of the 9th Field Company, commanded by Captain E. G. Young, was attached, crossed the Vaal River at Winsorton to cover the advance of a column, which had been organized at Barkly West by Colonel Mahon for the relief of Mafeking. The Boers were driven from a position which they occupied at Rooidam, some miles west of the river, and Fourteen Streams was taken on May 7th. Here the railway bridge had been destroyed by the enemy; and a ferry was established by

the Royal Engineers to keep up communication with Warrenton on the south side of the river where the 20th Brigade from Lord Methuen's Division, with which was part of the 11th Field Company, had been engaged in attacking a strong Boer position. During the fighting at this place the 3rd Balloon Section did excellent service in reconnoitring the enemy's defences, and in directing the artillery fire of a 6-in. gun which had been brought up from Kimberley. Some of the Boers afterwards stated that it was the moral effect produced by the balloon that was one of the main reasons why they evacuated the position on the arrival of the Tenth Division at Fourteen Streams. During the operations Captain Young was attacked with enteric fever and died at Kimberley on June 5th.

After the capture of Warrenton and Fourteen Streams, the First Division assembled at Boshof, and marched by way of Hoopstad to Kroonstad where it arrived on May 28th, while the Tenth Division entered the Transvaal, and occupied Christiania on May 16th. The following day Mafeking was relieved by Colonel Mahon, after a siege of seven months. The section of the 9th Field Company marched with the Tenth Division to Potchefstroom, and rejoined the headquarters of the company in Pretoria on July 2nd.

During these operations in the western theatre of war, Sir Redvers Buller was marching northwards through Natal to join Lord Roberts in the Transvaal. After the relief of Ladysmith, the Natal Army had remained for two months south of the Biggarsberg Mountains, and it was not until the middle of May that the forward movement commenced. During this period of waiting some changes were made in the organization of the Royal Engineer units, the 2nd Balloon Section, commanded by Major G. M. Heath, being converted into the 3rd Field Troop, and attached to the cavalry, while the pontoons belonging to A Troop and the Field Companies were returned to store, and were replaced by trestles of a special pattern, designed by Major Irvine for use in crossing the South African streams.

Sir Redvers Buller commenced his march northwards on May 10th, 1900, and, after some fighting, the Boers were driven

from the positions which they had taken up on the Biggarsberg Hills, 30 miles north of Ladysmith, and made little further resistance in Natal, leaving the road open to Laing's Nek, where they determined to make a stand. Their position, however, was turned by the capture of Botha's Pass on June 8th, and of Alleman's Nek on the 11th, when the Boers, seeing that their retreat into the Transvaal would be cut off, abandoned Laing's Nek, having blown up the tunnel under the Nek before retiring, so as to interfere with the railway communications. This was a serious matter, as it was essential that the line should be kept open for the transport of supplies, and it was necessary to restore the tunnel as soon as possible. The work was at once taken in hand by A Troop and the 17th Field Company, under Major F. M. Glubb, and carried out so energetically by day and night, that the line was cleared and trains were again able to run through the tunnel by June 18th. As soon as the railway was repaired the advance was continued and Standerton was occupied on June 23rd. A Troop marched to Standerton, where Major Irvine was appointed Commanding Royal Engineer, and took charge of the construction of works for the defence of this important place, while the 17th Company was employed in making a temporary bridge over the Vaal River, to take the place of the permanent railway bridge, which had been destroyed by the Boers.

On July 4th, the advance guard of the Natal Army joined hands with the right flank of Lord Roberts' force at Vlakkfontein between Standerton and Heidelberg, and preparations were commenced for the campaign in the Eastern Transvaal. Of the Royal Engineer units with the Natal Army, the 3rd Field Troop took part in the actions at Botha's Pass and Alleman's Nek, and went on to Standerton, while the 37th Field Company, after crossing the Drachensberg with the Fifth Division, halted at Volksrust, where they were employed in constructing defences, and in repairing the railway between that place and Standerton, and the 23rd Field Company were engaged on the line of communications.

When the British Army took possession of Pretoria on June 5th, the Transvaal forces, under General Botha, retired along

the railway leading east from the capital, and took up a position on some hills near Pienaarpoort Station about 14 miles distant. Lord Roberts sent a force of about 14,000 men to attack them, and Diamond Hill, the key of the position, was captured, when the Boers retired, leaving Pretoria safe from further trouble. But Lord Roberts decided not to follow them up until the Natal Army had arrived to take part in the operations.

Although Lord Roberts in his advance to Pretoria, had defeated all the Boer forces, with which he had come in contact, he had left behind him a long line of communications, passing through hostile territory, and liable to attack at many places. To guard this, it was necessary to keep a large force in the Orange Free State, consisting of the Third, Sixth, Eighth, and part of the Ninth Infantry Divisions, to hold the railway, and, as far as possible, to maintain order in the eastern and southern parts of the State. This force was increased by the arrival of the First Division, which, as has already been mentioned, after the capture of Warrenton, reached Kroonstadt on May 28th. The Boers were, however, by no means dispirited, and Christian de Wet, who, with a considerable force, had established himself near Heilbron, was determined to give the British as much trouble as he could. He commenced his operations as soon as Lord Roberts reached the Vaal on the march to Pretoria, and, on May 27th, an attack was organized on a body of Imperial Yeomanry, which was marching from Bloemfontein to Ventersberg, and was compelled to surrender at Lindley on May 31st, as neither Sir H. Colville, who was at Ventersburg, nor Sir H. Rundle, who was at Senekal with the Eighth Division, could arrive in time to relieve them. This Boer success was followed, on June 4th, by the capture of a British convoy, proceeding to Heilbron, and, three days later, De Wet attacked the line of railway near Roodewal, and destroyed the bridge over the Rhenoster River, thus cutting the communication between Bloemfontein and the Transvaal. Another attack on the railway was made on June 14th, when a Boer commando attempted to destroy the line where it crossed the Zand River at Virginia Siding, where Major Capper was in command, and had a force composed of four companies of the Railway Pioneer Regiment

and part of the Royal Lancaster Militia. Fortunately the position had been entrenched, and, though the Boers were in considerably superior strength, and had a field gun and some Maxims, they were driven off after a severe fight, in which the British lost two officers killed, one of whom was Major Seymour, second in command of the Railway Pioneers which he had helped to raise and organize.

Fighting continued in the north-east of the Free State during June and July, and the Boers were gradually driven back. The important town of Bethlehem was captured on July 7th, and then De Wet, with a Boer force of about 4,000 men, retired to the Brandwater Basin, a mountainous district, lying between the Wittebergen and Roodebergen Hills and the Caledon River. It was a difficult position to attack but it was determined to capture him, if possible, and, with this object, a force of about 18,000 men, under Sir A. Hunter, surrounded the hills and prepared to block the five passes, leading out of the Basin. Parts of the 7th, 9th, 11th, and 38th Field Companies assisted in the operations and had very arduous work in the occupation of the mountain passes. De Wet, who had from the first, opposed the retreat of the burghers into what he regarded as a dangerous trap, succeeded in escaping with President Steyn, and, with his own commando, got safely away to the north-west; but Prinsloo, who remained with about 4,300 Boers, after holding out as long as he could, surrendered on July 30th, and, with his men, were sent as prisoners to Cape Town.

After the main column of the British troops in the Transvaal had joined the Natal Army, Lord Roberts considered that the time had arrived for the advance from Pretoria into the Eastern Transvaal, and the operations were commenced by General French moving with the Cavalry Division on July 23rd, with the object of cutting off the retreat of General Botha and the Boers, who had taken up a position at Balmoral, on the railway from Pretoria to Middleburg. The headquarters and two sections of the Field Troop accompanied the Cavalry Division, the 1st Section with the 1st Cavalry Brigade, and the 2nd Section with the 4th Brigade. The 3rd Section was attached

to the 3rd Cavalry Brigade, which was employed in the north-east district of the Orange Free State, and this section never rejoined headquarters, as it was converted into a 4th Field Troop, under the command of Captain D. H. Ridout. With the infantry were the 12th Field Company, and a composite Field Company, commanded by Captain Clifford Coffin, and composed of sections taken from the 7th and 9th Companies, to which a section of the 11th Company was afterwards added.

The Boers did not wait for the arrival of the British at Balmoral, but retired, first to Middleburg and then to Belfast, the British troops marching after them and occupying Middleburg on July 27th. Here Captain Bowen, who had taken command of the Field Troop, on the appointment of Major Hunter-Weston as D.A.A.G. of the Cavalry Division, opened up the railway westwards to Brugspruit to bring up supplies for the cavalry and found that the line was intact, as the Boers had retreated before carrying out its demolition, for which they had made preparations. The advance was continued on August 15th, when General French got into touch with Sir Redvers Buller, and Belfast was occupied on the 24th, when the 12th Field Company was employed in constructing defences round it. The following day Lord Roberts arrived at Belfast and issued orders for the attack of the Boer position at Bergendal, 5 miles to the east, and this was captured, after a severe fight on August 27th, General Botha retreating northwards to Lydenburg, while President Kruger fled by train to Nelspruit, and, a fortnight later, took refuge in Portuguese territory, whence he sailed for Europe in October, leaving the Transvaal to its fate. The Battle of Bergendal may be regarded as the last action in the regular campaign in South Africa, but, as events proved, it was by no means the end of the war, notwithstanding the fact that, on September 1st, Lord Roberts issued a proclamation to the effect that the Transvaal Republic was annexed to the British Crown.

After the action of Bergendal the pursuit of the Boers was continued. Sir Redvers Buller marched north towards Lydenburg, which was captured on September 6th, and, the same day,

Carolina was occupied by General French, who had moved south of the railway with the Cavalry Division. From Carolina he turned east and captured Barberton on September 13th. During this march the Field Troop had hard work, as the roads were bad, and there were many drifts which had to be made passable for the transport waggons. As soon as Lydenburg and Barberton had been occupied, Lieut.-General Pole-Carew, advanced along the railway with the Eleventh Division, to which the 12th Field Company was attached, and reached Komati Poort on September 24th. Here was found an immense quantity of rolling stock, including thirty locomotives, which had been much damaged by the Boers, before they had retired; they had also destroyed the railway station and a considerable amount of ammunition, but, fortunately, had not time to blow up the railway bridge across the Komati River, although the line from Belfast had been greatly injured in many places. To put the railway into order, and get the rolling stock into working condition was an arduous task, but was satisfactorily accomplished under the superintendence of Lieut. E. H. M. Leggett, and the first troop train was able to run on September 28th, when the British force, except the garrison left at Komati Poort, was sent off by October 10th. The 12th Field Company remained at Komati Poort, to prepare the cantonments for the garrison, and the composite Field Company also remained there for some weeks, when it was broken up, and the sections rejoined the headquarters of their companies at Pretoria and Bloemfontein. The section of the 7th Field Company, which had left De Aar in November, 1899, with a strength of 50 men, was reduced to 17 of all ranks, and, since that time, it had marched 1,900 miles, taken part in 19 actions, and in the capture of ten towns. The 23rd Field Company, commanded by Major S. R. Rice, which had accompanied the Natal Army in its march through the Transvaal, took part in the actions at Geluk and Bergendal, and the occupation of Lydenburg. After the Natal Army was broken up the company was allotted to the Pretoria-Kaapmuiden Section of the line of communication to Komati Poort, with headquarters at Middleburg, where Colonel

J. C. Barker was in command, and which was much exposed to attack by Boer commandos, who did all they could to interfere with the railway communications.

In September, 1900, Lord Roberts was appointed Commander-in-Chief in England, and, two months later, handed over the command of the Army in South Africa to Lord Kitchener, who had been appointed as his successor, and who entered on his duties on November 29th. At that time, although the Boer forces had been beaten in the field, their powers of resistance had by no means come to an end, and they carried on a system of guerilla warfare with so dogged a determination that nearly two years elapsed before they could be finally subdued. In many respects this stage of the war was more trying for the British troops than the regular operations, which had been carried out so successfully by Lord Roberts, and the organization of the Army was completely altered, as the system of grouping the units by divisions and brigades was practically done away with, and was replaced by a system of independent columns, of varying strength, which were scattered through the country, each under a separate commander, and with no fixed connection with other columns in their vicinity.

This column system of warfare may be said to have commenced after the escape of General de Wet from the Brandwater Basin in July, 1900, when he initiated his policy of moving rapidly about the country, attacking and destroying the railways at various points so as to make communications difficult, and, at the same time, avoiding a conflict with any large organized body of British troops. When Lord Kitchener assumed the command, there were 38 columns in various districts, and, a year later, they had reached a total of 64. Speaking generally, the object of the columns was to pacify the districts in which they operated, pursue the enemy where he could be found, and remove all supplies, which could be useful to him; under the circumstances, it was frequently not at all easy to carry out these orders, especially as the Boers were better acquainted with the country and were able to move more rapidly than the British.

It would be quite impossible to follow the history of the



Royal Engineer units during this second stage in the South African Campaign, as the companies, like the Infantry Divisions, were, to a great extent, broken up, and attached in small parties to the different columns, frequently at a considerable distance from their headquarters. The work carried out was very various, and, besides the maintenance and exploitation of the railways and telegraphs, included the construction of defences, the provisions of cantonments and hospitals, road making, and bridge building. Probably in no campaign have the Royal Engineers had more arduous and more incessant work, frequently under very difficult conditions, and the official reports show that, in all cases, this work was carried out efficiently and satisfactorily. One branch of it was of special interest, as it attained a development unique in the history of war. This was the use of blockhouses, adopted in the first instance for the defence of the railways, and other lines of communications, and, at a later stage of the war, as a means of hemming in the Boers, and compelling them to surrender.

The first blockhouses constructed were those put up by A Troop for the defence of the railway bridges in Natal during the advance for the relief of Ladysmith, and they were used extensively when Lord Roberts marched from Bloemfontein into the Transvaal, leaving a long line of railway behind him, which was much exposed to the attacks of the Boers. These blockhouses were frequently built of masonry or concrete, and were two or three storeys in height, with machicoulis galleries and loopholes strengthened with steel plates, and they enabled a small number of men to keep off a considerable force of the enemy, unless the latter were provided with artillery. -- But as time went on and the number of blockhouses, which were required, rapidly increased, a simpler kind of building was devised, made of upright wooden posts with a double sheathing of corrugated iron, the space between the two skins being filled in with sand or shingle to prevent the penetration of bullets.

Early in 1901, Major S. R. Rice, then Commanding Royal Engineer at Middleburg, invented a new type of octagonal blockhouse, made of wooden frames, over which were two coat-

ings of corrugated iron, and, later on, designed a circular blockhouse, also of corrugated iron, which was found easier to make and to erect. This type proved so efficient that manufactories were started at Middleburg, Pretoria, Bloemfontein, and other places, where the materials for blockhouses were prepared, and sent out all ready for erection when required. Before long, the whole of the railway lines in the Transvaal, and Orange River Colony were provided with these blockhouses, which proved a most efficient addition to the defence of the lines of communication. The system was also adopted in the Cape Colony where the Boers gave much trouble by their attacks on the railways.

In July, 1901, the blockhouse system received a further development, as lines of them were erected across the open country, so that gradually the theatre of war was covered by a network of these defensible posts. The blockhouses were usually placed at a distance of from half a mile to three-quarters of a mile apart, and the intervals between them were well provided with wire entanglements and other obstacles, while spring guns and other forms of alarm were used, to give notice of any attempt on the part of the enemy to cross, or tamper with the obstacles at night. About 8,000 blockhouses were erected, disposed over a total length of about 3,700 miles.

During the whole of 1901 and the early part of 1902 the guerilla warfare continued with varying success on both sides, the Boers holding out with a tenacity, which, considering their small numbers, was very remarkable, but, in process of time, their powers of resistance came to an end, and, at length, in May, 1902, at a conference held between Lord Kitchener and the Boer leaders, terms of peace were arranged, and the Dutch Republics became definitely part of the British Empire.

That the part taken in the long struggle by the Royal Engineers was fully recognized is shown by the following list of honours and promotions awarded to officers of the Corps, who took part in the campaign. The ranks of the different officers are given as shown in the *London Gazette*, and their names are arranged in order of regimental seniority.

TO BE A VISCOUNT OF THE UNITED KINGDOM.  
General Lord Kitchener of Khartum, G.C.B., G.C.M.G.

TO BE G.C.M.G.  
General Lord Kitchener of Khartum, G.C.B., K.C.M.G.

TO BE K.C.B.  
Colonel E. Wood, C.B.  
Colonel H. H. Settle, C.B., D.S.O.

TO BE K.C.M.G.  
Brevet Lieut.-Colonel E. P. C. Girouard, D.S.O.

TO BE C.B.  
Colonel W. G. Morris, C.M.G.  
Lieut.-Colonel R. L. Hippisley.  
Lieut.-Colonel R. C. Maxwell.  
Brevet Colonel H. E. Rawson.  
Lieut.-Colonel G. H. Sim.  
Lieut.-Colonel W. F. H. Stafford.  
Major H. J. W. Jerome.  
Brevet Lieut.-Colonel J. E. Capper.  
Major F. G. Bond.

TO BE C.M.G.  
Brevet Colonel C. A. Rochfort-Boyd.  
Major W. F. Hawkins.  
Major W. A. J. O'Meara.  
Captain H. A. A. Livingstone.  
Brevet Lieut.-Colonel G. F. Gorrings, D.S.O.

#### THE VICTORIA CROSS.

Lieut. R. J. T. Digby Jones, who was killed at the assault by the Boers on Waggon Hill, Ladysmith, on January 6th, 1900, would have been recommended for the Victoria Cross, had he survived, on account of his conspicuous bravery and gallant conduct, in leading the force, which reoccupied the summit of the hill at a critical moment. The Cross was given to his relatives by command of His Majesty the King.

## TO RECEIVE THE D.S.O.

Lieut.-Colonel P. T. Buston.  
Lieut.-Colonel E. H. Bethell.  
Lieut.-Colonel A. H. Kenney, C.M.G.  
Major W. H. Turton.  
Major F. M. Glubb.  
Brevet Lieut.-Colonel A. E. Sandbach.  
Major G. M. Heath.  
Major R. S. Curtis.  
Major A. G. Hunter-Weston.  
Captain G. M. Harper.  
Captain A. L. Schreiber.  
Brevet Major H. B. Williams.  
Captain G. M. Hutton.  
Captain R. H. H. Boys.  
Captain R. N. Harvey.  
Captain C. O. C. Bowen.  
Captain E. D. Swinton.  
Brevet Major H. G. Joly de Lotbinière.  
Lieut. E. H. M. Leggett.  
Lieut. M. G. E. Bowman-Manifold.  
Lieut. D. S. MacInnes.  
Lieut. A. H. W. Grubb.  
Lieut. J. P. Moir.  
Lieut. A. D. Meares.  
Lieut. R. L. McClintock.  
Lieut. J. R. E. Charles.  
Lieut. H. O. Mance.  
Lieut. E. E. B. Wilson.  
Lieut. C. O. Place.  
Lieut. R. H. Greig.  
Lieut. C. R. Johnson.  
Lieut. R. F. A. Hobbs.  
Lieut. H. L. Mackworth.

## TO BE GENERAL.

Lieut.-General Lord Kitchener of Khartum, G.C.B., G.C.M.G.

## TO BE MAJOR-GENERAL.

Colonel Sir E. Wood, K.C.B.  
Colonel Sir W. G. Nicholson, K.C.B.  
Colonel Sir H. H. Settle, K.C.B.

## TO BE BREVET COLONEL.

Lieut.-Colonel C. K. Wood.  
Lieut.-Colonel H. E. Rawson, C.B.  
Lieut.-Colonel E. M. Bethell, D.S.O.  
Brevet Lieut.-Colonel H. M. Lawson, appointed A.D.C. to  
His Majesty the King.  
Brevet Lieut.-Colonel W. F. H. S. Kincaid.

## TO BE BREVET LIEUT.-COLONEL.

Major C. Maxwell.  
Major F. C. Heath.  
Major A. G. Thomson.  
Major J. L. Irvine.  
Major H. M. Jackson.  
Major S. R. Rice.  
Major C. D. Learoyd.  
Major H. Mullaly.  
Major J. E. Capper.  
Major C. H. Cowie.  
Major A. W. Roper.  
Major G. M. Heath, D.S.O.  
Major W. R. Stewart.  
Major G. S. McD. Elliot.  
Major R. S. Curtis, D.S.O.  
Major A. G. Hunter-Weston, D.S.O.  
Major G. H. Fowke.  
Major H. R. Gale.  
Brevet Major H. C. Nanton.  
Brevet Major G. M. Kirkpatrick.  
Brevet Major Sir E. P. C. Girouard, K.C.M.G., D.S.O.

## TO BE BREVET MAJOR.

Captain G. H. Fowke.  
Captain W. C. Hedley.  
Captain H. B. Williams.  
Captain H. R. Gale.  
Captain H. B. Jones.  
Captain H. C. Nanton.  
Captain G. M. Kirkpatrick.  
Captain G. A. Travers.  
Captain J. H. Twiss.  
Captain J. S. Fowler.  
Captain V. Murray.  
Captain T. Fraser.  
Captain W. S. Nathan.  
Captain F. R. F. Boileau.  
Captain W. D. Waghorn.  
Captain G. P. Scholfield.  
Captain E. G. Godfrey-Faussett.  
Captain F. G. Fuller.  
Captain H. G. Joly de Lotbinière.  
Captain C. G. Falcon.  
Captain J. M. C. Colvin, v.c.  
Captain A. J. Craven.  
Captain E. H. M. Leggett, D.S.O.

The names of the following officers were noted for promotion to the brevet of Major on promotion to the rank of Captain :—

Lieut. H. A. Micklem, D.S.O.  
Lieut. C. B. Thomson.

## TO BE MAJOR IN THE RESERVE OF OFFICERS.

Captain H. E. M. Lindsay.

## TO BE HONORARY CAPTAIN.

Quartermaster and Honorary Lieut. G. Taylor.  
Quartermaster and Honorary Lieut. A. N. Tucker.

## CHAPTER V.

## BARRACK WORKS.

Barracks in Great Britain in the 17th and 18th Centuries—The Irish Board of Ordnance—The Irish War of 1689-91—Policy of King William III. with regard to Barracks in Ireland—The Trustees of Irish Barracks—The Board of Overseers of Irish Barracks—Thomas Burgh, Chief Engineer of Ireland, 1700-1730—The Royal Barracks, Dublin, built 1705—The Irish House of Parliament built by Chief Engineer Major Sir E. Pearse in 1731—The Commissioners of Irish Barracks, 1752—Abolition of the Irish Board of Ordnance, 1801—Barracks in Great Britain and the Colonies to 1792—The New Barrack Department created in 1793—Extravagant Expenditure of the Barrackmaster-General—Barracks in Great Britain and Ireland placed under the Board of Ordnance in 1822—Barracks built by the Board of Ordnance, 1822-1855—Abolition of the Board of Ordnance, 1855—The Royal Commission on Barracks, 1857—The Barrack and Hospitals Improvement Committee—The Camps at Aldershot, Colchester, Shorncliffe and the Curragh—Netley Military Hospital—The Herbert Hospital at Woolwich—The Military Forces Localization Act of 1872—The Imperial Defence Act of 1888—Investigation of Barrack Expenditure by the Select Committee in 1888—The Barracks Act of 1890—The Military Works Act of 1897—The Military Works Continuation Acts of 1899, 1901, and 1903—Changes in Royal Engineer War Office Organization in 1904—Abolition of the Office of Inspector-General of Fortifications—The Barrack Construction Department—The Military Works Loans closed—The Earthquake at Jamaica in 1907—Barracks in Egypt—Further Improvements in Barracks required.

ONE of the important duties, which have devolved upon the Corps of Royal Engineers from early times, has been the construction and maintenance of barracks for the accommodation of the British Army at home and abroad ; and, as this subject was not fully described in General Porter's *History of the Corps*, it is necessary to depart from the principle of dealing only with what has occurred since 1886, and to give a short *résumé*

of the history of barrack construction since the Board of Ordnance was reorganized by Royal Warrant in the reign of Charles II. on July 25th, 1683.

This Royal Warrant\* laid down at considerable length the duties of the Master-General and other Principal Officers of the Ordnance, and also of the Under Ministers, as they were called, among whom was included the Principal or Chief Engineer, and the Assistant Engineers. The first officer to hold this important position after the Restoration was Sir Charles Lloyd, and, on his death in 1661, Sir Bernard de Gomme was appointed as his successor, and was the holder of the appointment at the time that the Board of Ordnance was reconstituted. In the Warrant nominating Sir B. de Gomme he is termed Principal Engineer, but this title was afterwards changed to that of Chief Engineer, and so remained until 1802, when it was altered to "Inspector-General of Fortifications and Works."

The amount of barrack accommodation, available for the troops at the end of the 17th century, was very limited, and the greater part of the quarters that then existed were contained in the castles and other fortifications scattered through the kingdom. Troops, not stationed in these, were either encamped, or billeted in public houses in the towns and villages, and, in 1697, the whole of the available Government quarters only provided room for about 5,000 men, and this of an unsatisfactory character.

The British Parliament objected very strongly to the establishment of a standing army, and, as a natural consequence, was also opposed to the construction of barracks, the provision of which would, it was feared, lead to an increase in the numbers of the Army. As long as the custom of billeting troops on the civil population was adhered to, it was considered that there was a greater inducement to disband troops, so soon as the necessity for which they had been raised had passed by. But, so far as barracks were built, they were constructed and maintained by the Board of Ordnance, and were under the supervision of the Chief Engineer.

\* See *The Military Forces of the Crown*, by Charles M. Clode, Vol. I., p. 456.



In Scotland, after the suppression of the revolt of 1715, barracks were erected at various places in the Highlands to quarter troops in order to keep the country in order. These barracks were small, constructed to hold from one to three companies each and were of a very simple description, as they consisted of a number of barrack-rooms, without any accessories, surrounded by a defensible wall.

In England the provision of barracks advanced very slowly during the 18th century, and, by 1792, the whole of the accommodation in charge of the Board of Ordnance for the troops in Great Britain and the Channel Islands was only sufficient for 20,487 men distributed in 43 fortresses and garrisons. In all cases of barrack construction, the estimates were carefully prepared by the Chief Engineer, and submitted to Parliament by the Board of Ordnance, a system which ensured a due regard for economy, as well as efficiency.

In 1793, however, the barracks were taken away from the charge of the Board of Ordnance, and a new system of barrack administration introduced, which led to very unsatisfactory results. But, before speaking of this new system, it is necessary to refer briefly to the barrack question in Ireland, where it was dealt with in an entirely different manner to that adopted in Great Britain.

In Ireland a Board of Ordnance under a Master-General, constituted on similar lines to the English Board, was established in the reign of Henry VIII. to take charge of the Fortifications and Ordnance, and on the Staff was a Chief Engineer, who had the superintendence of the King's buildings. This officer seems at first to have been nominated by the Master-General; but, after 1612, he was appointed by Royal Patent, and the first to be so appointed was Sir Josiah Bodley, who was described as "Director-General and Surveyor-General of Fortifications and Buildings." He held the office until 1617, when he was succeeded by Sir Thomas Rotheram and Capt. Nicholas Pinnar, who were joint Directors-General.

In 1670, Sir William Robinson was nominated by Charles II., and occupied the position during the reign of James II., and the civil war in Ireland, which followed the abdication

of the latter. In 1684 William Molyneux was appointed as the coadjutor of Sir W. Robinson, and they held the office conjointly until the former died and the latter resigned in 1700.

James II. fled from London to France, and thence to Ireland, where he landed at Kinsale in March, 1689, and took command of the Irish Army, with which he proposed to continue his struggle for the British crown. The principal method by which he endeavoured to effect his purpose was by carrying out a war of extermination against the Protestants who were loyal to King William, and either killing or driving them out of the country. An army of 10,000 men was sent to Ireland under the Duke of Schomberg to oppose King James in August, 1689, and he carried on the war with varying success until June, 1690, when King William, dissatisfied with the slow progress of the campaign, decided to take command of the army himself in order to put an end to the struggle. On July 1st he completely defeated James at the Battle of the Boyne, and the latter fled to France, leaving the Duke of Tyrconnell to continue the war, while William marched through the south of Ireland, occupying Carlow, Waterford and other places. In August he proceeded to the attack of Limerick, where Tyrconnell had established himself, and which held out so vigorously that William was forced to raise the siege and withdraw his army. He returned to England and appointed General Ginkel to the command of the army in Ireland, to whom Limerick at length surrendered in October, 1691.

But, though this may be regarded as the official conclusion of the war, the country was far from being tranquillized, and it was decided to adopt a policy of quartering troops in many places, in order to be always in readiness for suppressing revolts at short notice. It was this decision that led to the inauguration of the Irish barrack system.

King William ordered a careful study of the question to be made with the object of settling upon the places where barracks were required, and, in 1698, a return was presented to the Irish Parliament giving a list of these places, in order that the money required for building should be voted. The matter was regarded as of such importance that it was not committed for

execution to the Board of Ordnance, but to two newly-constituted public bodies, specially appointed for the purpose.

In December, 1700, Capt. Thomas Burgh succeeded Sir W. Robinson as Chief Engineer and Director-General of Fortifications and, during the same month, the patents for the two new Barrack Commissions were signed by King William. The members of the first commission were called "The Trustees of the Barracks," and their duty was to hold all barrack property on behalf of the Crown.

Their patent commenced thus :—

"Whereas, for the ease of our subjects of our Kingdom of Ireland from the charge and trouble of quartering the several troops and companies of our army there, and for the lodging and receiving such troops and companies, and securing the dangerous passages and fastnesses from Toryes and Rapparees, we have directed the building of convenient barracks and houses in our Kingdom of Ireland; and whereas, the more effectually to obtain these ends, by placing such barracks in the most proper places thereof, several contracts have been made with the owners of the soyle, on which it is judged the same may most conveniently be built for the public service; yet legal conveyances, grants, and leases have not yet been made or executed for want of persons to take such estates, and to contract for such rents as are to be paid for the same."

The patent then went on to appoint the Trustees legal owners on behalf of the Crown for all barrack property, just as the Irish Board of Ordnance held all land occupied by fortifications. The Trustees named in the patent were :—

Sir Thomas Southwell; Brigadier-General R. Ingoldsby; C. Carleton, Esq., Commissioner of the Revenue; Sir William Robinson, late Chief Engineer; and R. Gorges, Esq.

The second commission in connection with the new barracks was a much larger body. The members were called "Overseers of the Barracks," and, in the patent, it was stated that they were appointed :—

"With power to oversee and inspect the barracks, and from time to time to cause the same to be kept in good condition and repair; and to that end, and for that purpose, to give such

orders and directions, as they or any of them shall think proper ; and to observe and do all other matters and things necessary and convenient for the better ordering and regulating the said barracks as shall seem fit and expedient."

The names of the Overseers of Barracks, first nominated, were as follow :—

The Duke of Bolton,	}	Lords Justices of Ireland.
The Earl of Berkeley,		
The Earl of Galway,		

John Methuen, Esq., Lord Chancellor of Ireland.

Major-General Thomas Earle.

The Earl of Mount Alexander, Master-General of the Ordnance.

Sir John Hanmer, Bart.

Colonel R. Ingoldsby.

Colonel F. Langston.

Brigadier-General the Earl of Orkney.

Brigadier-General Zachary Tiffin.

Colonel R. Gorges, Quartermaster-General.

M. Harrison, Esq., Muster Master-General.

Sir R. Pyne, Chief Justice of the King's Bench.

Sir J. Hely, Chief Justice of the Common Pleas.

Robert Doyne, Esq., Chief Baron.

A. Broderick, Esq., Surveyor-General of the King's Manors.

Thomas Burgh, Chief Engineer and Director-General of Fortifications.

R. Rochfort, Esq., Attorney-General.

W. Robinson, Esq., Paymaster-General.

This was a very distinguished body of men to look after the barracks, although too large for practical work ; but the whole business was, judging from the records, conducted by Thomas Burgh, the Chief Engineer, a very capable man for the duty. Burgh, who was born in 1670, served in the Irish wars of 1689-91, and, on their conclusion, was appointed to the Irish Establishment of Engineers. He took part in the war in Flanders during 1692-95 under William III., as one of the King's Company, and, on his return to Ireland, became Engineer on the Establishment in 1691. In 1700, as already

mentioned, he became Chief Engineer in Ireland and took charge of the construction of the new barracks, in addition to his work as Director-General of Fortifications under the Board of Ordnance.

By an Act of Parliament passed in Dublin in 1697, a sum of £25,000 was provided for building barracks in various parts of Ireland, and this Act was succeeded by others, continuing the supply of funds for barrack construction. Of these barracks the most important were those in Dublin, which, as originally designed by Burgh, were to provide accommodation for two regiments of infantry and three troops of cavalry. These barracks, which were called the Royal Barracks, were commenced in 1705 and completed in 1709, at a cost of £22,863. The land, six acres in extent, was purchased for £764. When finished, it was regarded as the largest and most complete barrack in Europe, and was certainly far in advance of anything of the kind in Great Britain or Ireland.

The building was carried out by measurement contract, based on a schedule of prices, a copy of which Burgh presented to Parliament in 1709, and which is worth quoting, for the sake of comparison with the prices of building work at the present time. The return was as follows:—

*Rates of Work for Building the Barracks.*

	£	s.	d.
A perch of stone work .. .. .	0	4	0
A perch of 9-in. brick work .. .. .	0	5	0
A square of roofing .. .. .	1	15	0
A square of flooring and boarding .. .. .	2	0	0
A foot of cut bases and ashlar in hewn stone .. .. .	0	0	8
A yard of flagging the piazzas .. .. .	0	2	6
A yard of flagging the ground rooms .. .. .	0	1	9
A square of quartered partition .. .. .	0	12	0
A square of slating with best Carnarvon slates .. .. .	0	18	0
A square of rendering .. .. .	0	2	6
A yard of plain ceiling .. .. .	0	1	0
A yard of ceiling between joists .. .. .	0	8	0
A yard of mortar flooring .. .. .	0	1	0

			£	s.	d.
A yard of rendering walls	..	..	..	0	0 4
A yard of outside painting	..	..	..	0	0 7
An outside door and case	..	..	..	1	5 0
An inside door and case	..	..	..	0	15 0
A two-light window frame	..	..	..	0	8 6
A casement with four iron springs	..	..	..	0	3 6
A staircase of oak plank	..	..	..	5	0 0
A foot of glazing, the lead being very strong	..	..	..	0	0 6
A yard of paving	..	..	..	0	0 3
A foot of hearthstone	..	..	..	0	1 0

(Signed) THOMAS BURGH,

*Engineer and Surveyor-General.*

In 1717 there were 19 new barracks in course of construction in different parts of Ireland, the garrison then consisting of four regiments of cavalry, six regiments of dragoons, and 20 regiments of infantry.

Besides the barracks and fortifications, Chief Engineer Burgh had charge of the erection of other important Government buildings. Among these were the Custom House near Essex Bridge, the Council Chamber in Dublin Castle, the Armoury and Magazine, and a work, by which he will always be remembered, the Library in Trinity College, which was completed in 1732 at a cost of £17,000.

Lieut.-Colonel Burgh held the appointment of Chief Engineer until his death in 1730, and was succeeded by Capt. Sir Edward Pearse, who designed and erected the Irish Parliament House in College Green, which is now occupied by the Bank of Ireland. The first meeting of Parliament in the new House was held in 1731, when Pearse received the thanks of the Lords and Commons, and was given the honour of knighthood in recognition of his services. He died in 1733, and was succeeded as Chief Engineer by Arthur Dobbs, another officer of considerable ability, who appears to have carried out his duties in connection with the barracks in the same satisfactory way as his predecessors.

Dobbs resigned the post of Chief Engineer in 1744 to take

up work in connection with the British Colonies in America, and, in 1753, was appointed Governor of North Carolina, where he remained until his death in 1765. He was a successful administrator, especially in dealing with the Indians, of whom there were at that time a large number in the Colony.

On the resignation of Dobbs, Arthur Jones Nevil was appointed Chief Engineer of Ireland, a man who, as events proved, was unfitted for the responsible position. By this time the duties of the Trustees of the Barracks appear to have been handed over to the Overseers of the Barracks, and the latter Board had been largely increased. In the patent of 1746 the members included the Lord-Lieutenant, the Archbishops of Armagh and Dublin, the Bishop of Kildare, *all* the general officers, *all* the judges, with many other high officials, among them being the Master-General of the Ordnance, and the Chief Engineer. But, though so important a body, they do not appear to have troubled themselves to look after the barracks, which seem to have been left in the hands of Nevil, and the latter, in his turn, did not look after his subordinates. The natural result was that the barracks, of which there were 32 for cavalry, and 41 for infantry, scattered over Ireland, were seriously neglected and complaints were forwarded by different commanding officers pointing out the bad condition of the quarters for the troops.

Upon this the Lord-Lieutenant ordered Nevil to send in a full report upon the state of the different barracks, and, as this was regarded as unsatisfactory, a Parliamentary Committee was appointed which went thoroughly into the question and took evidence with regard to each of the barracks. The result of the investigation was that the Committee reported very strongly against the manner in which Nevil had carried out his duties and, in August, 1752, he was dismissed from the post of Chief Engineer. In the following year he was expelled from the Irish House of Commons, in which he sat as Member for Wexford, "for misappropriating the money allotted for building barracks, and erecting many of them in such a way as to endanger the health of the troops." It was said in the House of Commons, alluding to his second Christian name,

that "he was not 'Inigo Jones,' but 'Out I go Jones.'" The story of Chief Engineer Nevil should be a lesson to Engineer officers not to neglect their barrack duties.

It is somewhat remarkable that the Committee did not attribute blame to the Overseers of the Barracks, who had certainly neglected their duties as well as Nevil, but this was evidently realized by the Government, as, shortly afterwards, the ornamental Board was done away with and replaced by a working Board of seven members, who were paid £400 a year each, and were invested by patent with all the duties of the Trustees and Overseers of the Barracks. They were called the Commissioners of the Barracks.

Nevil was succeeded as Chief Engineer of Ireland by Lieut.-Colonel Thomas Eyre, who had begun his Engineer service in 1741 in South Carolina. He seems to have been a competent officer and held the appointment for 14 years. Like all the Chief Engineers of Ireland, Eyre sat in the House of Commons, being Member for Thomastown, and died, when speaking in the House, in 1772. When he resigned in 1766, Lieut.-Colonel H. M. Mason was selected for the post, and was followed in 1776 by Major Pigott, who was the first Irish Engineer officer to attain the rank of Major-General. He died a month after his promotion to that grade in 1793. During his term of office the Royal Barracks in Dublin were enlarged, and were but little altered during the succeeding century.

The last Chief Engineer of Ireland was General Charles Vallancey, who succeeded Pigott in 1793, and who retired from the Service in April, 1801, when the British and Irish Parliaments were united, and the Irish Board of Ordnance was abolished. After that time the duties of the Chief Engineer were carried out by the Commanding Royal Engineer for Ireland, appointed by the British Board of Ordnance. The first officer, so appointed, was Lieut.-Colonel B. Fisher, R.E., who was stationed in Ireland from 1801 to 1811.

But though the Irish Board of Ordnance ceased to exist at the Union, the Commissioners of Irish Barracks were continued until 1822, when by an Act of Parliament, passed on August 5th of that year, all the powers of that body were transferred to the



Board of Ordnance, which then became the sole authority for the construction and maintenance of barracks in the United Kingdom.

It has already been explained (see p. 132) that all the barracks in Great Britain were in the charge of the Board of Ordnance up to 1792. The estimate for barrack construction and maintenance had always been carefully prepared by the Board and submitted for the sanction of Parliament before expenditure was incurred, and the work was carried out under the direction of the Chief Engineer, a trained and competent officer. The rigid cæte, with which the Board suppressed expenditure, is well illustrated by the case of Lieut.-Colonel Andrew Frazer, R.E., who was cashiered by court-martial in 1792 for constructing works without proper authority.

Frazer, who appears to have been a very capable officer, joined the Engineers in 1759, and, after serving under Lord Tyrawley in the campaign in Portugal in 1759, was placed in charge of the demolition of the fortification of Dunkirk in 1763, though only a lieutenant of four years' service. Here he remained until 1779, and was then sent as Commanding Royal Engineer to Scotland and made the plans for the defences of the coast. In 1781 Capt. Frazer was the successful competitor for the erection of St. Andrew's Church, Edinburgh, which was built in accordance with his designs, but he refused to accept the premium and asked that it might be given to the next best competitor.

In 1787 Frazer was appointed Commanding Royal Engineer of Grenada and the adjacent West Indian Islands, and here committed the offence for which he was tried. The fact seems to have been that he found that certain works, including alterations in the defences and barracks for the Artillery in Grenada, were absolutely required, and he proceeded with their construction without proper authority from the Board of Ordnance. He was ordered home to England and was tried by general court-martial at the Horse Guards on January 16th, 1792, on several charges, to the effect that he had carried out works and expended money on his own responsibility, and

without authority from England. The Court stated that it had not been proved that the works were unnecessary, but, notwithstanding this, he was sentenced to be cashiered and the sentence was confirmed. By order of the Duke of Richmond, the Master-General of the Ordnance, a copy of the finding and sentence was sent to every Commanding Royal Engineer at home and abroad.

In the *Gentleman's Magazine* for 1792, the case was alluded to in the following words:—

"Colonel A. Frazer died in July, 1792, on his road to Geneva. Lieut.-Colonel Frazer was the excellent officer, whom it pleased the Duke of Richmond to try by a Court-Martial, for doing, though he followed precedent, what he certainly was not justified in doing, and wasting the public money, though not to his own emolument. The Court was obliged to break him. If the Duke of Richmond would have asked for his restoration it would have been readily granted. Too delicate to implicate others in the censure, though he could have produced a justification; too high-spirited to bear the appearance of disgrace, he went abroad and died."

The Board of Ordnance no doubt felt that they were responsible to Parliament for the expenditure of public money, and that it was absolutely necessary that all their subordinate officers should adhere strictly to the regulations. Such a system insured that no money should be wasted, and that no unnecessary barracks should be built, and it contrasted in a remarkable manner with the system of barrack construction in Great Britain which was established in 1792.

In that year the Government, of which William Pitt was then Prime Minister, decided that it was necessary to build a large number of new barracks for cavalry and infantry, and, instead of applying to the Board of Ordnance to construct them in the usual way, it was arranged to make a completely new department, and to place it in the charge of a cavalry officer, Colonel Oliver De Lancey, of the 17th Light Dragoons, who at that time held the appointment of Deputy Adjutant-General.

The way in which the department was started is best given in De Lancey's own words\* :—

" In the month of June, 1792 (being then Deputy Adjutant-General), I was directed to attend at the house of Mr. Dundas (now Lord Melville) at Wimbledon, where I found Mr. Pitt, Sir George Yonge, and several other persons. The conversation was on the subject of erecting barracks in different parts of England, which it was necessary should be erected with the utmost despatch, and I was particularly desired to undertake this service ; and being perfectly convinced from the situation of the country (with which I had been able to make myself intimately acquainted) of the necessity of the measure, and that it would not admit of delay, I next day arranged with the Secretary at War the mode of proceeding ; and, as no circumstance whatever would have induced me to entertain the idea of becoming a public accountant, it was settled that all payments should be made by the officers commanding the troops on the spot, giving drafts on their respective agents for the amount of the demands of the tradesmen employed. This circumstance I communicated personally to Mr. Pitt, who approved thereof, as the best and most simple mode of proceeding ; I therefore undertook this service on the express stipulation that I was not to become a public accountant. The great advantage arising from the mode of establishing barracks throughout the Kingdom having become evident, and it being necessary to put all matters relative thereto on a proper footing, a Warrant was issued in the year 1793 by the King, for the regulation thereof, and I was appointed, in addition to my situation as Deputy Adjutant-General, to be Superintendent-General of these barracks, and all matters relative thereto, under the immediate direction of the War Office."

The Warrant, or Letter of Service referred to, was as follows:—

WAR OFFICE, *January 1st, 1793.*

SIR,

The barracks in this Kingdom having been considerably increased, and the business relative thereto having, in consequence, become very extensive, it is found necessary to appoint a person to have the superintendence of the same.

\* See 1st Report of Commissioners of Military Enquiry, 1806, p. 96.

The King has therefore been pleased to order that you do take upon you the general superintendence and management of all matters relative to barracks, under the immediate direction of this Office ; to see that the Barrack Masters do diligently fulfil the duties of their office ; that the troops are regularly supplied with the different stores, fuel, candles, and other articles, to which they are entitled ; and that, in all circumstances, the business be conducted in conformity with His Majesty's Regulations ; and you are from time to time to make reports to this Office of every circumstance with which it may be necessary that I should be acquainted.

You are also to take upon you the general superintendence and management of all matters relative to the purchase and delivery of forage for the horses stationed in the second cavalry barracks.

And you are to collect and make up half-yearly, or as often as it shall be thought expedient, accounts, under the several heads of all expenses incurred on account of the said barracks, or of the troops stationed there, and transmit the same to this Office.

And for this service you will be allowed the sum of £1 ros. per diem, with such other travelling and contingent expenses as you shall be unavoidably obliged to incur in the execution of the duties of this Office, from Christmas last.

I have the honour to be,

Etc., etc.,

GEORGE YONGE.\*

To COLONEL DE LANCEY.

By a subsequent Warrant, the barracks for the ordnance troops, the Artillery and Engineers, were exempted from the jurisdiction of the Barrack Master-General, and left in charge of the Board of Ordnance. But all other barracks, their construction, maintenance and equipment, and the supplies to the troops therein, were taken away from the Board and put in charge of Colonel De Lancey, who, as subsequent events proved, was quite unfitted for the post.

As soon as the new Barrack Department was set on foot, the construction of barracks was taken in hand and proceeded with

\* Sir George Yonge was Secretary at War, 1782—1794.

rapidly, apparently in a manner wholly regardless of economy. The cost was not submitted to Parliament in estimates, but was charged to what was called "The Army Extraordinaries" which meant money expended on the responsibility of the Government, without reference to Parliament. Mr. Clode, in his work entitled *The Military Forces of the Crown*, has well summed up the matter in the following words\* :—

"In looking back on these transactions, it is impossible to do more than conjecture what could have been the real motive of suddenly improvising such a staff of inexperienced persons. If the object was to withdraw a large expenditure from the control of Parliament, by placing it in the hands of persons holding commissions from the Sovereign, and ignoring the authority of Parliament, or of persons unskilled in public affairs, ignorant of pecuniary or Parliamentary responsibility, untrained in the constitution of a large public department, and knowing only the rule of implicit obedience to a military superior, then the plan succeeded, at the cost of a vast waste of public money."

"When a department of the State (*i.e.* the Board of Ordnance) and all the public servants under it, are deliberately set aside, and their duties handed over to novices, the motive—whatever be its character—must be great and overpowering; for, though the result of such an experiment *may* be successful, yet, if failure or waste ensues, the scandal of these consequences is rather to be borne by the authors, than by the subordinate agents of the scheme, who, if honest, may have done their best to discharge the untried duties which they have been engaged to fulfil. In this instance anything more reckless than the expenditure cannot be conceived, or more wanting in official guarantees for the propriety of it. Thus, in one instance, a barrack for 1,000 men was *ordered* by the Commander-in-Chief and sanctioned by the Secretary at War on the same day *verbally*; and, in another, an expenditure of £88,000 was immediately entered upon, with the *order* of the Commander-in-Chief, but without even the verbal sanction of the Secretary at War. But how could an inferior military officer hesitate to obey such a command, or—being under the Mutiny Act—be blamed for doing so."

\* See *The Military Forces of the Crown*, Vol. I., p. 253.

"It is scarcely possible to doubt but that the Ordnance Department was put aside advisedly, to let in the power of the Commander-in-Chief, because the constitution of the Board interposed too many checks and safeguards in the expenditure of public money. Under the Ordnance Board such scandals would have been impossible, or possible only upon such a dereliction of prescribed duty as would have rendered the Board officers and their inferiors liable to punishment—to Parliamentary impeachment and criminal prosecution. That Board acted under the Treasury for finance, and the Secretary of State for executive duties; and hence their action needed the sanction of the highest ministerial officers of the Realm. Men of that calibre would have hesitated before they sanctioned acts that might—as those of the Barrackmaster-General did—become the subject of public reprobation and Parliamentary censure; whether they would, on the order of any Commander-in-Chief, have raised 203 barracks for 17,000 cavalry and 146,000 infantry, in direct violation of public feeling expressed so strongly in Parliament against barracks, some persons may think to be more than doubtful."

For some years this extraordinary barrack system remained in full swing, notwithstanding several ineffectual protests against it in Parliament. De Lancey, who was promoted Major-General in 1794, and Lieutenant-General in 1801, and had had his pay raised to £8 per diem, seems to have kept no check whatever on the expenditure, nor on the contractors employed in the construction of barracks. For the first few years he submitted accounts to the Secretary at War, who took no steps to have them efficiently audited, and after that the accounts seem to have passed into chaos. At last the Auditor-General called upon him to submit his accounts, and he refused to do so on the ground that he was under the Secretary at War and had nothing to do with the Auditor-General.

Upon this there ensued a long correspondence between the Barrackmaster-General, the War Office, and the Treasury, when it was decided that, in order to comply with the Acts of Parliament dealing with the finances of the country, the accounts of the Barrack Department *must* be submitted to the Auditor-General. Upon this De Lancey resigned, on the ground of ill-

health, in November, 1804. Two years later, when the Commissioners of Military Enquiry were appointed, the first department selected for investigation was that of the Barrack Office.

It was then found that the accounts had not then been audited or even submitted in an intelligible form by General De Lancey, although ordered to send a complete statement up to the date of his resignation; but, from a general statement given to the Commission, it appeared that over £9,000,000 had been expended by him during his years of office, out of which nearly £4,000,000 was for the construction of barracks, and that many of these were only partially paid for. Some of the items in the account are worth notice. It appeared that during his twelve years of office, De Lancey had drawn £26,007 for pay, £8,817 for travelling expenses, and no less than £88,923 for contingencies. Out of the latter he had bought a residence and furnished it at a cost of £8,000.

It is hardly necessary to say that De Lancey's account was never completely adjusted, but, notwithstanding this, he was not punished, but, on the contrary, was given a pension of £6 per diem for life. It is interesting to contrast his treatment with that of Nevil, Chief Engineer of Ireland, (see p. 139) and of Lieut.-Colonel Frazer (see p. 141).

After the resignation of General De Lancey, Major-General George Hewett, an infantry officer, was appointed Barrackmaster-General, but he held the office for a short time only, as, in 1806, he was sent as Commander-in-Chief to India. Soon afterwards, the post of Barrackmaster-General was abolished, and a Board of three Commissioners, somewhat on the lines of the Irish Board, was entrusted with all duties in connection with barracks. This Board in its turn was done away with in 1817, and a Controller of Barracks was nominated, an office which lasted until 1822.

It has already been shown that, when the Cavalry and Infantry Barracks were taken away from the control of the Board of Ordnance in 1792, the construction and maintenance of Artillery and Engineer Barracks were left in charge of the Board. Of these the most important built in the period under

consideration were the Royal Artillery Barracks at Woolwich, Portsmouth and Jersey, constructed between 1792 and 1797; and the Brompton Barracks at Chatham, commenced in 1804 and completed in 1806. The Brompton Barracks, which were originally intended for Artillery, were designed by Mr. Wyatt, a civilian architect, and constructed under the superintendence of Capt. R. D'Arcy, then Commanding Royal Engineer, and Lieut. T. Cunningham.

In 1818, the Duke of Wellington, who had commanded the Army of Occupation in France after the downfall of Napoleon, returned to England, and was immediately appointed Master-General of the Ordnance. As one who had a thorough knowledge of the wants of the British soldier, he naturally soon had his attention directed to the barrack question, and arrived at the conclusion that the most satisfactory course to adopt was to do away with the Barrack Departments both in England and Ireland altogether, and to place the barracks of the United Kingdom under the proper authority, the Board of Ordnance, the construction and maintenance being carried out by the Royal Engineers under the Inspector-General of Fortifications.

The reasons, which led the Duke to come to this decision, were well described in a Memorandum written by the late Field Marshal Sir John Burgoyne when he was Inspector-General of Fortifications, a paragraph in which was as follows :—

“ The first duty of the Corps (*i.e.* of Royal Engineers) is to plan, construct and maintain all fortifications and works of defence, with their casemates, magazines, and other essential buildings, as well as all stores and premises that are necessary for the Ordnance Branch; to which the Duke of Wellington, then Master-General of the Ordnance, in the year 1822, added the barracks in the United Kingdom, to the great advantage of the public service, and to a considerable saving. The construction and regulations of the barracks had been until then conducted by a distinct Barrack Board, which had its separate establishment and was worked entirely by civilians. The system was expensive, the barracks usually very bad, and many held under very objectionable tenures. These evils, except the expense of the establishment, might have been removed; but, having a Corps, which must be maintained on other accounts,



and which it was most desirable to retain in strength sufficient to meet the contingencies of war, and for relief to foreign stations (because it takes a long time to raise them), there was much advantage in breaking up a separate establishment, and in adding its duties to that of a military service that required similar qualifications."

Sir John Burgoyne did not realize that the Duke of Wellington's proposal was not a new idea, but was simply a return to the system which had worked satisfactorily for many years, and had been upset in 1792, when the Department of the Barrackmaster-General had been established; but this was natural, as Sir John did not enter the Army until 1798, six years after the new system had commenced.

The decision to place all the barracks in the United Kingdom in charge of the Board of Ordnance, was confirmed by an Act of Parliament passed in 1822 (3 George IV., cap. 108), by which the Barrack Departments in both Great Britain and Ireland were done away with, and all barracks and military lands were handed over to the custody of the Board, which thus became the sole authority for all fortifications, military buildings and property in the United Kingdom. The Inspector-General of Fortifications at the time of this important change of policy was General Gothe's Mann, who had been appointed in 1811, and remained in office until his death in 1830. The total amount expended on barrack construction in Great Britain from 1793 to 1819 was £6,601,404, of which £3,918,475 was spent by General De Lancey while Barrackmaster-General.

The barrack question was again raised in Parliament in 1828, and was carefully considered by the Committee on Army Estimates, when some interesting evidence was given on the subject. For instance Sir Henry Hardinge, the Clerk of the Ordnance, stated that he was not of opinion that it would be more economical to employ civil architects rather than military engineers, and he considered that the construction and maintenance of barracks could be carried out more economically by officers of the Royal Engineers than by any system of civil architects and clerks of works. He stated that Engineer

officers displayed the singular instance of being the only officers in the Army, who, by their services in time of peace, repaid to the public the whole of their maintenance. He also stated that he considered it would be even more impracticable to build barracks abroad by civil architects than at home, because men of talent would not be tempted by the salary that could be given to them. The Parliamentary Committee was satisfied, and the barracks were left in charge of the Board of Ordnance until the latter was abolished in 1855.

For some years after the Board of Ordnance resumed charge of the barracks, the amount expended on new buildings was small; the Army had been largely reduced on the termination of the French War; and, on the other hand, the amount of accommodation for troops which had been provided since 1792, if unsatisfactory, was very considerable. In consequence of this, the only barracks of any importance built between 1822 and 1845, when Sir John Burgoyne was appointed Inspector-General of Fortifications, were the following:—In London, St. George's Barracks (1826), Wellington (1831), and St. John's Wood (1835); in Manchester, Salford Infantry Barracks (1824), Hulme Cavalry Barracks (1829); at Portsmouth, the Cambridge Barracks (1825). In Ireland the Beggar's Bush Barracks, Dublin, were built in 1827, and the barracks at Londonderry in 1841.

Sir J. Burgoyne was given the post of Inspector-General of Fortifications in 1845 on the resignation of Sir Frederick Mulcaster. Sir John had been Commanding Royal Engineer at Chatham from 1821 to December, 1826, and had given much attention to the subject of barrack construction, having been President of a Committee appointed by the Duke of Wellington to investigate the question of the Barrack Department; and there can be no doubt that the Duke was largely guided by his advice, as regards doing away with this department, and restoring to the Board of Ordnance the duties in connection with barracks. One point which particularly impressed him was, that, under the Barrack Department system, there was no sufficient check to ensure economy, nor to guard against bad practices.

In one of his letters to the Duke of Wellington's private secretary, he wrote as follows :—

" The observations I was enabled to make on the late enquiry into a specific charge against Mr. — did not enable me to understand the entire mode of conducting the works of the Barrack Department ; but I could see enough to feel convinced that the system was a bad one. The accounts are all mixed up together, in a manner which renders it impossible to separate the expense of any one job from that of the whole mass of work, and which consequently prevents investigation into any specific abuse that may be suspected or pointed out."

" The clerk of works and contractor arrange everything between them, without any control, except that very general one that can be exercised by the surveyor from London ; if they combine together, they may therefore defraud Government to a great extent, and if the surveyor (if that is his title) at all connives at their proceedings, the facilities are of course very much increased."

" Now the Engineer Establishment (at this place for instance) consists, besides myself, of a subaltern officer, a clerk of works, an office clerk, an overseer, and a foreman of each trade, each taking an active part, and being a mutual check upon the others."

" I used formerly to consider such establishments for superintendence and check, as are usually kept up in the Ordnance Departments, to be needlessly large and expensive ; but I now feel convinced that, even with our small expenditure, there is no real extravagance in the system, and still less with reference to more extensive works. I do not mean to say that some little abuses may not take place ; but I think that they can only exist to a small extent, and must be carried on with great risk."

" In the Barrack Department the barrackmaster is a cypher, as far as regards the works ; there are no overseers, no foremen, and the contractor's people must necessarily be employed both for day and measurement work, which are jumbled up or separated, at the discretion of the clerk of works, *after the work is done*. He is the only check on the contractor, and, however honest he may be, it is impossible for him alone to inspect and see justice done to Government ; and moreover, at this place, besides all the work going on (to the extent, as I am told, of

£2,000 in a year) the same clerk of works has also to attend to Maidstone and Sheerness."

The most important barracks built under the supervision of Sir John Burgoyne before the Crimean War were the following :—Horfield Barracks at Bristol, completed in 1847 ; Preston Barracks, 1848 ; The Guards Barracks in the Tower of London, 1851 ; Sheerness Barracks, 1854 ; Sheffield Barracks, 1854. The Raglan Barracks at Devonport were commenced in 1854 and completed in 1856. All these barracks, although deficient of many things now considered to be absolutely necessary, were a distinct advance on older constructions, and, in some of them, separate accommodation was provided for married soldiers, who, as a rule, had to live with their wives and families in the rooms occupied by single men.

Prior to the Crimean War the question of the accommodation provided for the soldier attracted little public attention in England, and successive governments seem to have thought more of economy and the reduction of the Army and Ordnance Estimates to the smallest limit, than of improving the efficiency of the Army ; but that war caused a flood of light to be thrown on military matters, and led to many changes in administration, of which one of the most important was the abolition of the Board of Ordnance in 1855, and the transfer of its duties to the office of the Secretary of State for War, a change which appears to have been decided on with little consideration, and in the absence of the Master-General of the Ordnance, Lord Raglan, then in command of the British Army in the Crimea. A full account of this transaction, of the reasons for it, of the objections to it, and of the evils which have resulted from it, is given in Clode's *Military Forces of the Crown*, Chapter XX., a work already referred to. So far as the Royal Engineers are concerned it is unnecessary to go into these, as it did not affect their duties, and only caused a change of masters, the command and discipline of the Corps passing to the Commander-in-Chief, while everything that had to do with buildings, fortifications, lands, and stores was placed under the authority of the Secretary of State for War.

Lord Aberdeen's ministry resigned on February 1st, 1855,

after being defeated in the House of Commons, and he was succeeded as Prime Minister by Lord Palmerston, who appointed Lord Panmure Secretary of State for War. In the May following the Board of Ordnance was done away with, and questions respecting barracks came under the authority of the Secretary of State.

Lord Panmure took much interest in such matters, and in May, 1857, he appointed a Royal Commission, under the Presidency of Mr. Sidney Herbert (the late Lord Herbert of Lea), to enquire into the Regulations affecting the sanitary condition of the Army, including those for the provision of barrack accommodation for the troops, and the construction of military hospitals. The Royal Commission took a great deal of important evidence with regard to barracks and their Report may be regarded as the foundation stone of modern improvements in barracks.

As it was clearly impossible for the Royal Commission to visit all the barracks, Lord Panmure appointed a Committee in October, 1857, of which Dr. John Sutherland was chairman, and Captain Douglas Galton, R.E., was one of the members, to report on the sanitary condition and improvement of barracks and hospitals. This Committee, which visited nearly every barracks in the United Kingdom, sent in their Report in April, 1861. This Report is well worth study by anyone who wishes to understand what barracks used to be, and what important changes for the better have been carried out since that time.

The Royal Commission had recommended that 600 cubic feet of space should be given to each soldier in barrack-rooms, but the Committee found that this amount of accommodation was quite exceptional, and that, in order to give it in the 162 barracks examined, it would be necessary to reduce the regulation number from 75,801 to 53,806 men. It is easy to understand this, as, at a number of stations, there was a total of 34,882 men who had less than 400 cubic feet each, while in some barracks there was less than 250 cubic feet per man.

Besides the insufficiency of accommodation the Committee found many other improvements required as regards ventilation, drainage, the provision of married soldiers' quarters, etc.

They were authorized to spend a sum of £100 per barrack on an average in making the most important alterations, but this sum, as they pointed out, was quite inadequate to meet the case.

In 1859 Capt. Galton was appointed Assistant Inspector-General of Fortifications specially with regard to carrying out the improvements in barracks, and, in 1861, he was sent with Dr. Sutherland to the Mediterranean stations to make a similar report on the barracks and hospitals as they had done for the home stations, and they investigated the conditions of the former in the same thorough manner.

In 1862 the Barrack and Hospital Improvements Committee was formed by the then Secretary of State into a permanent body to advise him on all questions with regard to the sanitary condition of barracks and hospitals, and to examine the plans for all new barracks and military hospitals from the sanitary point of view. The Quartermaster-General was made President of the Commission, and the members were :—Captain Galton, who had become Assistant Under Secretary of State for War ; Captain Belfield, Deputy Director of Works for Barracks, and Doctors Logan and Sutherland, of the Army Medical Department. Three additional members were added on behalf of the India Office in 1863, of whom one was Mr. Rawlinson, Engineering Inspector to the Local Government Board. In 1865 the title of the Commission was altered to that of the Army Sanitary Committee.

This Committee, which continued to exist until 1904, did most useful work, and to it are due many of the great improvements in barrack construction carried out during the forty years of its existence. For these a great part of the credit must be given to the late Sir Douglas Galton, who did as much, if not more, than any one in improving the comfort and health of the British soldier.

During the progress of the Crimean War it was decided to erect camps in temporary materials at Aldershot, Colchester, Shorncliffe, and the Curragh, but, at the time of their construction, these were not regarded as permanent buildings, and were only expected to last for a few years. They were in fact intended to save the expense due to the wear and tear of tents

and other camp equipage. This view of the case was well expressed by Lieut.-Colonel H. V. Lugard, R.E., who had charge of the construction of the Curragh Camp, which was commenced in January, 1855, and who, in the Report on the operations connected with the formation of the camp, used the following words :—

“ The first reflection which naturally occurs is one of regret that this extensive amount of accommodation for troops (for 10,000 men) was not constructed of more permanent materials ; but it is necessary to bear in mind that the camps in England, as well as at the Curragh, were first called into existence by the exigencies of the Service in a time of war, when the embodiment of the Militia pressed for a large amount of barrack accommodation, and the necessity for training troops in large bodies became apparent. The first idea, probably, was to provide shelter for the soldier somewhat superior to that afforded by canvas tents in a humid climate, but with no view to a more permanent occupation than was absolutely necessary for the training and requirements of the Army during the continuance of the war—views which would appear, however, to have been enlarged upon during the early progress of the camps first undertaken. Hence the adoption of wood and other temporary and perishable materials, in the construction of these military towns ; for neither could the amount of bricks have been obtained, nor the quarters have been erected of masonry, within any reasonable period, or with sufficient rapidity, to meet the primary object of the measure.”

After completing the camp, Colonel Lugard went to China as Commanding Royal Engineer, and died at Hong Kong in November, 1857, when making arrangements for the attack on Canton. He would have been somewhat astonished if he had known that some of the temporary huts which he had built were still in use for the accommodation of troops 40 years afterwards, and that for many years they had practically been regarded by the authorities at the War Office as permanent barracks !

Although the huts at Aldershot were only erected as a temporary expedient, it was considered that, as the country in the vicinity afforded admirable opportunities for the training of

troops, it was desirable to make it a permanent military station, and in 1856, the barracks, now known as the Wellington Lines, were commenced. These were designed to contain three regiments of cavalry, six batteries of artillery and four battalions of infantry. They were completed in 1860, at a cost of a little over £600,000.

Another important barrack built at this period was that for the Guards at Chelsea, commenced in 1861. This was erected in accordance with designs furnished by Mr. J. Morgan, a civil architect, to whom the necessary military details were furnished by the Inspector-General of Fortifications. This was an expensive barrack, as it cost £194,000, or £166 per man, whereas the infantry barracks at Aldershot had cost £191,000, or a little under £45 per man.

The experience of the Crimean War had shown the great want of hospital accommodation in England, suitable for the reception of sick and wounded soldiers during a large campaign, and, in 1856, it was decided to construct a military hospital at Netley, on Southampton Water, for 1,000 beds, which was completed in 1864 at a cost of about £328,000. The designs for this hospital were made before the Report of the Barracks and Hospitals Improvements Committee had been drawn up, and, although far in advance of earlier military hospitals in many particulars, it would not now be regarded as a satisfactory building.

Not long afterwards an opportunity was afforded for the erection of a large military hospital on correct sanitary principles.

In 1858, when the Barracks Improvement Committee inspected the hospital at Woolwich, they found that it was supposed to contain 450 beds, and that there were actually 529 patients in it, although at the proper rate of 1,200 cubic feet per bed, there should only have been 304. The arrangements in many particulars were defective, and, no accommodation being provided for the orderlies, they had to sleep in the wards with the patients. The crowding became worse in the following year, and it was necessary to put up tents for the reception of the sick.



This serious state of affairs was brought to the notice of Lord Herbert, who had become Secretary of State for War in 1859, and who, having been President of the Royal Commission on Barracks and Hospitals, was able fully to realize the urgent need of providing better accommodation. He therefore decided to convert the existing hospital at Woolwich into barracks for the Military Train, and to build an entirely new hospital, on the most approved sanitary principles, on a new and healthy site, at some distance from the barracks. This was the origin of the building, which was properly called the Herbert Hospital to keep in memory the name of the statesman, to whose initiation its erection was due.

The designs were made at the War Office under the direction of Captain Douglas Galton, who, as has already been mentioned, had recently been appointed Assistant Inspector-General of Fortifications, and who at that time had a more thorough knowledge of the correct principles of hospital construction than any man in the Corps. Naturally many changes on previous ideas were introduced in the designs, and of these perhaps the most important was the adoption of the pavilion principle of construction, which ensured that all the wards should have windows on both sides, and that every bed should be next a window. The administration building was made a separate block from the wards, and the kitchen was also placed in a separate block. This pavilion arrangement, first adopted in the Herbert Hospital, has since then been regarded as a *sine quâ non* in all military hospitals, and the credit for it is principally due to Captain Douglas Galton.

The Herbert Hospital, which contained 654 beds, was commenced in 1861 and completed in 1864 at a cost of £220,884, or about £338 per bed. The Commanding Royal Engineers at Woolwich who had charge of the construction were Colonel Ford and Colonel Hawkins, and Captain Newsome was the Executive Officer who superintended the work.

The next important epoch of barrack building in the United Kingdom was in 1872, when additional barracks had to be provided to meet the necessities of the new system of Army organization established by the late Lord Cardwell, then

Secretary of State for War. It is not necessary to describe the details of his scheme, as they are well known, except so far as they concern the work of the Royal Engineers. Up to that time 58 battalions of the Infantry of the Line had been organized in regiments of two or more battalions, and the remaining 83 were single battalions. In the case of the former, when one battalion was at home and one abroad, the recruits required for foreign service were supplied from the home battalion; but, with the single battalions, if the battalion were abroad it was necessary to leave one company at home, and these companies were grouped in four company depôts, which were practically small battalions and treated as such.

Under Lord Cardwell's scheme it was decided to link the whole of the Line battalions into groups of two battalions and to form a separate depôt for each of these groups. The Guards and Rifle regiments had already a special organization and permanent depôts of their own, and did not, therefore, enter into the new scheme.

The groups of two battalions thus formed, were to be worked as one corps, of which one battalion would be at home, and one abroad in time of peace, while the depôt was to be formed of two companies from each of the battalions. The Militia was also brought into the scheme by attaching one or more Militia battalions to each of the Line regiments, with their headquarters at the same regimental depôt. In case of war, if the home battalion of the regiment went on foreign service, one of the corresponding Militia battalions was to be embodied at once to take its place. All recruits, both for Line and Militia, were to be brought to the depôt on enlistment, and receive their preliminary training, before being drafted to the battalions.

The carrying out of this new scheme necessarily involved the provision of a large number of new barracks to accommodate the regimental depôts, especially as it was intended that each of these should be situated in the country to which the regiment belonged. The decision to equalize the number of battalions at home and abroad also increased the number of those for

which accommodation had to be provided in the United Kingdom, and, in addition, it was decided to provide barracks for the continuous training of the Militia in certain counties, and to build storehouses in every district for the arms of the Regular troops, the Militia and Volunteers, and to establish a tactical training station for the north of England.

As the provision of the necessary funds for these extensive proposals would have been far too heavy a burden to place on the Army Annual Estimates, Lord Cardwell decided to ask Parliament for a loan of £3,500,000, and an Act, entitled the Military Forces Localization Act, was passed for this purpose in August, 1872, and the works were commenced with as little delay as possible.

The Act was divided into five heads which were as follows :—

1. Provision of regimental dépôt barracks and storehouses.
2. Provision of barracks to take the place of existing barracks required for conversion into dépôts, and of barracks for training Militia.
3. District store establishments.
4. Purchase of land for new dépôt centres, and at certain tactical centres for training troops.
5. Contingent expenses, including cost of superintending staff.

Under the first head 23 new single regimental dépôts and five new double dépôts were provided, while 29 existing barracks were converted into single dépôts, and two existing barracks into double dépôts.

New barracks, and additional accommodation at existing barracks to replace those which had been allotted as dépôts, were provided at 12 stations, and training barracks for Militia at four stations, while land for training troops was purchased at Aldershot, Strensall, and Wormwood Scrubs, near London.

The Military Forces Localization Act naturally threw a great deal of additional work on the Royal Engineers, both at the War Office and in the districts, and in December 1872, two Assistant Directors of Works for Barracks were appointed, Colonel E. C. Gordon and Lieut.-Colonel P. Ravenhill, while Major H. C. Seddon had charge of the design branch organized for the preparation of the plans of the many new buildings.

which had to be erected. The Engineer Staff in the districts was increased, and specially selected officers were placed in charge of the different new stations, as it was considered desirable that, as far as possible, the same officer should have charge of each important work from its commencement to its conclusion. For example Colonel J. M. C. Drake had charge of the important new barracks at Lichfield from the time the works were started until 1882, when he proceeded to Egypt on active service.

By that year the greater part of the Loan works had been completed but it was not possible to close the accounts finally until some years later, when the total expenditure under the Act was recorded as follows :—

	£
Head 1. Provision of dépôts .. .. .	2,335,682
„ 2. Provision of barracks other than dépôts ..	549,623
„ 3. District store establishments .. ..	13,205
„ 4. { Purchase of land at dépôts .. ..	181,338
{ Purchase of land for training .. ..	279,449
„ 5. Contingent expenses including staff ..	139,727
	<hr/>
	£3,499,024

Making a total of £976 less than had been authorized by the Act. The amount of new barrack accommodation provided under this Loan included quarters for 542 officers, 2,014 married non-commissioned officers and men, 13,350 single men, 977 hospital beds, and stabling for 1,118 horses.

During the years in which the expenditure under the Military Forces Localization Act was in progress, the following barracks were constructed out of funds provided in the Army Estimates : the barracks of the Household Cavalry at Knightsbridge, Hyde Park, and the Maryhill Barracks, near Glasgow.

In 1888, the Imperial Defence Act was passed, by which a Loan of £2,600,000 was authorized for the improvement of the defences of British military ports and coaling stations abroad, and out of this the sum of £350,000 was allotted for the provision of additional barrack accommodation in certain Colonies,

rendered necessary by the increase in the garrisons required for the new defence works. One of the most important of these stations was the island of St. Lucia, in the West Indies, which it was decided to occupy as a coaling station for the Navy. St. Lucia had formerly been a military station of considerable importance but the garrison had been withdrawn for many years, and the barracks had to be reconstructed at considerable cost.

The same year, 1888, was the commencement of an important epoch in the history of British barracks, as the question of expenditure on barracks was considered by the Select Committee of the House of Commons on Army Estimates. Strong evidence was given by the Duke of Cambridge, Lord Wolseley, and others as to the defective condition of many of the existing barracks and the insufficiency of accommodation provided. General Sir Lothian Nicholson, then Inspector-General of Fortifications, was closely examined as to the reasons for the defects, and made it clear to the Committee that these were due to the fact that, for many years, the amount of money provided for the maintenance of the barracks was totally insufficient even for necessary repairs. He mentioned the case of the wooden huts at Aldershot, the Curragh, and other stations, which had been erected as a temporary measure in 1855, but had lasted for more than 30 years and were in a deplorable state of decay. He showed that every year the amount proposed for expenditure under the Barrack Annual Estimate was cut down to an infinitesimal amount of what was really required, and explained that, under the existing system, there was no prospect of placing the barracks in a proper condition, as the sums wanted were far too large to take on the estimates.

In consequence of the evidence which he had given before the Committee, Sir L. Nicholson was directed by Mr. Edward Stanhope, then Secretary of State for War, to prepare an estimate of the amount required to put all existing barracks at home and abroad in a good state of repair and in accordance with modern requirements. This estimate, which included a large number of services that had been brought forward year after year as absolutely necessary, but had been struck out

for want of funds, amounted to £8,913,000, a large sum, but none too large for what was required.

After careful consideration of the matter, Mr. Stanhope decided, with the consent of the Government, to ask Parliament for a Barrack Loan, but, as the total was so large, it was settled that only the more pressing services were to be taken in hand, and that the amount was to be fixed at £4,100,000, less than half of what was known to be required. An Act, authorizing the expenditure of this sum, was passed by Parliament in 1890, with the title of the Barracks Act. The heads of proposed expenditure were as follows :—

	£
1. Reconstruction of the large camps at Aldershot, Shorncliffe, Colchester, and the Curragh ..	1,980,000
2. Improvement of existing barracks, and provision of new barracks to replace those condemned ..	1,670,000
3. Purchase of land and buildings .. ..	250,000
4. Contingent expenses, including staff .. ..	200,000
	<hr/>
	£4,100,000

As the duties in connection with the carrying out of the Barracks Act naturally caused a great increase of work in the office of the Inspector-General of Fortifications, it was decided to increase his staff by the appointment of a third Deputy Inspector-General and an additional Assistant Inspector-General. Colonel H. Locock was appointed to the first of these posts and Major C. M. Watson to the latter. In the districts, also, special officers were selected for work under the Barrack Loan, as Mr. Stanhope had laid it down as a fundamental principle that the same officer was to be in charge of each important work from start to finish, so as to ensure continuity of supervision. Among the officers who were engaged in superintending the Barrack Loan Works at the commencement were the following : At the great camps—Aldershot, Major W. Pitt, Major W. F. Noel, and Major H. L. Jessep; Colchester, Major M. W. Skinner; Shorncliffe, Lieut. P. Ashworth; the Curragh, Lieut. G. H. Fowke. At Barrack Stations in the United Kingdom—Ports-

mouth, Major C. Wilkinson ; Plymouth, Major C. Hoskyns ; Woking, Major R. C. Hellard ; Woolwich, Major N. M. Lake ; Dublin, Major R. M. Barklie and Major C. H. Bagot ; Belfast, Major J. Cameron. At Barrack Stations abroad—Cape of Good Hope, Major J. B. Sharpe ; Gibraltar, Capt. J. P. Brewin ; Malta, Major W. du C. Luard.

Of these officers there were several who were employed on the Barrack Loan from the time the Act was passed in 1890 until the accounts were finally closed in 1902. For example Major W. Pitt was appointed Commanding Royal Engineer, South Aldershot, on promotion to Lieutenant-Colonel, and succeeded to the position of Commanding Royal Engineer, Aldershot, in March, 1901. Again Major N. M. Lake, who had charge of the Barrack Loan Works at Woolwich until June, 1896, was then selected for the appointment of Assistant Inspector-General of Fortifications for Barrack Loans at the War Office, and succeeded to the post of Deputy Inspector-General in 1902.

The principal work carried out under the Barracks Act was the reconstruction of the great camps, where the wooden huts, which had given so much trouble for many years, were swept away, and replaced by permanent barracks, constructed in accordance with the latest principles of sanitation. Of these the most important was Aldershot, the largest military station in the United Kingdom, where accommodation was provided in new or reconstructed buildings for 368 officers, 89 warrant officers, 1,000 married non-commissioned officers and men, 11,092 single men, 559 hospital patients, and 558 horses. In addition to these, there were constructed headquarter offices, schools, gymnasia, a church, and many other miscellaneous buildings. Similar works were carried out at the other camps, though on a smaller scale than at Aldershot.

The principal Barrack Stations dealt with under this Loan were Portsmouth, Plymouth, London, Woking, Woolwich, Dublin, Belfast, Malta, Gibraltar, and the Cape of Good Hope, at all of which new barracks were provided, while at these, as

well as at a number of other places, the existing barracks were improved so far as the funds provided would allow, but, as has already been explained, the amount voted by this Loan was less than half what was required to put British barracks in a satisfactory condition. The total accommodation provided under the loan was as follows:—Quarters for 867 officers, 268 warrant officers, 2,525 married non-commissioned officers and men, 27,403 single non-commissioned officers and men, and 33 nursing sisters; hospital beds for 1,138 patients; stabling for 3,843 horses; and in addition a large number of accessory buildings.

Viewed as a whole the result of the Barracks Act was very satisfactory. Although it could only be regarded as a commencement in the operation of placing barrack accommodation at home and abroad upon a proper basis, it did a great deal in the direction of improving the sanitary condition and increasing the comfort of the British soldier.

The Barracks Act proved one point very clearly; that it was only by means of a Loan that it was possible to put barracks in a satisfactory condition, as the amounts that could be provided annually in the Army Estimates were wholly insufficient to meet what was properly capital expenditure. Speaking generally, a barrack may be expected to last for 100 years, and it is more reasonable that the cost should be spread over a period of say 30 years, than that it should all have to be paid for out of the estimates for the four or five years which it takes to build. On the other hand it was a vital part of the principle of Barrack Loans that no money should be expended upon temporary buildings such as hutments, or on maintenance services.

Up to March 31st, 1897, a sum of £3,340,985 had been expended out of the total of £4,100,000, provided under the Barracks Act, and in that year the Government decided to ask Parliament for a further Loan, a part of which was for Barrack Services. An Act was passed in April, 1897, entitled "An Act to Provide for Defraying the Expenses of Certain Military Works and Other Military Services," known as the Military



Works Act, which authorized the raising of a sum not exceeding £5,458,000, to be expended under the following heads:—

	£
Head 1. Defence works .. .. .	1,120,000
„ 2. Barracks, including completion of the large camps .. .. .	2,989,000
„ 3. Artillery and rifle ranges and manœuvring ground .. .. .	1,149,000
„ 4. Contingencies, including staff .. .. .	200,000
Total	<u>£5,458,000</u>

Of the amount provided for Barrack Services, £650,000 was for the continuation of the reconstruction of the large camps, £786,000 for the construction of barracks at other stations at home and abroad, where works were in progress under the Barracks Act of 1890, while the balance, £1,553,000, was for new services, due principally to alterations in the distribution of the Army, and to large increases in the garrisons of the fortresses and coaling stations abroad. The total strength of these garrisons had been increased from 31,680 officers and men in 1890 to 39,858 officers and men in 1897.

So far as the execution of the works was concerned, the Military Works Act of 1897 was treated as a continuation of the Barracks Act of 1890, and was carried on by the same officers at home and abroad as had been employed upon the latter. In April, 1896, Colonel H. Locock, Deputy Inspector-General of Fortifications for the Barrack Loan, had retired and was succeeded by Colonel C. M. Watson, while Lieut.-Colonel N. M. Lake was appointed Assistant Inspector-General for the same branch.

The amount included under Head 3 of the Loan was divided into two portions, of which one, £199,000, was for the provision of artillery ranges and accommodation for stores for the mobilization of the Army, while the second part, £950,000, was allotted for the purchase of ground for manœuvring, and the provision of rifle ranges at home and abroad. The largest item in this part was £600,000, for the purchase of 42,000 acres of land on Salisbury Plain, for a manœuvring ground.

Not long after the Military Works Act of 1897 had been approved, the Army was rapidly increased in strength. While the Army Estimates of 1897-8 showed a total strength of 117,152 officers and men at home, and 44,104 abroad, not including India, the estimate of 1899-1900 included a force of 131,802 at home, and 51,204 abroad, or a total increase of 21,720 officers and men, for whom barrack accommodation had to be provided. New battalions were added to the infantry, new batteries to the artillery, and the numbers of the other branches of the Service were also considerably increased. It had been decided to create an entirely new station at Wei-hai-Wei, in North China, and there everything had to be provided from the beginning.

It was therefore decided to ask Parliament for a further loan, and £4,000,000 was voted by the Military Works Act of 1899, under the following heads:—

	£
Head 1. Defence works .. .. .	1,000,000
„ 2. Barrack services .. .. .	2,770,000
„ 3. Ranges .. .. .	40,000
„ 4. Staff and contingencies .. .. .	190,000
	<hr/>
Total	£4,000,000

Hardly any of the £2,770,000 allotted for barracks was for the continuation of the improvement of existing barracks, which had been shown to be urgently required before the Barrack Loan of 1890, and by far the larger part was for the provision of new accommodation, made absolutely necessary by the great increases in the strength of the Army. The new accommodation was to be provided in two ways, first, by enlarging existing barracks, and secondly by the construction of an entirely new military station at Tidworth, on Salisbury Plain, at an estimated cost of £1,600,000, for eight battalions of infantry, Royal Engineers, Army Service Corps, and departmental troops, with the necessary garrison accessories.

But, notwithstanding the amounts provided under the Military Works Acts of 1897 and 1899, these sums were not sufficient

to meet the steady increase in the strength of the Army at home and abroad, and, in 1901, a further Act was passed to raise a sum of £6,352,500 by loan which was divided as follows :—

	£
Head 1. Defence works .. ..	750,000
„ 2. Barrack services .. ..	4,207,500
„ 3. Artillery and rifle ranges and mobilization storehouses .. ..	1,130,000
„ 4. Staff and contingencies .. ..	265,000
Total	£6,352,500

Head 2 (Barrack Services) was further subdivided in the Schedule of the Military Works Act of 1901 in the following manner :—

	£
Subhead a. New barracks for cavalry, artillery, and infantry at Salisbury Plain ..	460,000
„ b. New barracks for cavalry, artillery, and infantry in Scotland ..	380,000
„ c. New depôts and additions to existing depôts .. ..	270,000
„ d. Additional accommodation at barracks at home .. ..	485,500
„ e. Completion of wooden hutments at Aldershot, Kildare, Lichfield, Salisbury Plain, and Shorncliffe ..	1,187,000
„ f. Provision of accommodation for additional troops at the large camps ..	697,000
„ g. Married soldiers' quarters .. ..	100,000
„ h. Purchase of land for barracks ..	120,000
„ i. Barracks abroad .. ..	508,000
Total	£4,207,500

In an important respect the Military Works Act of 1901 differed from all the previous Barrack Loans. In 1890, when

the system of raising money by loan for expenditure on barracks was commenced, it was laid down as a fundamental principle by Mr. Stanhope, then Secretary of State for War, that nothing was to be spent upon temporary huts or other buildings not of a really permanent nature. This decision was, of course, perfectly sound and should never have been departed from. But, when the large increases in the Army were authorized in 1899, it was apparently forgotten that there was not sufficient barrack accommodation for the additional troops, and that barracks take some years to build. It was therefore decided to revert to the plan that had been adopted during the Crimean War, and to put up wooden hutments in the vicinity of Aldershot, Shorncliffe, and other places as a temporary measure, and a sum of £500,000 was included in the Barrack Annual Estimates for 1900-01 to enable the work to be commenced. This was in accordance with correct principles, as temporary buildings are a proper charge for the Annual Estimates. But, in the following year, when the Military Works Act was under consideration, it was decided to depart from these principles, and to place the charge for completing these hutments on the Loan, and, as has been shown above, a sum of £1,187,000 was included under the Barrack Head of the Loan for this purpose. The object was to keep the Annual Estimates down, but this was not a sufficient reason for the serious change in policy. Of the sums provided for permanent barracks at home and abroad, by far the greater part was for the construction of new, and extension of old barracks, rendered necessary by the large increases in the Army, so that but little was available to continue the scheme, commenced under the Barrack Loan of 1890, for placing all existing barracks at home and abroad in a satisfactory condition.

By March, 1903, the total amount which had been expended under the Military Works Acts of 1897, 1899, and 1901 was £6,993,830, out of the total of £15,810,500, voted by Parliament; and, of this, £3,012,022 had been expended on barrack services, out of £9,966,500. Notwithstanding that there were such large sums still available for expenditure, which it would have taken

years to spend, it was decided to ask Parliament for a further loan of £5,000,000, divided under the following heads :—

	£
Head 1. Defence works .. .. .	594,000
„ 2. Barracks .. .. .	3,575,000
„ 3. Artillery and rifle ranges including ground for manœuvring and mobiliza- tion stores .. .. .	696,000
„ 4. Staff and contingencies .. .. .	135,000
	<hr/> £5,000,000

Of the £3,575,000 allotted for barracks, £2,000,000 was for the provision of accommodation for the Army in South Africa, the larger proportion being for wooden hutments. This was an extension of the vicious plan which had been adopted in the Military Works Act of 1901, of paying for temporary buildings out of money raised by loan.

In 1904 some very important changes were made in the Royal Engineers Organization at the War Office. In February of that year the appointment of Inspector-General of Fortifications was abolished, and shortly afterwards the appointments of Deputy and Assistant Inspectors-General were also done away with. The drastic changes then made are dealt with in Chapter I., and need only here be considered so far as Barrack Works are concerned. A new office was created, that of Director of Fortifications and Works, who was made subordinate to the fourth military member of the newly-formed Army Council, the Master-General of the Ordnance, and whose duties included a part of those of the late Inspector-General of Fortifications, as regarding the construction and maintenance of barracks. But of these duties a large and important part was transferred to a new civil department, called the Barrack Construction Department, placed under the charge of a civilian architect, the Director of Barrack Construction, who was made subordinate to the civil member of the Army Council, the Parliamentary Under-Secretary of State, and who was to have charge of all new barrack and hospital services at home, of which the estimated value

was more than £2,000. It was also decided that he was to take charge of the works then in progress under the Military Works Loans at home stations.

This was practically a return to the policy of 1792 (see p. 142), when the barracks were taken away from the Board of Ordnance, and placed under an inexperienced officer, a policy which failed completely, and was reversed in 1822, when the Duke of Wellington, then Master-General of the Ordnance, was convinced of the advantage of having the construction and maintenance of barracks in the hands of the Royal Engineers, and the Act of Parliament was passed by which the Barrack Department was abolished, and the barracks were given over to the Board of Ordnance, and placed under the charge of the Inspector-General of Fortifications.

The transfer of the charge of the services in progress at home under the Military Works Acts was completed on March 31st, 1905, and, on that date, the total amount which had been expended on barrack services was as follows :—

	£
1. Reconstruction of the large camps in the United Kingdom .. .. .	1,136,368
2. Barracks in the United Kingdom .. .. .	2,266,197
3. Hutments in the United Kingdom .. .. .	699,154
4. Barracks at stations abroad .. .. .	1,556,417
5. Cantonments for the Army in South Africa .. .. .	2,534,801
Total	£8,192,937

In April, 1906, a further change of policy was decided upon by the Government, and it was then settled to close the expenditure under the Military Works Loan without exhausting the borrowing powers authorized by Parliament, and only to complete services which had actually been commenced, or for which contracts had been made. New barrack services were to be included in the Annual Estimates. As at this time the total amount which had been expended, under the Barrack Head of the Loans, was £9,012,244, out of a total amount of £13,541,500, included in the Loans for barrack services, there

was a balance of £4,529,256, the greater part of which was never issued.

This decision was a reversion to the barrack policy, which had been in force prior to 1890, when the Barracks Act was passed, because it had been found impossible to provide sufficient sums for absolutely necessary barrack services upon the Annual Estimates. It is probable that the decision was due in part to the fact that the true principle of Barrack Loans, *i.e.*, of spending money only on permanent buildings, which would last much longer than the period fixed for paying off the Loan, had been departed from, and that temporary buildings, such as the hutments at home, and the cantonments in South Africa, had been charged against the Military Works Loans, instead of being paid for in the Annual Estimates. But, whatever the reason may have been, the practical result was that a sum of more than £4,000,000, which had been voted by Parliament, was allowed to lapse, and that the necessary corresponding additions were *not* made to the Annual Estimates, so that there are still many old barracks which have not been reconstructed in order to bring them into accord with modern requirements. The original scheme for the improvement of existing barracks, prepared before the passing of the Barracks Act of 1890, was never carried out, as a large proportion of the sums provided under the Military Works Loans was, as has been explained, for the construction of *new* barracks at stations which had not been in existence in 1890. It is to be regretted that so large a sum was surrendered which might have been employed with great advantage for increasing the comfort of the British soldier.

Although under the new *régime* the Director of Fortifications and Works had little to do with the construction of new barracks at home, there was much work in connection with the improvement of existing buildings, while, abroad, he continued to have charge of the construction of new barracks. An important service under the latter head was carried out in 1907, when an earthquake wrecked nearly every building in the neighbourhood of Kingston, Jamaica, and the barracks at Up Park Camp were almost destroyed. As it was important that the barrack accom-

modation should be restored with the least possible delay, all the materials were prepared at once in England and sent out ready for erection. In order that the new buildings should be able to withstand earthquake shocks, the principle of design adopted was steel framing, filled in with concrete on expanded metal for the walls, with the floors raised some distance above the ground. The work of erection was carried out under Colonel F. G. Bowles, the Commanding Royal Engineer, and the troops were re-housed within 10 months after the disaster. The total cost, including the reprovizion of all accommodation, was under £80,000.

Another large barrack scheme carried out abroad was in Egypt, where new barracks for part of the Army of Occupation were built at Abbasiyeh, near Cairo, at a cost of £230,000 provided by the Egyptian Government, under the superintendence of Colonel S. Davidson, and completed in 1911. The system of construction adopted was that of concrete blocks for the walls, and reinforced concrete for the roofs and floors. These barracks are regarded as very satisfactory.

At home improvements in existing barracks continued to be carried out, so far as the limited sums provided in the Annual Estimates would allow, but there still remain many barracks in which the standard of comfort is below that which is now regarded as necessary for the British soldier, and the hopes that were expressed twenty-five years ago, when the Barrack Loan was under contemplation, have not yet been realized. This, however, has not been due to the officers of the Royal Engineers, who, as the previous pages will show, have worked diligently in the past, and whose successors in the Corps will work as diligently in the future to maintain a high standard of efficiency in the execution of their duties in connection with Barrack Works.



## CHAPTER VI.

## THE ORDNANCE SURVEY, AND SURVEY WORK ABROAD.

The Ordnance Survey since 1885—The Geographical Section of the General Staff—Colonial Survey Work—The Colonial Survey Committee—The Colonial Survey Section—Egypt—The Anglo-Egyptian Sudan—East Africa and Uganda—South Africa—The Gold Coast—The Gambia—Sierra Leone—Southern Nigeria—Northern Nigeria—The Federated Malay States—The Island of Pemba—Fiji—Palestine Exploration—Boundary Commissions—The Gambia (Anglo-French), 1890-99—Sierra Leone-French Guinea, 1891-99—The Anglo-Liberian Boundary, 1903—The Gold Coast-French Sudan, 1900—The Gold Coast-French Ivory Coast, 1902—The Gold Coast-Togoland, 1901-4—Lagos-Dahomey, 1900—The Niger-Lake Chad, 1902-4—Yola-Lake Chad, 1903—Cross River (Southern Nigeria-Kameruns), 1895-1906—The Cross River Rapids-Yola, 1907-9—Bechuanaland-German South-West Africa, 1898-1903—Southern Rhodesia-Portuguese East Africa, 1892-1905—Lake Nyasa-Lake Tanganyika, 1898—Northern Rhodesia-Belgian Congo, 1911-12—Uganda-Belgian Congo, 1907-08—The Anglo-German-Belgian Boundary Commission, 1911—British-German East Africa, 1892-1906—Chile-Argentine, 1902-3—Peru-Bolivia, 1911.

SINCE 1885, the year to which the account of the Survey work of the Corps was carried in Vol. II., the field of operations of the Survey branch has been very widely extended. The development of the British Empire during the last 30 years has necessitated the accurate mapping of very large areas of land, and our Colonies and Protectorates, especially in Africa, are now provided with Survey Departments of their own, or have been surveyed by various parties specially sent out for the purpose. In nearly all cases, the preliminary work has been done by members of the Royal Engineers—officers, non-commissioned officers and men—and in many cases the whole work has been carried through by Royal Engineers. In Africa alone, boundary commissions chiefly composed of members of the Corps, have now mapped some 15,000 miles of frontier.

Since the formation of the Colonial Survey Committee, great strides have been made towards the complete mapping of the whole of the British Empire, and the following pages will show the important part played in the work by the Royal Engineers.

In addition to the large number of non-commissioned officers and men employed during the last 30 years on the Survey of Great Britain and Ireland, many have had experience of surveying in all quarters of the globe, and great benefit has resulted to the Empire in the training of military surveyors capable of carrying out work in any class of country with precision and despatch. The non-commissioned officers and men employed on Colonial Surveys have often worked alone for months in tropical countries; they have been in charge of parties of Natives in difficult situations, and not the least benefit to the *personnel* has been the resulting growth of the spirit of self-reliance. It is impossible to give an account of this work in chronological order. The clearest method is to describe briefly the surveys in each part of the Empire.

#### THE ORDNANCE SURVEY SINCE 1885.

It is fitting that the work of this Department should be described first, since it has now a history of 120 years behind it, and has furnished a very large part of the *personnel* whose work is outlined hereafter. The work of the Ordnance Survey from its beginning to 1885 has been described in Vol. II., page 228.

The Survey of Great Britain on the 25-in. scale was practically completed in 1890. The whole of England, Wales and Scotland has been surveyed and published on the 25-in. and 6-in. scales, and the first revision has also been published. The second revision of these large scale maps is now in progress, and 18 counties in Great Britain have been completed and published on both the 6-in. and 25-in. scales. As regards the large scale maps of Ireland, the 6-in. map was completed as long ago as 1840, and its revision is now in hand, following that of the 25-in. plans. Ireland has also been surveyed on the 25-in. scale, the fieldwork having been completed in 1913, and the publication of the whole will be finished in 1914.

It must not be supposed that with the completion of the large scale surveys, the main work of the Ordnance Survey has been done. The revision of such large scale work entails a great amount of labour, and if the work of past years is to be of full value to-day, it must necessarily be kept constantly corrected up to date. Primarily, therefore, the Ordnance Survey is charged with the constant revision in 20-year periods of the large scale maps—25-inch and 6-inch; and of the small scale maps—chiefly the one inch and half inch to the mile—the revision of which is carried out in 15-year periods.

During the period under review, great improvements in the method of map production have been introduced in the Survey, and it is the policy of the Department to continually revise its methods, and keep abreast of the times. Some of the processes now in commercial use had their origin in the workshops of the Ordnance Survey. One of the most important improvements has been the invention of the Vandyke process, named after Conductor Vandyke (formerly R.E.), of the Indian Survey, who introduced it. This process enables the zinc plates to be prepared direct from the manuscript plans, and has proved very economical, both in time and money. The offices at Southampton contain the latest machinery for all the varied forms of printing involved in the production of maps. Within the last three years, great improvements in the small scale maps have been introduced. The coloured 1-in. map, which formerly occupied a high place among topographical maps of the world, had somewhat lost its prestige owing to the great strides in cartography on the Continent, but experiments have recently been made towards its improvement, and in its new form it can hold its own with the finest continental work. The revival of military science since the South African War, and the rapid growth of motoring in this country, have combined to greatly increase the demand for the topographical maps.

Much other work besides the revision of the national maps is done by the Ordnance Survey. The headquarters at Southampton serve as a training school for surveyors employed in the Crown Colonies and Protectorates, as well as for the Do-

minions. Non-commissioned officers and men of the Survey Companies are continually abroad on topographical duties; at the present time (June, 1914) there are about 80 so employed.

During the war in South Africa, 1899-1902, there was a considerable drain on the *personnel* of the Department. Seven officers out of an establishment of 24, and a large number of non-commissioned officers and sappers of the Survey Companies were sent to South Africa, and, while the strength of the Ordnance Survey was thus reduced, the work demanded was largely increased. In the first year of the war, the number of maps printed for the War Office was 374,538, entailing 766,818 printings, while the largest number of printings in any previous year was 102,850. Two Field Survey Sections were sent out from the Ordnance Survey during the first year of the war; two more went to South Africa in 1902, a fifth, prepared for South Africa, was remodelled as the Colonial Survey Section and sent to Mauritius in 1902, while a sixth section was held in readiness at home. In addition to the sections, 12 non-commissioned officers and men were sent out for employment as photographers, printers, and draftsmen.

During the last 10 years, the map-printing department of the Survey has greatly increased in size and importance, owing to the large amount of work done for other Government Departments. As a comparison between the work done 25 years ago, and that of the present day, it may be stated that in 1889 the average number of impressions of all kinds printed was 242,600 per annum. In the year 1913-1914, there were 2,602,600 impressions, involving 6,468,650 printings, representing a tenfold increase during the period.

*Geodesy.*—With the completion of the Principal Triangulation of the United Kingdom, much valuable material became available for furthering the science of geodesy, and for several years Colonel Clarke's investigations into the Figure of the Earth remained the last word in geodetic progress. The great improvements in modern instruments, however, led to a belief that the accuracy of the old British triangulation was not altogether up to the standard of precision required in the more

modern continental work. There was no suggestion that the accuracy was not amply sufficient for practical map-making purposes, but the doubt was one which called for investigation, and in 1904 a proposal for the remeasurement of a portion of the old triangulation was put forward by Major C. F. Close, R.E., and Major E. H. Hills, R.E., and submitted to the Royal Astronomical Society. In 1906, the subject was advanced at the meeting of the British Association at York. By 1908 the proposal had fully matured, and finally in 1909 the Board of Agriculture and Fisheries authorized the Director-General of the Ordnance Survey to undertake the measurement of a new base and a test triangulation, to include some original primary points, in Morayshire—a locality remote from the Lough Foyle and Salisbury Plain bases—in order that it might be learnt what linear errors had accumulated. The base measurement and triangulation were carried out by Captain W. J. Johnston and later by Captain H. St. J. L. Winterbotham—successively in charge of the Trigonometrical Division of the Survey.

The result of the investigation, in the words of Colonel Close,

“is to establish the fact that the accuracy of the triangulation is not only amply sufficient for all practical purposes, but also for all present scientific requirements. The errors remaining in the old triangulation, after its adjustment, are of the same order as those in more modern work, and, if a chain of triangles from Dover to the Shetland Islands (about 700 miles) was re-measured by modern methods, the alteration in the total length would be unlikely much to exceed 25 yards.”

In addition to the investigation into the accuracy of the horizontal framework of the Survey, a revision of the primary levelling has been undertaken since 1911, with a view to improving the levelling of the country, and also to facilitate scientific investigation into the movements of the earth's crust. The main lines of levels are now being laid out so that it is possible to establish, at intervals of 25 miles, specially constructed bench marks, deep down below the soil and subsoil and founded on solid rock. Up to the present time, three

circuits have been completed and closed on themselves; the actual closing errors of the circuits are :—

- (1) Length 286 miles, closing error 0'032 ft.
- (2) „ 266 miles, „ „ 0'022 ft.
- (3) „ 343 miles, „ „ 0'188 ft.

The Ordnance Survey has taken an important part in the development of the International ~~1800000~~ map. The International Central Bureau has been established at Southampton, and all the secretarial work is now centred there.

The following officers have held the post of Director-General of the Survey since 1885 :—

Colonel Richard H. Stotherd, C.B.

Colonel Sir C. W. Wilson, K.C.B., K.C.M.G. .. 1886—1895.

Colonel Sir J. Farquharson, K.C.B. .. 1895—1899.

Colonel Sir D. A. Johnston, K.C.M.G. .. 1899—1906.

Colonel R. C. Hellard, C.B. .. 1906—1909.

Colonel S. C. N. Grant, C.B., C.M.G. ... 1909—1911.

Colonel C. F. Close, C.M.G. ... 1911—

#### THE GEOGRAPHICAL SECTION OF THE GENERAL STAFF.

The Geographical Section of the General Staff is the outcome of a long succession of changes in the intelligence system of the War Office. The section had its origin in 1803 when a branch, called the *Depôt of Military Knowledge*, was formed in the Quartermaster-General's Department for the purpose of collecting information of the geography and topography of the Colonies and foreign countries. The branch, however, withered, and was absorbed in the new Topographical and Statistical Department in 1857, under the direction of Major T. B. Jervis, R.E., who had for many years persevered in his efforts to have such a department established. Colonel Jervis did not live long after his appointment to the post of director. He died in 1857; but he left a clear scheme for the duties which he conceived should be performed by the Department, and he had executed a number of maps pertaining to the Crimean War and the Near East.

On Colonel Jervis' death a Committee was appointed to revise a scheme for the amalgamation of the existing establishments concerned with topographical work. These establishments were :—the Topographical Dépôt of the Quartermaster-General's Department, the Survey Branch of the Inspector-General of Fortification's Department, and the Topographical Department. The result of this Committee's report was the formation, as stated above, of the Topographical and Statistical Department, which included the Ordnance Survey. Lieut.-Colonel (afterwards Major-General Sir Henry) James, R.E., was made Director, and under him was Major Elphinstone, v.c., as Executive Officer, succeeded in 1859 by Major A. C. Cooke.

In 1870 the Ordnance Survey was transferred from the War Office to the Office of Works, with Sir Henry James as Director-General, while Captain C. W. Wilson took over the Topographical and Statistical Department, which underwent further changes. In 1873, the Department became merged into the Intelligence Department formed that year. Major Wilson was succeeded by Lieut.-Colonel R. E. Home in 1876 as A.Q.M.G. in charge of the Topographical Section.

Thereafter there were no considerable changes in organization until 1904, when the Intelligence Department became the Directorate of Military Operations, divided into four sections. The fourth of these sections is the present Geographical Section, which is now the directing and organizing head of the geographical work of the Empire. Its main duties are :—

The provision of maps for war ;

The collection and arrangement of all geographical and topographical information of the Empire and foreign countries.

The co-ordination of all Survey organizations in the Empire.

The head of the section is a member of the Colonial Survey Committee. The first head of the Geographical Section was Lieut.-Colonel C. F. Close, c.m.g. ; he was succeeded in 1911 by Lieut.-Colonel W. C. Hedley.

## COLONIAL SURVEY WORK.

*The Colonial Survey Committee.*

The Colonial Survey Committee was formed in August, 1905, to advise the Secretary of State for the Colonies in matters affecting the survey and exploration of British Colonies and Protectorates, especially those in Tropical Africa.

The Committee as originally constituted consisted of :—

A representative of the Colonial Office.

The Director-General of the Ordnance Survey.

The Chief of the Geographical Section, General Staff, with joint Secretaries representing the Colonial Office and the Geographical Section, General Staff.

In 1913, the scope of the Committee was extended to include geological surveys in British Colonies and Protectorates, and three additional members were appointed.

“ It is the duty of the Committee to make such recommendations as will ensure the rapid and economical prosecution of accurate surveys where these are required, and the rendering the results available, as speedily as possible, for use by the various governments concerned and the public.”

The Committee's annual reports have year by year proved how necessary it is to co-ordinate all that has been, and is being, done towards the accurate mapping of our Colonies and Protectorates.

*The Colonial Survey Section.*

This section was first formed in 1902 for employment under the Intelligence Department of the War Office. It was required for the purpose of making surveys of those Colonies and Protectorates which had not then survey organizations of their own, and for undertaking special surveys. It is now administered by the Geographical Section of the General Staff. Its composition may be varied to suit the class of work required, but normally it consists of two officers and four non-commissioned officers and men.

From March, 1902, to April, 1903, it was employed in Mauritius



under Major W. A. Harrison and Lieut. F. B. Legh. The survey was on the scale of one inch to a mile. The base,  $2\frac{1}{2}$  miles long, was measured along the railway near Providence. From Mauritius, Lieut. Legh took half of the section to St. Helena, in April, 1903. He surveyed the island on the scale of  $2\frac{1}{2}$  inches to the mile, with a  $1\frac{3}{8}$ -mile base on Deadwood Plain. In November, 1903, Captain H. D. Pearson took over the section, and with Lieut. Legh as his assistant, surveyed the neighbourhood of Freetown, Sierra Leone. Their map was on the scale of one inch to the mile and was completed in September, 1904. The section was next prepared for duty in Jamaica, but the scheme was countermanded.

In 1905, under Captain L. C. Jackson and Lieut. A. S. Redman, the section went to South Africa, and was continuously employed for the next  $5\frac{1}{2}$  years on the topographical survey of the Orange River Colony (see page 193). Captain H. St. J. L. Winterbotham and Lieut. A. G. McNeill succeeded Captain Jackson and Lieut. Redman in 1908, completing their work in 1911.

At the present time the section is employed in the Federated Malay States. It proceeded there in May, 1912, under Captain T. N. Dunman\* and Lieut. D. A. Hutchinson.

### *Egypt.*

Surveys of a kind had been started several times in Egypt, and there existed patches of more or less accurate work dating from the early part of the 19th century to its close, but it was not until 1897, when the Khedivial Government found it necessary to make a complete re-assessment of the land taxes, that an organized Survey Department was formed, and a Cadastral Survey on a sound footing was instituted. The reorganization of the Department was placed in the hands of Capt. H. G. Lyons, R.E., who became Director-General of the Survey Department in 1898, having previously held the position of Director of the Geological Survey of Egypt.

In order to bring relief from the anomalies, which had accumulated in times past, as rapidly as possible, the re-assessment

\* Captain Dunman unfortunately lost his life in June, 1914.

of the land taxes had to be carried out within 10 years, and thus the Survey Department had the difficult task of improving methods, of introducing better systems, and of increasing the output, without delaying for a single week the progress of the Cadastral Survey.\* Captain Lyons succeeded, however, not only in completing the work by the allotted time, but in rapidly introducing greater precision in the work, until by 1907 the land was being surveyed on a thoroughly sound and accurate system. A complete series of cadastral maps (scale 1 : 2500) of all cultivated land were published, and topographical maps of the whole country on various scales were produced, based on the triangulation system which had been prepared for the cadastral maps. During these years of reorganization, Captain Lyons improved the scientific side of his Department, and Egypt is now taking her share in the measurement of the great arc of the meridian, which will, when complete, stretch through Africa from south to north. Captain Lyons also set on foot various scientific enquiries, and personally studied the Nile Basin, publishing an account of his investigations in his *Physiography of the Nile* (Cairo, 1906), and in his reports on the "Rains of the Nile Basin, and the Nile Flood" for 1906-1908. Captain Lyons left the Department in 1909, and was succeeded by a civilian Director-General.

#### *The Anglo-Egyptian Sudan.*

As soon as the state of the country permitted, after the defeat of the Dervishes in 1896, a Survey Department for the Sudan was formed, with Colonel the Hon. M. G. Talbot as Director. The immense area of the Anglo-Egyptian Sudan (about 1,000,000 square miles), and the limited funds available, prevented any systematic survey being carried out, but much has been done during the past twelve years to meet local requirements, and gradually the patches of accurate work are spreading.

Officers of the Department have carried out some very valuable explorations and rapid surveys along the difficult frontiers between the Sudan, Abyssinia, and Uganda. In 1900 Major H. H. Austin was specially selected to make an exploratory survey of the country along the western and

\* *The Cadastral Survey of Egypt.* Cairo. 1909.

southern borders of Abyssinia south of the Sobat River to Lake Rudolf. He was accompanied by Major R. G. T. Bright, of the Rifle Brigade, and started from Omdurman on December 29th, 1900. The expedition also consisted of a medical officer, and an escort of one native officer, and 22 rank and file of the 10th Sudanese Battalion, with 30 camel-men and two Arabs as transport drivers. Leaving the Sobat River on 14th January, 1901, the party cut adrift from the outside world, and heard no news again until the following August. The expedition was from the first hampered by swamps; and when the swamps were left behind, the waterless desert was encountered instead. In March, a most anxious time was experienced. Water was very scarce, heavy casualties amongst the men and animals had occurred, and, in addition to these troubles, the natives were either actively hostile, or refused all assistance. Austin himself fell sick on the 9th May, but he pluckily kept to his work until by 17th June his medical officer insisted on his resting. He became seriously ill with scurvy, and the delay caused by the enforced halting added further to the dangers of the situation. Fortunately, relief was brought by the District Commissioner at Baringo Post, and the expedition was able to reach its destination. It is exploratory work of this description which adds so much to our geographical knowledge of the world, but the story of it is modestly hidden in official reports.

The next exploratory survey in these regions was Captain P. Maud's in 1902—1903. This officer joined an expedition under Mr. Butter for the purpose of carrying out the Survey work along the Sudan-Abyssinia Frontier. Captain Maud's assistants were Khan Sahib Sher Jung, of the Indian Survey, who carried out the plane-tabling, and Jemadar Shahzad Mir, Bengal Lancers, who was chiefly employed on road sketching between Captain Maud's fixed points. Lines of latitudes and azimuths chiefly formed the framework of the survey, but a portion of the route travelled was triangulated from a base  $3\frac{1}{4}$  miles long, and the triangulation carried on to the vicinity of Lake Rudolf. Thence the system of latitudes and azimuths was reverted to, and continued until the expedition reached its destination on the Uganda Railway at Nakura Station (13th July, 1903).

In 1903, Colonel the Hon. M. G. Talbot, Director of Surveys in the Sudan, conducted a delimitation of the frontier between the Sudan and the Italian Colony of Eritrea, a length of 330 miles, from the river Setit to Abu Gamal. In the same year Major C. W. Gwynn, D.S.O., who had already made two successful journeys along the Abyssinian frontier, was sent on a third surveying expedition. Leaving Khartum on the 10th December, 1902, he travelled by steamer to Abu Haraz, thence by boat to Gedaref, and on to Gallabat, demarcating the boundary southwards, and finishing up at Fashoda six months later.

In 1908, Major Gwynn was again sent out to delimit the western boundary of Abyssinia. He took with him Captain R. L. Waller and Corpl. C. Carter. The Abyssinian Commissioners failed to appear, owing to the disorganization of the State during the Emperor Menelek's illness. The following is an extract from the Report:—

"The Commission proceeded to the frontier *viâ* the Web River, connecting the Ganale-Dawa Junction by triangulation and a line of latitudes and azimuths with Adis Ababa, which latter place was also the origin of Capt. Maud's survey, 1902-3. Working west, as the country was unsuitable for triangulation, the Dawa Valley and Garre Plain were surveyed with measuring wheel and compass. A route through the Marehan districts south of the Dawa and Eil Wak was also sketched. From the Boran Highlands Capt. Maud's triangulation was extended east and south and the frontier districts which lay outside this officer's work were resurveyed. The frontier with necessary modifications was beaconed from the Ganale-Dawa Junctions as far as Long. 38° 40' E. Further west, with the exception of cairns constructed on the shores of Lake Stephanie, natural features were employed to define the line. From Lake Rudolf Capt. Maud's triangulation was extended to the southern extremity of the Sudan Frontier, Lat. 60° N., Long. 35° E. The Kibish Valley and the plateau west of it were surveyed with plane table, many points on Major Austin's and Bottego's routes being fixed. The headquarters of the Commission returned *viâ* Kuffa to Adis Ababa where it was rejoined by a portion of the party which had returned direct from Lake Rudolf. Dire Dawa was reached May 10th, 1909. In addition to the Survey work on the frontier, a line of

triangulation connecting Harrar and Dire Dawa to Adis Ababa was run, and the country traversed was sketched with plane table. Three lines of plane-table survey were also run, chiefly through previously unexplored country between Adis Ababa and the southern frontier. In all some 3,000 linear miles, averaging 10 miles in width, were surveyed."

The Survey work in the Sudan has been most arduous, and although it will be many years before the topography of the whole has been completed, the preliminary exploration of this vast area is nearly complete. The officers who have borne the burden and heat of the work are, besides those previously mentioned, Captain H. D. Pearson (who is the present Director of Surveys, Sudan), Captain A. E. Coningham, Captain H. Kelly, and Lieut. A. G. McNeill.

*East Africa and Uganda.*

A Survey Department for East Africa was established in 1903 as a branch of the Public Works Department, but its work was then mainly connected with land registry. In 1905 Major G. E. Smith, R.E., who was then in the country on the Anglo-German Boundary Commission, was directed to report upon the surveys of the Protectorate, and as a result the department was reorganized the following year, with Major Smith as Director, assisted by Captain G. S. Knox as Deputy-Director (subsequently Director), and Lieut. E. W. Cox as Assistant-Director for the Trigonometrical and Topographical Branch. The framework of the East African Surveys is tied on to a great chain of triangulation executed by successive boundary commissions from Mombasa to Lake Albert. A number of sheets have been issued, but there is still a wide field in front of the topographers in East Africa. The following officers of the Corps, in addition to the above-named, have shared the work:—Captain G. C. Williams, who became Director of Surveys in 1912; Captain A. M. Coode, who has made a number of valuable reconnaissances in little known districts; and Lieut. G. A. P. Maxwell.

In Uganda, the work is even more complete than in the neighbouring Protectorate. There the framework consists of the accurate triangulation carried up by the boundary commissions

from the Indian Ocean into the heart of Africa to Lake Albert, and also of the portion of the arc of the  $30^{\circ}$  meridian measured in 1911. The topography to date comprises a block of about 40,000 square miles. Apart from the work of the boundary commissions of 1902-04, 1907-08, and 1911, which is considered further on (see page 213), important topographical surveys were carried out in 1907-08 under Captain A. G. Stevenson, D.S.O., in connection with his Uganda Railway Extension Survey. In the same year, Lieut. C. E. Fishbourne, with two non-commissioned officers, were engaged in mapping the region between Lake Victoria and the north of Lake Chioga. In 1908, a special party consisting of Captain W. C. Macfie, Lieut. H. L. D. Pennington, and six non-commissioned officers, was sent out to undertake the regular topographical survey of the Kingdom, a task of some 13,500 square miles, on the scale of  $\frac{1}{250,000}$ . This was completed in September, 1910. In the report of the Colonial Survey Committee for 1910, were the following words:—

“The Uganda Topographical Party, under the command of Capt. Macfie, did very excellent work, and the result is a striking example of the value of assigning a clear and definite programme of work to a specially selected body of trained topographers.”

Unfortunately, Lieut. Pennington died of blackwater fever at Bululu, July 29th, 1910, shortly before the completion of the work in which he had borne a conspicuous part.

In 1908 Captain Stevenson continued his special surveys, assisted by Lieut. H. A. L. Hall, and surveyed an area of about 2,000 square miles in the Bunyoro Province, and another area of about 600 square miles in the Naivasha Province of the East African Protectorate. Lieut. Fishbourne, assisted by two non-commissioned officers, also extended his mapping to the north-east of Lake Chioga, completing 900 square miles in the year. During the same year, advantage was taken of the presence in Western Uganda of the Anglo-Congolese Boundary Commission, to carry out the geodetic measurement of about  $2\frac{1}{2}^{\circ}$  of the arc of the  $30^{\circ}$  meridian. The reconnaissance of the

region was carried out by Lieut.-Colonel R. G. T. Bright, Rifle Brigade, who commanded the British party, and the actual measurement was entrusted to a joint commission, consisting of Captain E. M. Jack, Mr. G. T. McCaw, Lance-Corpls. A. J. Jones and C. H. Page, R.E., as the British section, and Dr. Marcel Dehalu, assisted by Captain Wangermee, for the Belgians.

The work of Captain Jack's party consisted of the measurement of the base, at which the Belgian officers assisted, and the observation of the horizontal and vertical angles. The astronomical work was done by the Belgian section. The base was selected on the eastern side of the Semliki Valley. Its length was about 11 miles, and the measurement was made in both directions with invar wires. There were 16 primary stations in the triangulation, and the field work occupied the party from March, 1908, to February, 1909; progress being difficult owing to the bad climatic conditions for observing.

#### *South Africa.*

South Africa now possesses a geodetic triangulation of the first order, due entirely to the efforts of the late Sir David Gill, K.C.B., His Majesty's Astronomer Royal at the Cape. The execution and superintendence of the field work has been throughout in the hands of Colonel Sir William Morris, K.C.M.G., C.B.

The value of this work to the subsequent surveys of South Africa cannot be overestimated, and its contribution to geodesy is of the greatest importance. Sir David Gill's dream was the measurement of an arc of the 30th meridian east carried up from Natal to Cairo, and connecting with the great Russian arc terminating at the North Cape in Latitude  $70^{\circ}$  N. The African portion of this arc is progressing as opportunity offers, and the gaps now to be filled are those about Lake Tanganyika and in the Sudan. Sir William Morris' work is thus monumental, and his minutely-detailed reports of his work are models of their kind.

The triangulation was taken in hand in 1883, by a party composed of Colonel Morris, Lieut. H. D. Laffan and 14 non-

commissioned officers and men, R.E. Their first work was the measurement of the Natal base line, about 14 miles from Maritzburg. The base, 10,800 ft. long, was measured with 10-ft. steel bars, and occupied the party from 4th September to 24th October. The detachment was then split up into five parties—one headquarter, or observing party, and four out-parties for marking the stations for the observers. The preliminary reconnaissance for the extension of the triangulation to the north of Natal, and south-westwards into Griqualand East, occupied the remainder of 1883, and in March, 1884, the field work of the triangulation began, starting with the base extension to the first side of the geodetic chain—the line Zwartkop-Gilboa.

“Most of the observations were taken to Indian parabolic lamps at night, especially on the shorter lines, heliographs being used at favourable times of the day on the longer lines.”\*

In May, 1884, Lient. Laffan and four of the men were transferred to the secondary survey of the Colony (Natal). The southern point of the Natal chain, Umtamvuna, was reached on the 6th November, and astronomical determinations of latitude and azimuth were there made during the rest of that month.

December was spent in determining the longitude of Kokstad, in Griqualand East, by exchange of telegraphic signals with the Cape observatory. On January 2nd, 1885, the detachment left Kokstad for Maritzburg. While at the latter place, a line of levels, 54 miles long, was run to Durban, from which a determination of the height of the Natal base above mean sea level at Durban was obtained. Two independent levellings gave a difference of only  $8\frac{1}{2}$  in. on the 54 miles. From February to June, the triangulation was carried northwards as far as Newcastle, where another complete determination of the astronomical latitude, longitude and azimuth was made. This completed the Natal chain, and the party proceeded to carry the work through the Transkei district to Port Elizabeth.

In September, 1885, Lieut. Laffan took charge of the field

\* *Report of the Geodetic Survey of South Africa, Vol. I.*



work, while Colonel Morris proceeded to Cape Town to determine his personal equation with reference to his longitude observations at Newcastle and Kokstad. In the earlier part of 1886, the party had to be reduced owing to the curtailment of the vote for the Survey, and Lieut. Laffan and seven non-commissioned officers and men left the Colony, Laffan and two of his non-commissioned officers going on survey duty in Bechuanaland. Colonel Morris' party was now reduced to one officer and five men. With his reduced establishment, each party now consisted of one man only, upon whom devolved the whole of the work, but in no single instance, Colonel Morris reports, did a man fail to show his light when required.

The work was naturally more arduous now, but it was nevertheless carried on without slackening. The detachment left King William's Town on 20th July for Port Elizabeth, beaconing their points as they went, the headquarters party beaconing along the southern line of the chain, and the remaining two men along the northern line. They reached Port Elizabeth on the 9th August. Here another base was measured. It was 5,600 ft. long, and its measurement occupied the party from 13th October to 12th November. From the latter date, to February, 1887, the party worked at the extension of the triangulation from the Port Elizabeth base, and from March to September at bridging the gap between Port Elizabeth and the Transkei work. Colonel Morris now spent some time at Port Elizabeth in a very careful determination of the longitude of that station. Owing to the proximity of the Cape observatory, he could now make an exchange of observers, thus eliminating the personal error which hindered his previous determinations. At the beginning of 1888—the four years' accumulation of observations made it necessary to suspend field operations, in order that some of the results might be given to the Natal Government for their Survey.

The compilation of all the previous work was started at Cape Town in February, 1888, and continued there until March, 1889, three of the detachment returning to England during that period. The computations at the Cape showed a difference of over seven seconds of arc between the geodetic

and astronomical differences of latitude at Port Elizabeth, pointing to an abnormal deflection of the plumb-line. It was therefore resolved to determine a further series of latitudes in that neighbourhood when the field work was resumed.

In April, 1889, the party re-formed at Port Elizabeth, and confirmed the existence of the suspected deflection, before proceeding with the triangulation westwards. By this time, the character of the country had necessitated a revision of the transport, and the ox-wagons hitherto employed were now abandoned for horse-drawn Cape carts. The improved transport enabled greater progress to be made, and during 1890 the chain of triangles from Port Elizabeth to Kimberley was fully beaconed and prepared for observing. The first six months of 1891 was spent in making the observations up to Kimberley, and the remainder of the year was occupied in measuring a fresh base and its extension at Kimberley.

"There remained now, for completion of the work, the chain along the parallel of  $30^{\circ}$  from Hanover to Calvinia, and the tie-chain connecting this with the arc of parallel from Port Elizabeth to Caledon. The two arcs are about 100 miles apart across the Karroo. The mountains on both sides have considerable elevations, and it was found possible to connect the two chains by one large quadrilateral figure."

The longest line was 101.3 miles in length. This work lasted from March to October, 1892, and brought the field work of the original Survey to an end.

The rising in Matabeleland and the South African War interrupted the scheme but Sir David Gill did not abandon his project, and before peace was concluded he had set on foot active preparations for the continuance of the geodetic work already done in Natal and Cape Colony. The result was that in November, 1902, Colonel Sir William Morris was appointed Superintendent of a new Survey Department to carry out the extension of the triangulation into the Orange Free State, Transvaal and across the Limpopo to connect with the previous triangulation in Southern Rhodesia. Sir William Morris was assisted by Lieuts. W. A. de C. King and T. N. Dunman as recon-

naissance officers, whose duties were to examine the country and select the trigonometrical points. Captain H. W. Gordon joined the staff later, in charge of one of the observing parties, and towards the end of 1903, Captain C. H. Ley also joined, taking over the reconnaissance and selection of stations along 820 miles of the chain of triangulation. Altogether these officers carried their work over 3,090 miles of chain.

Captain Gordon's was for a considerable time the only observing party in the field, and between July, 1903, and July, 1906, he was responsible for observing along 1,024 miles of chain, after which he was transferred for completing the work on a chain connecting the Limpopo terminals of the Transvaal arc with the existing triangulation in the neighbourhood of Gwelo. Only £1,600 was available for filling this gap in the scheme, but Captain Gordon's "energetic and economical management" as Sir David Gill reported, completed the work in eight months for the prescribed amount. Between January and September, 1905, Captain C. H. Ley carried out a chain of second order triangulation between the Kimberley and Ottoshoop bases, a total length of 340 miles.

Lack of funds in the South African Colonies prevented the extension of the geodetic survey into a topographical survey for the whole of South Africa, and with the completion in 1907 of the geodetic framework the work was brought to a close.

*South Africa.—Work during the South African War, 1899-02.*

At the beginning of the war, the only maps available for the use of the troops were (1) a general map of Cape Colony, (2) an obsolete general map of Natal, (3) a military reconnaissance executed in 1896 by Captain S. C. N. Grant of the northern part of Natal, but only as far south as Ladysmith, (4) maps compiled from the farm surveys of the Orange Free State and Transvaal, which had no pretence to being topographical maps.

Arrangements became necessary at once for improving these maps, and largely adding to them, and the Survey Companies at home were called upon to furnish the parties. In July, 1899, half a "Mapping Section," consisting of Major H. M. Jackson and two or three non-commissioned officers, was sent

to Natal. In October, 1899, the other half was despatched to Cape Town, consisting of Major S. C. N. Grant, one non-commissioned officer, and one sapper. These detachments were primarily intended for the rapid reproduction of maps and sketches in the field, but they were also provided with the means of making rough surveys and reconnaissances. The "Mapping Section" was followed in January, 1900, by No. 1 Survey Section, under Captain C. F. Close, with Serjt. (now Lieut. & Qr.-Mr.) T. Johnson, and seven other rank and file. This section was employed first at Cape Town, where, happily, a lithographic outfit was obtained, which enabled the section subsequently to carry out an immense amount of reproduction work. From Cape Town the section moved to Orange River, where the first field work was done, and the resulting map, printed in the field, was the first of its kind.

As Lord Roberts advanced, the section moved to Bloemfontein, where it prepared a two inch to the mile map of the neighbourhood for defence purposes. On the advance to Pretoria, maps were compiled from the farm surveys for the actions at the Vet River, Zand River, Kroonstad, etc. Then the section went to Pretoria under Major H. M. Jackson, A.A.G. for topography, Capt. Close having been invalided home, and during the remainder of the war, it was employed on special surveys, and the production of the useful maps which became known as "Jackson's Series."

In May, 1900, No. 2 Survey Section embarked for South Africa, under Captain H. du P. Casgrain. This section was first employed in making maps of the Kimberley neighbourhood, and then at Pretoria where its duties corresponded with those of No. 1 Section. Towards the end of the war, No. 3 Section, under Captain H. W. Gordon, and No. 4 Section were despatched, but active operations had ceased on their arrival, and these sections were employed in completing the surveys of the battle-fields for historical purposes.

"The total area surveyed and mapped (chiefly on the scale of 2 miles to an inch) was 13,730 square miles. Of this total, part was published and issued in twelve original maps, the remainder was incorporated in maps compiled from the Farm

Surveys of the Colonies. Of these compiled and partly revised maps, 116 different sheets were issued—viz., 62 for the Transvaal and part of Natal, 20 for the Orange River Colony and 33 for the Cape Colony. Besides these, three general maps on smaller scales of parts of Northern Natal and Zululand, and of the Transvaal and Orange River Colony were compiled, printed and issued. In all, 463,600 maps of all kinds were printed by the Mapping Section, of which 307,980 were issued.

“Miscellaneous work included:—Reconnaissances of the enemy's positions at Paardeberg and Poplar Grove; special surveys of and around Bloemfontein and Pretoria: and the compilation and printing of several thousands of reconnaissance sketches, reports, etc.”

The Orange Free State is now completely surveyed on the scale of  $\frac{1}{125000}$ . The Survey was carried out entirely by the Colonial Survey Section, R.E. by an arrangement between the War Office and the Government of the Orange River Colony, whereby half the total cost—£18,500—was borne by the Colonial Government. The section, composed of Captain L. C. Jackson, Lieut. A. S. Redman and 4 N.C.O.'s, left England in September, 1905. Work was begun near Kroonstad in October and was systematically extended sheet by sheet. The Survey was based upon the geodetic triangulation carried out by Sir W. Morris. This was broken up into a secondary triangulation, with sides about 8 miles long. The secondary points were plotted on plane-tables, and the detail survey carried out entirely by rigorous plane tabling. As the work progressed, the plane-table's points were multiplied by a topographical triangulation. All the heights were based on the geodetic values, with a resulting probable error of less than a foot.

The section was divided for work into two sub-sections of one officer and two N.C.O.'s each with half the transport. The officer executed the triangulations for his sub-section, and had general supervision of the field work. The non-commissioned officers were employed entirely on plane tabling, each having a complete block of country 15 minutes square. The camps were so arranged that the plane-tables were about equally distant from the centres of their respective sheets.

In August, 1908, Captain Jackson and Lieut. Redman completed their tenures of appointment, and were succeeded by Captain H. St. J. L. Winterbotham and Lieut. A. G. McNeill. The field work was completed at a cost of £18,500 in May, 1911, when the section returned to England. The average daily output throughout the 5½ years' work was about 21 square miles per diem, the highest figure reached being 27·6 square miles in the Brandfort region. The total area mapped was 51,600 square miles. The average triangular errors of the secondary triangulation, varied from 3·5 seconds in the earlier stages to 2·1 seconds in the later years.

"There is no instance of a topographical survey more expeditiously or cheaply carried out, or more efficiently organized."\*

#### *The Reconnaissance Survey of Cape Colony.*

This work was begun in 1904 and was administered directly by the War Office. It consisted of reconnaissance sketches based on the geodetic triangulation. Extending from this framework a graphic triangulation, strengthened by minor instrumental chains of triangulation, was carried out, providing a network of points sufficient in number and accuracy to control the plane tabling. Six officers seconded from various regiments and seven other attached officers carried out the work under the supervision of Captain C. G. W. Hunter, R.E. In March, 1908, Captain Hunter was succeeded by Captain G. F. Evans, who in turn handed over the work to Captain H. W. Gordon in March, 1909. About 100,000 square miles of the northern portion of Cape Colony had thus been mapped on the scale of  $\frac{1}{250,000}$  when the work was closed down on the formation of the Union of South Africa.

#### *The Gold Coast.*

"A rigorous survey of the Gold Coast Colony was rendered necessary in 1901 on account of the large number of gold-mining concessions taken up by companies. These concessions

\* Colonel Close, Chapter on "Mapping" in the *Oxford Survey of the British Empire*, Vol. 6, p. 329.

were, for the most part, indifferently demarcated by private surveyors, a great deal of overlapping of boundaries occurred, and a considerable amount of litigation ensued."

In the middle of 1901, Major A. E. Watherston, C.M.G., was appointed Director of Surveys, and was assisted by the following officers:—Captain F. R. S. Gervers, Lieuts. A. E. Coningham, and E. F. W. Lees.

This party "laid down several long traverse lines on which to base the survey of the concessions, and cut one or two concession boundaries, in order to obtain a basis on which to determine fair survey fees for boundary cutting."

The survey of the concessions was regularly started in October, 1902. During the three seasons 1902-3, 1903-4 and 1904-5, upwards of 300 concessions were cut, and the country covered with a network of long traverses, triangulation being impossible owing to the dense forest. The topographical maps of the Colony are based on these concession surveys. In 1903-4 Captain F. G. Guggisberg determined accurate latitudes with the zenith telescope at different points in the network. The longitude of Accra was determined by Major Watherston by cable from Cape Town. In 1904 Major Watherston was appointed Chief Commissioner of the Northern Territories of the Gold Coast, and Major F. G. Guggisberg succeeded him as Director of Surveys.

In 1904-5 the survey of Ashanti concessions was started. By August, 1906, the whole of the Gold Coast Colony and a part of Ashanti were covered with a network of traverses from  $4^{\circ} 45'$  N. to  $6^{\circ} 45'$  N. and  $1^{\circ} 12'$  East to  $2^{\circ} 47'$  West. The traverses were rigidly surveyed with theodolite and steel tape. Their execution necessitated continual cutting through the forest which covers the whole country except a portion between Accra and the Volta River. Angular measurements in the traverses were corrected every 5 or 10 miles by observed azimuths. In the course of this work, Captain C. B. O. Symons carried out an accurate traverse up the Volta River from Kpong to Yeji.

In January, by which time the cadastral and topographical

work of the Gold Coast itself had been carried out, Major Guggisberg handed over the Survey Department to Captain E. F. W. Lees, who commenced to form a more permanent department, in view of the increasing number of mining concessions to be demarcated. The  $\frac{1}{125000}$  map of the Colony was completed and published in August, 1908.

The services of Lieuts. H. A. L. Hall and P. J. Mackesy were lent to the Colony, 1910—1912, to carry out under the Director surveys of special mining areas, and these officers remained in the Colony to carry out the survey of the Northern Territories of the Gold Coast, an area of some 31,000 square miles. Early in 1914, Captain Lees returned to England, and was succeeded as Director of Surveys by Captain H. A. L. Hall. The work is now being carried into the Northern Territories of the Gold Coast. Corpl. E. J. Strickland and Sapper Sheridan unfortunately lost their lives in these arduous duties.

#### *The Gambia.*

No less than four boundary commissions have successively delimited the frontiers of this Colony, and the resulting maps have provided all that is required for depicting the topographical features.

In 1890 Captain A. H. Kenney was British Commissioner and in 1898-99 Lieut. A. H. Tyler was Assistant British Commissioner. In 1910 a cadastral survey of Bathurst was decided on, and a party composed of Captain B. H. O. Armstrong, Sergt. W. F. Crook and Lance-Corpls. Page and Muse went out in November. Captain Armstrong started the work by observing traverses round the town, and handed over to Sergt. Crook to complete the detail survey. Unfortunately the two junior non-commissioned officers died of fever shortly before the party returned to England for the recess. Sergt. Crook returned to Bathurst the following season and completed the work.

#### *Sierra Leone.*

The boundaries of this Colony have been completely mapped by the boundary commissions of 1891-92, 1895-8, 1900 and



1903. The interior is not so completely mapped, but in 1904 the neighbourhood of Freetown, about 250 square miles in extent, was surveyed by the Colonial Survey Section under Captain H. D. Pearson.

In 1912, a small party composed of Captain G. A. P. Brown, ex-Company-Sergeant-Major McGregor and two sappers went out to make a cadastral survey of Freetown. The framework consisted of primary and secondary traverses, the detail being filled in by chaining. In 1914, Captain L. A. B. Doucet took out a party to survey the Freetown Peninsula, and the Protectorate of Sierra Leone. This work is still in progress.

### *Southern Nigeria.*

The beginnings of Survey work in Southern Nigeria (now administratively joined to Northern Nigeria) were the small department formed in March, 1901, by Captain A. J. Woodroffe, who had with him Lieut. L. N. F. I. King, one native surveyor and one clerk.

As an illustration of the work done by these officers in the early stages of a regular survey, the following account has been given in some detail:—

"From April to June, 1901, the party was employed on the survey of a route for a telegraph line from Bonny to Calabar. From November, 1901, to May, 1902, the party was similarly employed between Ogbo and Forcados. During the latter part of the same period, the officers were employed in a military capacity with the Aro Field Force, and in fixing the boundary between Northern and Southern Nigeria. From November, 1902 to January, 1903, geographical positions were fixed on the Kiva River. January, 1903, to May, 1903, the party erected the telegraph line from Ogbo to Forcados, and from November, 1903, to May, 1904, the party was similarly employed between Bonny and Calabar. From November, 1904, to June, 1905, positions were fixed on the Cross River, the Oban Hills were triangulated, and compass traverses were made of the country to the north of Abokam. From November, 1905, to present date (August, 1906), the party has been employed upon the Anglo-German (Southern Nigeria-Kamerun) Boundary. (Woodroffe and Hearson)."

The Oban Hill triangulation, about 2,000 square miles in extent, was connected with Calabar by latitude and azimuth, and the longitude of Calabar has been fixed chronometrically from Bonny.

During the period 1901-05 the astronomical positions of 50 important places were fixed, and the longitude by chronometrical differences based on Bonny. The Anglo-German Boundary Zone comprising an area of 810 square miles was topographically surveyed. In the autumn of 1906, Captain Woodroffe completed his tour of service in Southern Nigeria, and the department was amalgamated with that of Lagos under Mr. E. P. Cotton as Director of Surveys.

In May, 1910, the Survey Department again came under the control of an R.E. officer, and Major F. G. Guggisberg, C.M.C., was appointed Director. He at once proceeded to reorganize the work, and enlarge the basis of operations. Lieut. G. G. Waterhouse undertook the triangulation over an area of 4,640 square miles, the field work of which he completed single-handed in about three months. Major Guggisberg's reorganization of this Department had an immediate effect, and it was the first attempt to establish a complete scientific topographical survey in British West Africa. In 1911-12 Lieut. Waterhouse, assisted by 2nd Corpl. Hosking, R.E., carried out a further triangulation over an area of 5,577 square miles. A special cadastral party consisting of 12 non-commissioned officers, R.E., surveyed the town of Lagos on a large scale for local schemes of expansion. The two Nigerias are now being amalgamated, and one Survey Department for both is under organization by Major Guggisberg.

As regards Northern Nigeria, until its recent amalgamation with Southern Nigeria, there was no organized Survey Department. The frontiers have been surveyed by various boundary commissions headed by R.E. officers. The western boundary, bordering on Dahomey, was delimited in 1900 by an Anglo-French Commission, of which Major J. I. Lang was British Commissioner. The northern boundary, bordering on the French-Sudan in 1902-04 by an Anglo-French Commission (Lieut.-Colonel G. S. McD. Elliot), and the northern portion of the east boundary in 1903-04 by an Anglo-German Commission under Lieut.-Colonel L. C. Jackson.

*Northern Nigeria.*

The northern boundary had to be re-surveyed by Major R. A. P. O'Shee and Lieut. J. G. Hearson in 1906-07 owing to a rectification of the frontier.

In 1905-6 an expedition consisting of Captain R. Ommanney and Captain G. F. Evans and assisted by two officers of the West African Frontier Force fixed, by exchange of telegraphic signals, the longitudes with reference to Lagos of fifteen towns throughout the Protectorate: the longitude of Lagos itself being based telegraphically on Cape Town. The results of this expedition, which was highly successful, enabled good use to be made of the various sketches sent in by the local civil and military officers. The portion of the eastern boundary from the sea to the Cross River Rapids was surveyed by an Anglo-German Commission (Captain A. J. Woodroffe and Lieut. J. G. Hearson).

From 1907-1909 the mapping of Northern Nigeria—or rather the compilation of the numerous road sketches on a framework formed of points fixed by Captain Ommanney's party and by the various boundary commissions—was in the hands of the Intelligence Officer of the Protectorate, assisted by Lance-Corpl. A. R. Turner, R.E., who went out in June, 1909. In 1910, two N.C.O.'s, R.E., were sent out to assist in the survey of the Bauchi Tin Mines, on the scale of  $\frac{1}{62500}$ , and in 1912 a special party of 11 N.C.O.'s and men, R.E., was sent out under Captain F. L. N. Giles to carry on the Mines Survey. This work is still going on. In 1913, Major F. G. Guggisberg, C.M.G., then Director of Surveys of Southern Nigeria, was appointed acting Surveyor-General for Northern Nigeria, and as these two Protectorates in 1914 were united to form one, under the name of Nigeria, a combined survey department is being organized at the present time.

*The Federated Malay States.*

In 1896 Colonel W. G. Morris was invited to make a report on the Perak Survey. His report contained many valuable suggestions. In 1906 very large arrears of Revenue Survey work had accumulated, while, at the same time, great difficulty was

experienced in getting competent men to fill vacancies in the staff. For these, and other reasons, it was considered desirable that an independent inspection of the department should be made, and the Secretary of State for the Colonies, on the recommendation of the Colonial Survey Committee, deputed Major E. H. Hills, C.M.G., to visit the country and report on the whole question. He reported that the first reform should be the amalgamation of the separate State Revenue Survey Departments, with the Trigonometrical Survey, into one department under a competent Surveyor-General. This was at once accepted, and Colonel H. M. Jackson became the first Surveyor-General. The other recommendations related to matters of detail, which it was considered better to postpone until the Surveyor-General had had time to make himself acquainted with the conditions.

Owing to the approaching completion of the principal triangulation, a convenient moment now offered for starting a systematic topographical survey. Progress in this direction was at first slow, and at the request of the Federated Malay States Government the Colonial Survey Section was lent for three years, from May, 1912. The Colonial Survey Section employed on this work, consisted of Captain T. N. Dunman, Lieut. D. A. Hutchinson and four N.C.O.'s, R.E. The plane-table work is in thick forest country. In 1913 Major G. S. Knox was appointed Deputy Surveyor-General to assist Colonel Jackson.

### *The Island of Pemba.*

It was decided in 1910 to survey Pemba Island, the source of most of the clove supply of the world, lying about 60 miles north of Zanzibar. A preliminary examination of the island was made in August, 1910, by Major H. W. Gordon and in April, 1911, a party composed of Captain J. E. E. Craster, Lieut. Kyngdon, R.G.A., Lance-Corpls. Cager, Whitters, and McQueen, R.E., was sent out to make the survey.

"The island is 40 miles long, and 6 to 12 miles wide. Some 2 or 3 miles off the western coast lies a chain of small islands, and on the eastern shore of the largest of these a base

had been selected by Major Gordon. Nearly the whole length of the base lay below high-water mark, and the central portion below the low-water mark of neap tides, so that the measurements could only be made at low water during spring tides. The base was measured with a 300-ft. steel tape, and the end of each tape length was marked by a steel toilet pin stuck in the side of a wooden picket, driven firmly into the ground. The tape was stretched with a spring balance to a tension of 20 lbs. The base was 13,817 ft. long, and the probable error of the mean of the two measurements was 0.4 of an inch. An azimuth was observed at Weti with a 5-in. micrometer theodolite: the observations on two pairs of east and west stars having a probable error of .5 in. Triangulation was only possible between the chain of islands and the west coast of the main island. Very few points could be fixed inland, owing to the lack of any prominent hills, and the dense vegetation. A large amount of clearing was required at each trigonometrical station, and on the average, it took one day to establish each. Some of the stations were established in mangrove swamps, and below high-water mark, no other site being possible."\*

Heights were obtained by reciprocal vertical angles from the stations. The interior and the east coast of the island were traversed with the theodolite and steel tape, or by sub-tense methods. For the topography, prismatic compass traverses were run between trigonometrical and traverse stations, cutting up the country into triangles of 3 to 5 miles side.

"The country offered many difficulties to the topographers. Steep razor-backed ridges about 200 ft. in height alternated with deep crooked valleys. The bottoms of the valleys were marshy and often impassable, and tidal creeks filled with impenetrable mangrove swamps intersected the country, so that long détours were necessary; owing to the nature of the work, the topographers could only survey half a square mile each day."\*

\* See Captain Craster's Report in *Royal Engineers Journal*. 1912, page 145.

The Survey, 400 square miles in extent, was completed in 9½ months. The climate is so trying, that, with the exception of the survey party, no other European had successfully attempted to camp for more than a few nights in the interior.

### *Fiji.*

A trigonometrical survey on which to base land surveys was sanctioned in August, 1908. Captain C. H. Ley was put in charge of this work, which was estimated to last for two years, and to cost £4,000.

Viti Levu, on which work was first started "is an island about 4,112 square miles in area, and consists of a crumpled mass of hills rising to 4,500 ft. above the sea, covered with dense forest. One road alone exists, which crosses the island for the most part along the river Rewa. There are a few coast roads besides, but the interior is otherwise traversed by native tracks alone. The top slopes of the hills are very steep, while innumerable streams have cut the lower slopes into a network of ravines filled with densest vegetation. The main difficulty in this special work is for the Europeans to keep in health for a sufficient time to carry a line of triangulation through the interior, where, except the native vegetables, no food is to be obtained. Paths have generally to be cut to the hill tops, and a clearing of the summits before a round of angles can be taken, is, as a rule, a laborious task."

The effect of damp and mildew was so damaging to plane-table sketches in these forest-covered hills, that plane-tabling was abandoned in favour of the field book. High and low water marks were continuously observed from February 10th to March 10th. Captain Ley was unfortunately obliged on account of ill-health to leave Fiji in 1909, and eventually resigned his appointment.

(See Colonial Survey's Committee's reports, 4th and 5th years).

### PALESTINE EXPLORATION.

Under the auspices of the Palestine Exploration Fund, Captain S. F. Newcombe and Lieut. J. P. S. Greig, accompanied by Corps. Rimmer and McDiarmid, R.E., carried out a geographical

survey of 4,500 square miles of South-Western Palestine during 1913-14. This was a continuation of the Survey of the Holy Land, which was made by Lieuts. Conder and Kitchener in 1872-77, an account of which is given in Vol. II., p. 271, and completes the work up to the boundary line between Egypt and Palestine. The archæological work of the expedition was in charge of Mr. J. Woolley and Mr. C. Lawrence.

#### BOUNDARY COMMISSIONS.

The great majority of Boundary Commissions have been appointed to delimit African frontiers. Since 1884, when the partition of Africa between Great Britain, France, Germany, Belgium and Portugal began, there has been an almost constant succession of International Commissions, with the result that the total length of accurately mapped British frontiers in Africa alone is about 15,000 miles.

The British Commissioners have nearly always been appointed from the Corps of Royal Engineers, and as in many cases the first reliable information of the geography of the African Colonies has come from the labours of the Commissions, it will be seen how important a part the Corps has taken in developing those parts of the Empire. No development can regularly proceed until sufficient and accurate maps have been obtained. The Administrator cannot administrate: the trader cannot carry on his trade rapidly: and the soldier cannot make his campaigns without good maps. The making of the maps has been real pioneer work in many cases; the journeys of the commissioners often being the white man's first appearance over the ground. In the following accounts of the Boundary Commissions, some have been described in more detail than others, to serve as typical examples.

##### *The Gambia (Anglo-French), 1890-99, 425 miles of Frontier.*

Of the four commissions which have at different times delimited this frontier, three have contained a representative of the Corps. The first, in 1890, was conducted by Captain A. H. Kenney, with Corpl. C. McGregor. The second, in 1895-96, was under Mr. Reeves, of the Colonial Civil Service,

but Corpl. McGregor again accompanied the expedition. The third, in 1898-99 headed by Mr. Reeves, contained Lieut. A. H. Tyler as Assistant Commissioner, and Sergt. C. McGregor and Sapper Harlin as topographers.

*Sierra Leone—French Guinea, 1891-99, Frontier 260 miles.*

Captain A. H. Kenney was the British Commissioner in 1891-2. In 1895 Lieut. A. H. Tyler and four non-commissioned officers and men took part in a commission headed by Lieut.-Colonel J. K. Trotter, R.A. Lieut. Tyler took a number of successful lunar photographs for the determination of longitude at various places. He was also responsible for the astronomical work generally and for the topography. Major S. C. N. Grant fixed the position of Tembi Kunda and other places in the Protectorate, forming a framework on which the existing sketches could be based. In January, 1899, Lieut. J. P. Mackesy was the British Commissioner appointed to demarcate the boundary from Tembi Kunda to the 13th degree of longitude west of Paris, in conjunction with Captain Gaden, of the staff of the French Sudan. The work was completed in February, 1899.

*The Anglo-Liberian Boundary, 1903, 195 miles.*

January 1st, 1903, a Commission of which the British representatives were Captain H. D. Pearson, British Commissioner, Lieut. E. W. Cox, Assistant Commissioner, Sergt. A. R. Briscoe, and Lance-Corpl. C. H. Dillon, with Lieut. R. A. Cockburn (West African Field Force) in command of the escort, left Freetown, Sierra Leone, to delimit the boundary between Sierra Leone and Liberia.

"The boundary was described as starting from the intersection of the River Uldafu, with the 13th meridian west of Paris, and following this meridian southwards to its intersection with the river Mannah, from which point to the coast the left bank of the river Mannah at low water formed the boundary. The position of the starting point was unknown, but the source of the river Niger, which rose near the village of Tembikunda, had been determined both for latitude and longitude, by Captain S. C. N. Grant, C.M.G., R.E., in connection with the Anglo-French Boundary Commission of 1895-96."



Thus it was only necessary, before actually starting work on the boundary, to fix, from the source of the Niger, the intersection of the river Uldafu and the 13th meridian west of Paris. A short base was measured at the starting point, and triangulation carried eastwards, until the 13th meridian (W. of Paris) was reached, and thence down the meridian for about 8 miles, when the nature of the country proved unsuitable for triangulation. Subtense traversing was then substituted as far as the river Mannah. The last 30 miles of this traverse lay through the so-called impenetrable forest which stretches south from Bariwalla to the river Mannah. The sky was invisible owing to the dense overhead growth during the whole 30 miles. Down the left bank of the river Mannah, which was only navigable for 30 miles, a chain and compass traverse was carried to the coast. The Commission finished its work in July, 1903.

*The Gold Coast—French Sudan, 1900, 195 miles.*

This Commission, under Captain A. E. G. Watherston, with Lieut. F. B. Henderson, R.N., was appointed in 1900 to delimit the frontier along the route of the territories. Work was started at Leo, on the 21st March. The country was covered with a low scrubby bush, and no hills were visible. Triangulation was out of the question, and a system of chained lines, whose directions were noted on the plane-tables, was adopted, the roads for some nine miles on either side of the general line being traversed by compass, and the time noted. Latitudes and azimuths were observed at frequent intervals to check the direction and magnetic variation.

After fixing the latitude of Leo, the expedition marched to the Black Volta River, the starting point of the frontier, which was reached on the 29th March, and thenceforward the work proceeded, not without interruptions from tornadoes, until April 25th, when the parties reached Leo again on their eastward journey. Some trouble with the Natives occurred on the way, but Captain Watherston took firm action, and after making an example of one chief who opposed the advance, by destroying his compound, and fining him in cattle, the difficulties were removed. The Red Volta River was crossed on October 24th, and

several towns visited. On 2nd November, the Commission arrived at Zwaga, and finally reached Accra on the coast on 30th December.

*The Gold Coast—French Ivory Coast, 1902, 450 miles.*

The above was delimited in 1902 by a party consisting of Major Watherston as Chief Commissioner, Captain H. B. Des Vœux, as Assistant Commissioner, and Captain R. W. Soden, Royal Fusiliers, as Political Officer.

Major Watherston, in July, 1901, had also been appointed Director of Surveys for the Gold Coast, and charged with the duty of organizing the survey of the gold-mining concessions on a sound basis. For four years he laboured in the exacting climate, carrying his work forward with unflagging energy and capacity. For his work on the international boundary he received the Companionship of the Order of St. Michael and St. George, and in the spring of 1905 he was made Chief Commissioner of the Northern Territories of the Gold Coast. Here again, he threw himself with great zeal into his task, and proved himself a most able Administrator. The climate, however, told upon him, and his frequent attacks of fever impaired his physical strength; he died in harness at Tamale in December, 1909. Major Watherston was succeeded as Director of Survey on the Gold Coast by Major F. G. Guggisberg in 1905.

*The Gold Coast—Togoland, 1901-4, 165 miles.*

Captain W. J. Johnston and Lieut. J. F. Turner, with Corpls. S. A. Boyd and W. S. Sloan, formed the British section of this Commission, which left England in 1901. The country was too flat and thickly covered to allow of triangulation, and a system of road traverses with the theodolite, checked by latitudes and azimuths, was adopted.

Work in the field was started in November, and was completed on August 23rd. The astronomical work was done by Captain Johnston, while Lieut. Turner carried out the compass surveys to the right and left of the road traverse. In 1904 Lieut. A. E. Coningham demarcated 125 miles of the frontier at its southern end, with a German Commissioner, and in the

same year, Captain H. B. Des Vœux demarcated the boundary from the 9° North latitude to the southern boundary of the French Sudan.

*Lagos—Dahomey, 1900, 235 miles.*

This Commission consisted of Major J. I. Lang (now Lang-Hyde) as British Commissioner, assisted by Lieut. G. W. Denison, and Commandant Toutée on the French side.

Their work was to delimit the frontier between Lagos and Dahomey from the 9° parallel of North latitude to the river Niger. The delimitation took from February to May, 1900. In addition to mapping the frontier, Major Lang made a special survey of a forest region on the banks of the Niger.

The country to be traversed was, for the most part, flat and covered with forests. It was impossible to make a triangulation, and impracticable to use the method of latitudes and azimuths. The parties therefore traversed the paths connecting the villages along the frontier, and took astronomical observations at certain places as a check upon the work.

*The Niger—Lake Chad, 1902-4, 860 miles.*

1902-1904. This Commission, on the British side, consisted of Lieut.-Colonel G. S. McD. Elliot, Chief Commissioner, Captain C. H. Foulkes, Captain G. R. Frith, and Lieut. G. F. Evans, Assistant Commissioners. In 1906 a further Commission was sent out to survey this frontier. Major R. A. P. O'Shee was Chief Commissioner, with Major C. B. Symonds, Royal Artillery, and Lieut. J. G. Hearson as Assistant Commissioners. The Commission arrived at Doli on December 1st, 1906, and on December 10th a theodolite traverse of the Mataukari road was commenced at Bengu, the distances being measured by a steel tape. Roads of lesser importance were sketched with compass and wheel measurements. The road traverse was continued to Yo, which was reached on 9th January, 1908. Lieut. Hearson, with Corps. Richardson and Atfield, had traversed over 1,200 miles with the steel tape, doing as much as 100 miles per month, a performance which, in that difficult country and trying climate, is very remarkable. Sergt. Woram and Corpl. Rimmer, R.E., assisted Major Symonds with the road compass sketches.

*Yola—Lake Chad, 1903, 350 miles.*

A strong Commission set out in February, 1903, to delimit and survey the Anglo-German Frontier from Yola to Lake Chad. The British party consisted of Lieut.-Colonel L. C. Jackson, Captain G. F. A. Whitlock, Lieut. L. C. Jackson, and Lieut. L. C. A. de B. Doucet. It had been decided to determine the longitude of Yola by a series of occultations, but out of 30 attempts during the six weeks which the Commission spent at Yola, only three observations could be made, owing to the cloudy weather. The German party, arriving later, and adopting the method of moon culminations, had the advantage of weather, but there was a difference of only 3.5 seconds of arc between the two mean results. The geographical position of Yola being previously undetermined, several observations for latitude were also made there, so as to obtain a starting point for the triangulation which was afterwards carried up to Lake Chad.

*Cross River (Southern Nigeria—Kameruns), 1895—1906,  
140 miles.*

This Commission surveyed in 1895 the frontier between what was then called the Niger Coast Protectorate and the German Colony of the Kameruns, from the Cross River Rapids to Rio del Rey. The officers of the British party were Captain C. F. Close and Captain E. P. S. Roupell (R.E. Militia). This expedition was the first to march across that tract of country and furnish accurate geographical knowledge of it.

In 1905 a Commission was appointed to delimit this boundary. Captain A. J. Woodroffe and Lieut. J. G. Hearson were the British Commissioners. The party, with 175 carriers, left Calabar on 18th December, 1905. They arrived at Ekong on 24th December, and were occupied until 3rd January in clearing the summit of Ekong Hill, observing and computing time, latitudes, and azimuths. A base was cleared at Ekongdup. The Cross River was surveyed with theodolite and subtense bar. Theodolite traverses with the subtense method of obtaining distances were adopted wherever triangu-

lation was impossible ; but the roads and rivers south of the Cross River were surveyed by compass and wheel. The party returned to Calabar on 10th June, 1906.

*The Cross River Rapids—Yola, 1907-9, 285 miles.*

This boundary was surveyed by a Commission sent out in 1907. The members were:—Major (local Lieut.-Colonel) G. F. A. Whitlock, Captain H. T. G. Moore, Lieut. W. V. Nugent, R.A., 2nd Lieut. W. D. Downes, Royal Sussex Regt., with Lance-Corpls. H. Locke and E. F. Davies, R.E., as plane-tablers.

"The Commission started work from Yola on October 6th, 1907, and surveyed the boundary line as far as Kwossa, 170 miles S.W. of Yola, where on 19th April, 1908, work was suspended for the rainy season. This portion of the boundary traverses bush country, crossing the Shebshi Mountains at about 100 miles from Yola, a range which rises to a height of 4,500 ft. above sea level, with several peaks, the highest of which is Vogel Spitz, 6,700 ft." After the recess, work was resumed on 19th October, 1908. The country then became

"very rough and mountainous, until within 50 miles of Boundary Post No. 5 (of Capt. Woodroffe's survey, 1905-6) when it became undulating, and covered with dense forest, the trees being for the most part 100 ft. high. From the middle of January, 1909, to the finish of the work (April, 1909) tornadoes with torrents of rain were of daily occurrence, and delayed the work.

"On the 16th April, 1909, the British and German Commissioners met at Bashu, Southern Nigeria, and after comparing maps, etc., agreed on the line from the centre of Yola to the centre of the river Anebir in Southern Nigeria, and thence to Boundary Post No. 7 (Capt. Woodroffe's survey) as a provisional boundary line, leaving the selection of a boundary with natural features for the consideration of the Home Governments. The total length of boundary delimited was approximately 320 miles, while an area of nearly 4,000 square miles was accurately surveyed by triangulation and plane tabling.

"Except at Sonkwala, which is about 80 miles north of the Cross River, all the natives were friendly. Here fighting took place on December 24th and 26th, the British and German escorts fighting side by side. The Commission's losses were 5 killed and 19 wounded."

Major Whitlock was in command of the combined escorts in the fighting in the Sonkwala Valley, and the African General Service Medal was awarded on this occasion.

*Bechuanaland—German South-West Africa, 1898–1903, 1,113 miles.*

This long boundary was surveyed in 1898–1903 by Major H. D. Laffan (now Lieut.-Colonel Laffan, C.M.G.) representing Great Britain and Lieut. Wettstein, representing Germany. The two officers met at Rietfontein in November, 1898, and carried a triangulation along the 20° meridian east to its intersection with the 18° parallel south, and thence due east to the 21° meridian.

*The Manica Boundary, 1892, 235 miles.*

This boundary lay between Southern Rhodesia and Portuguese East Africa, from 18° 30' S. to the Sabi River. It was surveyed in 1892 by Major J. J. Levenson as Chief British Commissioner, and Captain S. C. N. Grant, and Lieut. C. S. Wilson, as Assistant Commissioners. The same boundary was beaconsed in 1898–99 by Captain C. S. Wilson.

*Barue Boundary, 1898, 145 miles.*

This was a Commission sent out to adjust the frontier between Portuguese East Africa and Southern Rhodesia, from the Mazoe River to 18° 30' S. The British party consisted of Lieut.-Colonel J. J. Levenson, Captain A. E. G. Watherston, and Lieut. C. Russell-Brown.

*Anglo-Portuguese Boundary North and South of the Zambesi, 1904–05, 475 miles.*

The work on this boundary was divided into two parts, the portion between North-Eastern Rhodesia and Portuguese East Africa north of the Zambesi, being dealt with in 1904, and the lower portion, between Southern Rhodesia and the Portuguese Colony, in 1905. The British Commission in both cases consisted of Major R. A. P. O'Shea, in command, Captain A. N. Campbell, R.A., Lieut. L. C. A. de B. Doucet, and Lieut. E. W. Cox; Sergt. Probert, Corpls. Attfield and Crusher, R.E.

*Lake Nyasa—Lake Tanganyika Boundary, 1898,  
225 miles.*

This Commission, composed of Captain C. F. Close, Chief Commissioner, Captain F. R. F. Boileau, Assistant Commissioner, Captain Chichester, in command of the escort, Lance-Corps. J. G. Scott and N. S. Peacock, R.E. (Wahid Ali Khan being added as a Surveyor on the arrival of the party), was sent out in 1898 to delimit the frontier between British and German territory from Lake Nyasa to Lake Tanganyika. The Commissioners arrived at Karonga, on Lake Nyasa, 18th June, 1898. Captain Close, and two members of the German party proceeded to Nkata Bay, 110 miles south of Karonga, where the telegraph line then ended, and by exchanging 11 complete sets of signals with the Cape Town observatory, obtained a value for the longitude at that place. The determination of time was made by observing equal altitudes of different stars. The longitude was then carried down to the lake shore (about 2 miles) by means of a traverse, and thence to the Kambwé Lagoon, near Karonga, by the transport of 14 watches and chronometers for three journeys. Karonga was reached on 10th July.

Thenceforward the two sections of the Commissioners worked separately, agreeing to meet at Chitete on the Songwe River to compare geographical results. The triangulation was continued to Tanganyika, and a survey was made of the country between the Stevenson Road (some 12 miles of which had to be re-aligned to bring it within the British boundary) and the Kilambo River, and also west of Mambwe. The position of the 32nd meridian of longitude as determined separately by the two parties differed by a little over 500 yards, while that of the 33rd meridian differed by four feet only.

On 11th November, the two Commissioners met at Ikawa, and compared results. The British party assembled at Karonga on the return journey and reached Chinde on December 20th, having completed their work in six months. Nearly all the members had attacks of fever, but there were no serious cases.

*Northern Rhodesia—Belgian Congo 1911–12, 1,200 miles.*

This was a joint Commission appointed by the British and Belgian Governments in 1911 to delimit the frontier, 1,200 miles long, between Rhodesia and the Congo Free State. The following Royal Engineers were appointed to the Commission:—Major R. A. Gillam, as Chief British Commissioner, Captain R. Walker, and Lieut. O. E. Wynne as Assistant Commissioners, and six non-commissioned officers, R.E. The Commission left England in July, 1911, and met the Belgian party at Sakanja on 1st September. In addition to delimiting the frontier, the Commissioners were to include a topographical survey of a large tract of country, as it was hoped to gain important knowledge of this part of the Empire.

The framework laid down was a triangulation based on the two points Msenguli and Chantunile, of the great Rhodesian chain of geodetic triangulation. In the first six months, roughly 6,000 square miles of country were triangulated, with an average triangular error of 5·7 seconds. Soon after commencing work, the party was divided into two groups, Major Gillam and two Assistant Commissioners (officers of the Royal Artillery) with four N.C.O.'s, R.E., as plane-tables, working on the Rhodesia—Katanga (Zambesi—Congo Watershed) boundary, while the second group, composed of Captain R. Walker, R.E., Lieut. O. E. Wynne, R.E., and three N.C.O.'s, R.E., took up the survey of the meridian forming the boundary south of Lake Bangweolo, together with the topographical survey of a large area on either side of the meridian.

The first party found that the "watershed, which had been described as 'bush' country, was covered with a thick forest of trees, which averaged 50 ft. in height. There were very few prominent features, and in order to maintain triangulation, large towers had to be built. This naturally delayed progress, and by the end of 1912 it was realized that the 24th meridian could not be reached by May, 1913, that is, in time to give the Anglo-Portuguese Commissioners (who were arriving to delimit the frontier between Rhodesia and Angola) a rigid determination of longitude for the starting point of their work. When the rains prevented further work in the field, triangu-



lation had been carried as far as  $26^{\circ} 15' E.$  covering an area of some 6,300 square miles from the geodetic base. In addition to this, some 1,450 square miles had been topographically surveyed."

The second party found their country "though difficult, not so troublesome as the watershed, and excellent progress was made. Before the rains broke, the longitude of Panta had been determined by triangulation from the geodetic base, and an area of some 5,800 square miles had been topographically surveyed" (Colonial Survey Committee's Report, 8th year). Major Gillam's health unfortunately broke down in November, 1912, and he was unable to return with the Commission. His place as Chief British Commissioner was taken by Captain R. Walker and Lieut. E. M. W. Sealy joined in the latter's place.

The Commission has now nearly completed its work.

*Uganda—Belgian Congo, 1907–08, 8,800 miles.*

The British Commissioners were Lieut.-Colonel R. G. T. Bright, C.M.G., Rifle Brigade, Captain E. M. Jack, R.E., and Lieut. the Hon. F. R. D. Prittie, Rifle Brigade. Corpl. A. Thomas, Lance-Corpls. A. Jones, and C. Page, R.E., were the plane-tablers.

"The Commission commenced work in the middle of March, 1907, at Mount Ihunga, though while marching there from Entebbe, a rapid plane-table survey of the road was made. To enable the triangulation to be satisfactorily continued in connection with the surveys of the recent Anglo-German Boundary Commissions (1902-6), it was considered necessary for the British section to visit Chamiumbu, a trigonometrical station in German East Africa. By the end of May the triangulation had advanced to the country at the north of Lake Albert Edward, and it was decided, owing to the dense haze covering the country and making it impossible to observe objects more than a few miles distant, to measure a check base, and take astronomical observations. While these were being completed, the N.C.O.'s engaged in mapping the country, who were some distance behind, were enabled to complete their work.

"In August the rainy season commenced again, and the

clearing of the atmosphere enabled the triangulation to be continued. It was found to be impracticable to carry it along the 30th meridian which crosses over the inaccessible heights of Ruwenzori, so it was continued round the eastern side of the mountain till, in the vicinity of Fort Portal, it was found possible to erect a signal. This point, whence a view could be obtained over the valley of the Semliki, is on a spur of Ruwenzori, at an altitude of 10,000 ft. Even at this altitude the cold was intense, and Karangora, as the peak is called, was the most unpleasant spot visited by the Commission. It was perpetually wrapped in clouds, and swept by a bitter wind and driving rain or hail.

"As soon as the triangulation had been completed to Karangora, Captain Jack and myself returned to Katwe, with the intention of working round the western side of the Ruwenzori Range, which runs north-eastwards. We had been compelled by the obstruction it placed in our path to diverge some 19 miles to the east of the 30th meridian. During October and November, the triangulation was carried across the western spurs of Ruwenzori and over the dense forest between that mountain and the river Semliki. It was connected with the work previously done in August and September on the Toro side of the mountain. In the meantime, the R.E. non-commissioned officers were mapping Ruwenzori and the forest-clad valley of the river Semliki. Their work was difficult, and entailed hardship, but by dint of patience and perseverance they had finished by the 10th February the topography of the boundary zone, with the exception of a portion of the snow-covered heights. The sketching of that part of the mountain would have been a hazardous undertaking, as they were inexperienced in mountaineering, and unprovided with the necessary equipment. During February (1908) a 'check base' was measured near the river Semliki, and astronomical work undertaken, this last stage being completed by the end of March. Thus, after a year's work, the British Commission had completed its actual labours in the field. During the operations of the Commission suitable points had been selected for stations in the geodetic triangulation for the measurement of the arc of the 30th meridian.

*Topography.*—"Very good mapping work was done on Ruwenzori by all three non-commissioned officers, but especially

by 2nd Corpl. A. Thomas. It was of course out of the question to plane-table the whole of the highest parts, as this would have required a specially equipped expedition. Corpl. Thomas, however, mapped the whole of a strip 17 miles wide by 26 miles from east to west, going right across the mountain, and reaching an altitude of over 14,000 ft. within a few miles of the highest point. In all, the whole of the mountain was successfully mapped, with the exception of some 70 square miles of practically inaccessible country."

*The Anglo-German-Belgian Boundary Commission, 1911.*

This Commission was appointed to delimit the frontier between Uganda and the Congo in the 'Mfumbiro district, and also the Uganda-German East African Frontier to the east of Mount Sabinio. The British party was composed of Captain E. M. Jack, R.E., as Commissioner, with Captain the Hon. F. R. D. Prittie, Rifle Brigade, as Assistant Commissioner, and Company-Sergeant-Major H. Higman, Corpl. G. Archer, and Lance-Corpl. S. Powell, R.E.

The party reached Nkabwe in February, 1911, and completed its work in August, 1911. The country traversed by the boundary consisted chiefly of highlands 6,000 ft. above the sea, and dotted with small lakes. Part of the region consisted of the volcanic chain of the 'Mfumbiro Mountains with heights ranging from 10,000 ft. to 14,700 ft. The Natives in parts of the district were restless and truculent, and there were some casualties amongst the carriers, but none occurred amongst the Europeans. The triangulation was started from Nkabwe and Ruankoba, two of the stations of the main triangulation of the Anglo-Belgian Commission of 1907, and carried eastwards, spreading a network of triangles over the country between 1° S. latitude and the new boundary between Uganda Protectorate and German East Africa, finally connecting up with Thunga and Chamiumbu, fixed by the Anglo-German Commission. The two topographers, Corpls. Archer and Powell, R.E., mapped 1,230 square miles in 296 days, giving an average progress of 4.16 square miles a day.

*British-German East Africa, 1892, 118 miles.*

Lieut. G. E. Smith, R.E., took part in this delimitation, which was a preliminary survey extending from the Indian Ocean to Lake Jipe.

*British-German East Africa, 1904-06, 350 miles.*

The boundary ran from Lake Jipe to the Victoria Nyanza. The British Commissioners were (local) Lieut.-Colonel G. E. Smith, Major R. G. T. Bright, Rifle Brigade, and Lieut. T. T. Behrens, R.E.

*Uganda—German East Africa, 1902-04, 150 miles.*

Lieut. T. T. Behrens took part, under Colonel Delme Radcliffe, in this delimitation. His work included series of observations for determining the position of Port Florence; the chronometer determination of longitude and triangulation between Mizinda and Entebbe, and between Mizinda and Rukira; also the measurement of the base at Rukira. He also furnished a valuable geographical report on the country south-east of Lake Albert Edward. The Commission finished its work in April, 1904.

*The Chile—Argentine Boundary Commission, 1902-3.*

The Commission consisted of Colonel Sir T. H. Holdich, K.C.M.G., K.C.I.E., C.B., Captains C. L. Robertson, and W. M. Thompson, R.E., Captain B. Dickson, R.A., and Lieut. H. A. Holdich, Indian Army. Captain H. L. Crosthwaite, R.E., joined the Commission later. It was sent out to settle a dispute between Argentine and Chile as to their frontier along the Patagonian section of the Andes.

Through a geographical misconception, it had been assumed that the crest of the main range which parted the waters in the northern section of the Andes was also the frontier in the southern or Patagonian section. But as a matter of fact the main range was not the main water parting; and each side claimed the boundary "to be determined by that geographical condition which was most favourable to its own interests. Experts were accordingly appointed, but they failed to

come to a mutual understanding and at last, when war seemed inevitable, the final appeal to British arbitration was mutually accepted."

But the difficulty was that accurate topographical maps did not exist, and no decision could be made by the arbitrators without the necessary geographical knowledge of the country. Thus "it was found advisable to send out a British Commissioner with instructions to examine the territory in dispute in the Patagonian Andes with a view to furnishing such geographical evidence as was necessary in order to frame an award."

The party started for their exploratory survey early in 1902. "It had to be carried through about 1,000 miles of mountainous country without roads, or bridges, or supplies, and to include the examination of many hundreds of miles of the Pacific coast at a time when equinoctial gales might be expected; whilst the whole programme was to be condensed into the few remaining months of the short Patagonian summer before snows blocked the way to the coast. It could of course only be done by dividing the party."

Captain Robertson with Captain Thompson to assist took the southern section, which comprised "the most rugged and difficult of the Southern Andes." Captain Dickson took "charge of certain outlying areas to the north," while Sir T. Holdich himself took the coast examination and the northern section of the mountain area.

From March to May the parties traversed the whole region. They tested the mapping and collected all the necessary geographical evidence.

The Commission returned to England and the award was made by King Edward VII. in November, 1903, and the second part of the Commission's work now began--viz., the demarcation on the ground of the newly-defined boundary. Pillars had to be erected over 900 miles of boundary in the few months of summer.

The party was the same as before, with the addition of Captain H. L. Crosthwaite, of the Indian Survey. The work of pillaring the boundary was "done by attacking it all along the line at once. Each assistant was told off to a certain section, within

which he was guided by his maps to the absolute position of each pillar to be erected. Each was accompanied by Argentine and Chilian representatives, and, in case of a critical discussion as to the exact site of any pillar, he was either to decide the question himself or (if he considered it of primary importance) he was to refer the point to me as chief arbitrator and representative of the tribunal. With such energy and determination did all the party set to work—clearing roads through the forests, building boats for the lakes, climbing peaks for the purpose of a better outlook, and finally hauling the iron framework of the pillars into position over inconceivably rough ground—that the whole line was demarcated, plotted on the maps, tabulated and reported on, without a single hitch, a month before I had reckoned it could possibly be done.”

*Peru—Bolivia Boundary, 1911.*

In 1911 Major A. J. Woodroffe, accompanied by Captain Toppin, Northumberland Fusiliers, Lieut. C. G. Moores, R.E., and Captain Nanson, R.A., was sent out to delimit the boundary between Bolivia and Peru.

This work, which is still in hand, is likely to furnish much interesting geographical information of those parts.

## CHAPTER VII.

## SERVICE IN VARIOUS DEPARTMENTS OF THE STATE (NOT INCLUDING INDIA), 1886—1912.

The War Office Headquarter Staff—Army Staff at Home Stations—Army Staff Abroad (except India)—The Admiralty—The Foreign Office—The Colonial Office—The Board of Trade—Various Departments of the State—Egypt and the Sudan.

IN addition to their duties as Engineers, the officers of the Corps have constantly been employed in other Government departments, as their education and training have specially fitted them to hold positions of trust and responsibility, and General Porter, in the second volume of his History, has given the names of a number of those who were so employed prior to the date when he wrote. Of some of the officers he mentioned in this connection short memoirs were included, and of others, who have since passed away, biographies are given in the present volume, which will help to show the nature of the services rendered by them to the State. But, as many of those who have rendered similar services since 1886 are still living, and as, happily, the time has not yet come for dealing with their memoirs, it has been considered desirable in this chapter to give lists of the officers who have been employed in important positions in various departments since that date, and these lists may prove helpful to those who, in time to come, will take in hand the continuation of the History of the Corps.

It is evident that there are several ways in which the names in these lists could be arranged, but, for convenience of reference, it has been thought better to give them in alphabetical order, with the title of the latest military rank reached, and also to give the last appointment held, while the dates added show the whole period of employment in the Department, including in some cases, the time of service in a lower capacity.

In one important respect there has been an important change as regards the employment of Engineer officers outside the

scope of their own special duties during the past half-century. Prior to the Crimean War, when the Board of Ordnance was a separate department from the War Office, and the organization of the Corps was one of the duties under the direction of the Master-General of the Ordnance, it was comparatively rare for the officers to be given appointments on the General Staff of the Army; and this continued to be the case even for some time after the abolition of the Board in 1855, and the transfer of its duties to the War Office, as there appeared to remain some relic of the idea that the Ordnance Corps were not quite part of the Regular Army, and that the officers were not entitled to be given appointments of command, and on the Staff, in the same manner as the cavalry and infantry. But, of late years, this idea has been gradually disappearing, and at the present time, there are a number of Royal Engineer officers employed on the Headquarter Staff at the War Office, and also on the District Staff both at home and abroad. The number too shows a tendency to increase, as will be seen by an examination of the dates in the following lists:—

*War Office Headquarter Staff.*

Agar, Colonel E., Deputy-Assistant Adjutant-General, Intelligence Branch .. .. .	1891—1896
Ardagh, Major-General Sir J. C., K.C.M.G., K.C.I.E., C.B., Assistant Adjutant-General, Intelligence Branch .. .. .	1887—1888
„ Director of Military Intelligence .. .. .	1896—1901
Armstrong, Colonel R. Y., C.B., Member of the Ordnance Committee .. .. .	1891—1892
Bate, Colonel C. McG., Member of the Ordnance Committee .. .. .	1899—1902
Bowman-Manifold, Major M. G. E., D.S.O., General Staff Officer, 2nd Grade .. .. .	1909—1912
Clayton, Colonel V. G., Member of the Ordnance Committee .. .. .	1888—1891
Close, Colonel C. F., C.M.G., General Staff Officer, 1st Grade .. .. .	1905—1911



Cowan, Colonel J. H., Member of the Ordnance Committee .. .	1902—1905
Davies, Colonel J. G. S., Member of the Ordnance Committee .. .	1886—1888
Edmonds, Colonel J. E., C.B., General Staff Officer, 2nd Grade .. .	1904—1909
" " " " 1st Grade .. .	1909—1911
Enthoven, Major C. H., General Staff Officer, 2nd Grade .. .	1905—1909
Foster, Colonel H. J., Deputy-Assistant Adjutant- General, Intelligence Branch .. .	1890—1895
Fuller, Major F. G., General Staff Officer, 2nd Grade .. .	1908—1910
Gordon, Major H. W., General Staff Officer, 2nd Grade .. .	1911—1913
Gorringe, Major-General C. F., C.B., C.M.G., D.S.O., Director of Movements and Quarterings .. .	1906—1909
Grant, Colonel S. C. N., C.B., C.M.G., Deputy-Assis- tant Adjutant-General, Intelligence Branch .. .	1897—1900
Harper, Colonel G. M., D.S.O., General Staff Officer, 2nd Grade .. .	1903—1906
" " " " 1st Grade .. .	1911—
Harrison, General Sir R., G.C.B., C.M.G., Quarter- master-General .. .	1897—1898
Hedley, Colonel V. C., General Staff Officer, 1st Grade .. .	1911—
Hepper, Colonel A. J., D.S.O., Member of the Ordnance Committee .. .	1892—1896
Hills, Major E. H., Deputy-Assistant Adjutant- General, Intelligence Branch .. .	1899—1905
Hunter-Weston, Colonel A. G., C.B., D.S.O., General Staff Officer, 1st Grade .. .	1911—1914
Kirkpatrick, Colonel G. M., C.B., General Staff Officer, 2nd Grade .. .	1904—1906
Lambert, Colonel S. J., Member of the Ordnance Committee .. .	1896—1899
Lawson, Major-General H. M., C.B., Director of Movements and Quarterings .. .	1904—1906



Girouard, Colonel Sir E. P. C., K.C.M.G., D.S.O., Assistant Quartermaster-General, Western Command .. .. .	1906—1907
Harper, Colonel G. M., D.S.O., General Staff Officer, 2nd Grade, Staff College .. .. .	1907—1910
Harrison, General Sir R., G.C.B., C.M.G., General Officer Commanding, Western District .. .. .	1890—1895
Hart, General Sir R. C., K.C.B., K.C.V.O., General Officer Commanding, Thames District .. .. .	1902—1906
Hunter-Weston, Colonel A. G., C.B., D.S.O., General Staff Officer, 2nd Grade, Eastern Command .. .. .	1904—1908
„ General Staff Officer, 1st Grade, Scottish Command .. .. .	1911—1914
Kincaid, Colonel W. F. H. S., C.B., Assistant Quartermaster-General, 1st Army Corps .. .. .	1903—1907
Lawson, Major-General H. M., C.B., Brigadier- General, Ireland .. .. .	1906—1907
„ Major-General in Charge of Administra- tion, Aldershot .. .. .	1907—1910
„ Commanding 2nd Division, Aldershot .. .. .	1910—1914
Leach, Lieut.-General Sir E. P., V.C., K.C.B., K.C.V.O., General Officer Commanding, Belfast District .. .. .	1900—1905
„ General Officer Commanding, Scottish Command .. .. .	1905—1909
Macdonogh, Colonel G. M. W., Deputy-Assistant Quartermaster-General, Thames District .. .. .	1903—1904
Maxwell, Major-General R. C., C.B., Brigadier- General in Charge of Administration, Western Command .. .. .	1906—1909
„ Major-General in Charge of Administra- tion, Southern Command .. .. .	1909—1911
„ General Officer Commanding, Eastern Coast Defences .. .. .	1911—
Ruck, Major-General R. M., C.B., Major-General in Charge of Administration, Eastern Com- mand .. .. .	1908—1912

Scott, Major-General D. A., C.B., C.V.O., D.S.O., General Officer Commanding, Thames District	1906—1909
Settle, Lieut.-General Sir H. H., K.C.B., D.S.O., General Officer Commanding, Southern Coast Defences	1905—1908
Sinclair, Colonel H. M., C.B., Assistant Quarter- master-General, Southern District	1899—1900
„ Assistant Quartermaster-General, Wes- tern District	1903—1907
„ Assistant Adjutant-General, Scottish Command	1907—1908
Warren, Lieut.-General Sir C., G.C.M.G., K.C.B., General Officer Commanding, Thames District	1895—1898
Williams, Colonel H. B., D.S.O., Deputy-Assistant Adjutant-General, Southern Command	1906—1906
„ General Staff Officer, 2nd Grade, Eastern Command	1908—1911
„ „ „ 1st Grade, Irish Command	1912—

*Army Staff Abroad (except India).*

Ardagh, Major-General Sir J. C., K.C.M.G., K.C.I.E., C.B., Assistant Adjutant-General, Egypt	1885—1887
Bigge, Lieut.-Colonel T. A. H., Assistant Military Secretary, Bermuda	1902—1906
Blood, General Sir B., G.C.B., Major-General, South Africa	1901—1902
Boileau, Colonel F. R. F., Deputy-Assistant Adju- tant-General, South Africa	1900—1901
Bond, Colonel F. G., C.B., Deputy-Assistant Adju- tant-General, South Africa	1901—1902
Burn, Lieut.-Colonel E. M. J., Deputy-Assistant Adjutant-General, South Africa	1900—1902
Capper, Colonel J. E., C.B., Assistant Director of Railways, South Africa	1899—1901
Casgrain, Major P. H. du P., Deputy-Assistant Adjutant-General, South Africa	1901—1902

Chermside, Lieut.-General Sir H. C., K.C.M.G., C.B., Commanding Troops in Crete .. ..	1897—1899
„ Commanding 3rd and 7th Divisions, South Africa .. ..	1900—1901
Coffin, Major Clifford, General Staff Officer, 2nd Grade, Sierra Leone .. ..	1911—1913
Cowie, Colonel C. H., Assistant Adjutant-General, South Africa .. ..	1900—1902
Dorward, Major-General Sir A. R. F., K.C.B., D.S.O., Commanding Troops at Wei-hai-Wei ..	1899—1901
„ General Officer Commanding, South China .. ..	1901—1902
„ „ „ Straits Settlements .. ..	1902—1905
„ Major-General in Charge of Administra- tion, South Africa .. ..	1905—1909
Elliot, Colonel G. S. McD., Assistant Director of Railways, South Africa .. ..	1899—1900
Edwards, Lieut.-General Sir J. B., K.C.B., K.C.M.G., General Officer Commanding, China ..	1889—1890
Ferrier, Major-General J. A., C.B., D.S.O., General Officer Commanding, Sierra Leone ..	1911—
Gale, Lieut.-Colonel H. R., Deputy-Assistant Adjutant-General, South Africa .. ..	1899—1902
Girouard, Colonel Sir E. P. C., K.C.M.G., D.S.O., Director of Railways, South Africa ..	1899—1902
Gorringe, Major-General G. F., C.B., C.M.G., D.S.O., Deputy-Assistant Adjutant-General, South Africa .. ..	1900—1901
Grant, Major P. G., Deputy-Assistant Adjutant- General, South Africa .. ..	1900—1901
Gwynn, Major C. W., C.M.G., D.S.O., General Staff Officer, 2nd Grade, Australia .. ..	1911—
Hart, General Sir R. C., V.C., K.C.B., K.C.V.O., General Officer Commanding, Cape Colony ..	1907—1909
„ General Officer Commanding-in-Chief, South Africa .. ..	1912—1914
Heath, Colonel G. M., D.S.O., Deputy-Assistant Adjutant-General, South Africa .. ..	1901—1902

Heath-Caldwell, Major-General F. C., C.B., Assistant Adjutant-General, South Africa . . . . .	1899—1902
Hunter-Weston, Colonel A. G., C.B., D.S.O., Chief Staff Officer, Cavalry Division, South Africa . . . . .	1900—1902
Jackson, Colonel H. M., Assistant Adjutant-General, South Africa . . . . .	1900—1902
Jones, Lieut.-Colonel H. B., Deputy-Assistant Adjutant-General, South Africa . . . . .	1901—1902
Kirkpatrick, Colonel G. M., C.B., Deputy-Assistant Adjutant-General, South Africa . . . . .	1899—1902
„ Deputy-Assistant Quartermaster-General, Canada . . . . .	1902—1904
„ Inspector-General of the Forces, Australia . . . . .	1910—1913
Kitchener, Field Marshal Earl, K.P., G.C.B., O.M., Chief of Staff, South Africa . . . . .	1899—1900
„ Commander-in-Chief, South Africa . . . . .	1900—1902
Kincaid, Colonel W. F. H. S., C.B., Assistant Adjutant-General, South Africa . . . . .	1900—1902
Livingstone, Lieut.-Colonel H. A. A., C.M.G., Assistant Quartermaster-General, South Africa . . . . .	1900—1902
Lennox, General Sir W. O., K.C.B., Commanding Troops at Alexandria . . . . .	1884—1887
„ General Officer Commanding, Ceylon . . . . .	1887—1888
Lawson, Major-General H., C.B., Assistant Adjutant-General, South Africa . . . . .	1899—1900
„ Deputy Adjutant-General, South Africa . . . . .	1900—1902
„ Chief Staff Officer, South Africa . . . . .	1902—1903
Murray, Lieut.-Colonel J. H. S., Assistant Director of Railways, South Africa . . . . .	1899—1902
Macdonald, Major-General Sir J. R. L., K.C.I.E., C.B., Assistant Adjutant-General, China . . . . .	1900—1901
„ General Officer Commanding, Mauritius . . . . .	1909—1912
McInnes, Major D. S., D.S.O., Deputy-Assistant Quartermaster-General, Canada . . . . .	1905—1908

Mullaly, Major-General H., C.B., C.S.I., Deputy- Assistant Adjutant-General, South Africa ..	1899—1900
Nanton, Colonel H. C., Assistant Director of Railways, South Africa .. .. .	1899—1902
Nathan, Major W. S., Assistant Director of Rail- ways, South Africa .. .. .	1900—1902
O'Meara, Major W. A. J., C.M.G., Deputy-Assistant Adjutant-General, South Africa .. .. .	1900—1902
O'Sullivan, Colonel G. H. W., Assistant Adjutant- General, China Expeditionary Force .. .. .	1901—1902
Sandbach, Colonel A. E., C.B., D.S.O., Assistant Adjutant-General, South Africa .. .. .	1899—1901
Scholfield, Major G. P., Director of Steam Road Transport, South Africa .. .. .	1900—1902
Scudamore, Lieut.-Colonel W. V., Deputy-Assis- tant Adjutant-General, South Africa .. .. .	1900—1902
Settle, Lieut.-General Sir H. H., K.C.B., D.S.O., Inspector-General of the Lines of Communi- cation, South Africa .. .. .	1899—1902
Stewart, Colonel W. R., Assistant Director of Rail- ways, South Africa .. .. .	1899—1902
Twiss, Lieut.-Colonel J. H., Assistant Director of Railways, South Africa .. .. .	1899—1902
Williams, Colonel H. B., D.S.O., Deputy-Assistant Adjutant-General, South Africa .. .. .	1900—1902
Warren, General Sir C., G.C.M.G., K.C.B., General Officer Commanding, Straits Settlements ..	1889—1893
„ Commanding 5th Division, South Africa	1899—1900

### *The Admiralty.*

At the Admiralty the duties of the Department of Works have, for many years, been carried out by officers of the Royal Engineers, who have also been employed, in a number of cases, as Superintending Engineers at the Royal Dockyards. The work was greatly increased by the extension of the Dockyards under the Naval Defence Loans, when large sums were authorized by Parliament for expenditure at the naval bases at

home and abroad. The officers who have held appointments under the Admiralty since 1886 were as follow :—

Davidson, Colonel S., Superintending Engineer, Portsmouth .. .. .	1903—1907
Exham, Colonel S. H., C.B., Superintending Engineer, Portsmouth .. .. .	1895—1903
„ Superintending Engineer, Rosyth ..	1903—1912
Kenyon, Colonel E. R., Superintending Engineer, Devonport .. .. .	1896—1901
Lewis, Colonel J. F., Special Duty, Ascension and the Falkland Islands .. .. .	1896—1897
Pilkington, Major Sir H., K.C.B., Superintending Engineer, Chatham .. .. .	1886—1893
„ Director of Works, Admiralty ..	1893—1895
„ Engineer-in-Chief, Naval Loan Works	1895—1906
Raban, Colonel Sir E., K.C.B., Superintending Engineer, Portsmouth .. .. .	1890—1895
„ Director of Works, Admiralty ..	1895—1912
Seddon, Colonel H. C., Special Duty, Admiralty..	1885—1887
Smith, Colonel P. G. L., Director of Works, Admiralty .. .. .	1884—1893

#### *The Foreign Office.*

A considerable number of officers of the Corps have been employed under the Foreign Office in different capacities, especially in connection with the acquisition of new territories, before these were handed over to the Colonial Office to be treated as an integral part of the British Empire. The following list of officers who served under the Foreign Office during the period under review does not include the names of those employed on Boundary Commissions, as the latter have already been given in Chapter VI. :—

Agar, Colonel E., Military Attaché with the Japanese Army .. .. .	1905—1906
Ardagh, Major-General Sir J. C., K.C.M.G., K.C.I.E., C.B., South African Deportation and Compen- sation Commission .. .. .	1901—1902



Austin, Lieut.-Colonel H. H., C.M.G., D.S.O., Special Duty, East African Protectorate .. ..	1897—1899
Chermiside, Lieut.-General Sir H. C., G.C.M.G., C.B., Consul at Erzerum .. ..	1888—1889
„ Military Attaché, Constantinople .. ..	1889—1896
„ British Commissioner, Crete .. ..	1896—1897
Close, Colonel C. F., C.M.G., Special Duty, West Coast of Africa .. ..	1896—1897
Craster, Colonel S. L., Special Duty, Somaliland .. ..	1893
Edmonds, Colonel J. E., C.B., Special Duty, South Africa .. ..	1901—1904
Elliot, Colonel G. S. McD., Consul at Van, Asia Minor .. ..	1897—1898
„ British Staff Officer, Macedonian Gendarmerie .. ..	1906—1907
Fowke, Colonel G. H., Military Attaché with the Japanese Army .. ..	1905—1906
Foster, Colonel H. J., Military Attaché, United States .. ..	1903—1906
Frederichs, Captain D. A., Special Duty, Somaliland .. ..	1901
Grover, Colonel G. E., Assistant Commissioner for the Chicago International Exhibition, 1893 .. ..	1892—1893
Hunter, Major C. G. W., Special Duty, Somaliland .. ..	1903—1904
Jackson, Colonel L. C., C.M.G., Special Duty, Foreign Office .. ..	1902—1903
Jekyll, Colonel Sir H., K.C.M.G., British Commissioner-General for the Paris International Exhibition, 1900 .. ..	1897—1901
Joly de Lotbinière, Major H. G., D.S.O., Special Duty, Somaliland .. ..	1903—1904
Kitchener, Field Marshal Earl, K.P., G.C.B., O.M., etc., British Commissioner, Zanzibar .. ..	1885—1886
„ British Agent and Consul-General, Egypt .. ..	1911—
Leverson, Colonel J. J., C.M.G., Special Duty, East Africa .. ..	1896—1897

Matheson, Major J. C., Special Duty, Chile	..	1912—
O'Shee, Major R. A. P., c.m.g., Special Duty, Benin	.. .. .	1897—1898
Palmer, Major-General H. S., Special Duty, Japan		1885—1892
Phillips, Major G. E., Special Duty, Somaliland		1901—1902
Sclater, Captain B. L., Special Duty, East Africa		1895—1897
Smith, Major G. E., c.m.g., Special Duty, East Africa	.. .. .	1895—1897
Smith, Colonel Sir R. M., k.c.m.g., Director of Persian Telegraphs	.. .. .	1863—1887
Stevenson, Major A. G., d.s.o., Special Duty, Somaliland	.. .. .	1904—1905
Trotter, Colonel Sir H., k.c.m.g., c.b. Military Attaché, Turkey	.. .. .	1882—1889
„ Consul-General, Beirut, Syria	..	1890—1894
„ Consul-General, Galatz, Rumania	..	1894—1906
Watson, Colonel Sir C. M., k.c.m.g., c.b., British Commissioner-General for the St. Louis International Exhibition, 1904	.. .. .	1903—1905

### *The Colonial Office.*

The appointments held by Royal Engineer officers under the Colonial Office and in the Column since 1886 have been considerable in number, and varied in nature. Of these the more important were the following:—

Anderson, Colonel F. J., Deputy Colonial Engineer, Penang	.. .. .	1892—1897
Buckle, Captain S., Colonial Engineer, Gibraltar		1884—1894
Cameron, Major Sir M. A., k.c.m.g., Assistant Colonial Engineer, Penang	.. .. .	1884—1892
„ Crown Agent for the Colonies	..	1895—
Carmichael, Major J. F. H., Office of the Crown Agents for the Colonies	.. .. .	1904—
Chancellor, Major Sir J. R., k.c.m.g., d.s.o., Governor of Mauritius	.. .. .	1911—
Chermside, Lieut.-General Sir H. C., g.c.m.g., c.b., Governor of Queensland	.. .. .	1902—1905

Clauson, Major Sir J. E., K.C.M.G., C.V.O., Lieutenant-Governor and Chief Secretary, Malta	1906—
Curtis, Colonel R. S., C.M.G., D.S.O., Inspector-General, South African Constabulary	1900—1908
Davy, Major C. W., Central South African Railways	1902—1904
Des Vœux, Major H. B., Special Duty, Gold Coast	1901—1903
De Wolski, Colonel F. R., Special Duty, New South Wales	1889—1892
Druitt, Lieut.-Colonel E., Special Duty, Queensland	1889—1893
Foster, Colonel H. J., Director of Military Science, Sydney University	1906—
Gallwey, Lieut.-General Sir T. L. J., K.C.M.G., Governor of Bermuda	1882—1888
Gironard, Colonel Sir E. P. C., K.C.M.G., D.S.O., Commissioner of Railways, South Africa	1902—1904
„ Governor of Northern Nigeria	1907—1909
„ Governor of the East African Protectorate	1909—1912
Grant, Colonel S. C. N., C.B., C.M.G., Assistant Director of Survey, Cyprus	1880—1886
„ Special Duty, West Africa	1895—1896
Harvey, Major R. N., Special Duty, Transvaal	1903—1905
Hime, Lieut.-Colonel the Right Hon. Sir A. H., K.C.M.G., Colonial Engineer, Natal	1875—1893
„ Minister of Lands, Natal	1893—1899
„ Prime Minister, Natal	1899—1903
Jervois, Lieut.-General Sir W. F. D., G.C.M.G., C.B., Governor of New Zealand	1883—1889
Jervois, Major J., Special Duty, New Zealand	1885—1888
Lees, Major W. E., Director of Public Works, Gold Coast	1904—1910
Leslie, Major G. A. J., Special Duty, Ashanti	1908—1912
Leggett, Major E. H. M., D.S.O., Special Duty, South Africa	1902—1906
„ Special Duty, East Africa	1907—1911

McCallum, Colonel Sir H. E., K.C.M.G., Colonial Engineer, Straits Settlements .. ..	1880—1897
„ Governor of Lagos .. ..	1897—1899
„ Governor of Newfoundland .. ..	1899—1901
„ Governor of Natal .. ..	1901—1907
„ Governor of Ceylon .. ..	1907—1913
Macdonald, Major-General Sir J. R. L., K.C.I.E., C.B., Special Duty, East Africa .. ..	1897—1899
McInnes, Lieut.-Colonel D. S., D.S.O., Special Duty, Ashanti .. ..	1897—1898
„ South African Constabulary .. ..	1902—1904
Manser, Major W. E., Special Duty, Victoria ..	1910—
Nathan, Lieut.-Colonel Sir M., G.C.M.G., Governor of the Gold Coast .. ..	1900—1903
„ Governor of Hong Kong .. ..	1903—1907
„ Governor of Natal .. ..	1907—1910
Nicholson, General Sir L., K.C.B., Governor of Gibraltar .. ..	1901—1903
Ommanney, Captain Sir M. F., G.C.M.G., K.C.B., Crown Agent for the Colonies .. ..	1877—1900
„ Under-Secretary of State for the Colonies .. ..	1900—1906
O'Shee, Major R. A. P., C.M.G., Special Duty, West Africa .. ..	1897—1898
Penrose, Colonel C., C.B., Special Duty, New South Wales .. ..	1885—1889
Prendergast, Colonel T. J. W., British Commissioner at Wei-hai-Wei .. ..	1900—1902
Pritchard, Major H. L., D.S.O., Special Duty, Ashanti .. ..	1895—1896
Rainsford-Hannay, Colonel F., C.B., Special Duty, Victoria .. ..	1889—1894
Renny-Tailyour, Colonel H. W., Special Duty, New South Wales .. ..	1891—1895
Rhodes, Captain E. F., Special Duty, Victoria ..	1885—1889
Sclater, Lieut. B. L., Special Duty, East Africa ..	1891—1897
Simmons, Field Marshal Sir J. L. A., G.C.B., G.C.M.G., Governor of Malta .. ..	1884—1888

Sydenham, Colonel Lord, G.C.S.I., G.C.M.G., Governor of Victoria .. .. .	1901—1904
Tyler, Major A. H., Special Duty, West Africa ..	1896—1899
Watherston, Major A. E. G., C.M.G., Chief Com- missioner for the Northern Protectorate, Gold Coast .. .. .	1905—1909
Whitlock, Major G. F. A., Special Duty, Northern Nigeria .. .. .	1907—1909

*The Board of Trade.*

General Porter described in Volume II. (see p. 326) how, shortly after the introduction of railways into England, when it became imperative to form a special department to advise the Board of Trade on matters connected with the construction and working of railways, Major-General Sir F. Smith was appointed Inspector-General of Railways and was succeeded by Major-General Sir C. Pasley. Since that time the office of Inspectors of Railways has always been held by officers of the Royal Engineers, to whom are entrusted the duties of examining any new line before it is opened for traffic, and of investigating the cause of serious railway accidents. There can be no question that it is in great part due to the care and vigilance with which the Inspectors of Railways have carried out their important duties that the public owe the remarkable safety of British railway traffic. The names of the officers who have served under the Board of Trade since 1886 were as follow :—

Addison, Lieut.-Colonel G. W., Inspector of Railways .. .. .	1894—1899
Boughey, Colonel G. F. O., C.S.I., Commissioner for Light Railways .. .. .	1897—
Cardew, Major P., Inspector of Electricity ..	1889—1903
Druitt, Colonel E., Inspector of Railways ..	1900—
Hutchinson, Major-General C. S., C.B., Inspector of Railways .. .. .	1871—1896
Jekyll, Colonel Sir H., K.C.M.G., Assistant Secretary of the Railway Department .. .. .	1902—1911

Marindin, Colonel Sir F. A., K.C.M.G., Inspector of Railways .. .. .	1877—1900
Pringle, Major J. W., .. .. .	1900—
Rich, Colonel F. H., .. .. .	1871—1892
Von Donop, Lieut.-Colonel P. G., .. .. .	1900—
Yorke, Lieut.-Colonel Sir H. A., C.B., .. .. .	1891—1913

*Various Departments of the State.*

Besides those whose names are included in the lists given above, a considerable number of Royal Engineer officers have held appointments in different Government departments, the more important of which were as follow :—

Abney, Captain Sir W. de W., K.C.B., F.R.S., Assistant Director of Science, South Ken- sington .. .. .	1877—1899
„ Assistant Secretary, Board of Education .. .. .	1899—1903
Browne, General Sir J. F. M., K.C.B., Governor of the Royal Military Academy .. .. .	1880—1887
Call, Lieut.-Colonel C. F., Assistant Superintendent of Stores for India .. .. .	1883—1887
Chancellor, Major Sir J. R., K.C.M.G., D.S.O., Assistant Secretary, Committee of Imperial Defence .. .. .	1904—1906
„ Secretary, Colonial Defence Committee .. .. .	1906—1911
Clauson, Major Sir J. E., K.C.M.G., C.V.O., Secretary, Colonial Defence Committee .. .. .	1900—1906
Clayton, Major Sir E. G., C.B., Department of Con- vict Prisons .. .. .	1884—1908
Courtney, Major D. C., Assistant Superintendent of Stores for India .. .. .	1887—1889
Du Cane, Major-General Sir E. F., K.C.B., Chair- man of the Directors of Convict Prisons .. .. .	1869—1887
Donnelly, Major-General Sir J. F. D., K.C.B., Director for Science, South Kensington .. .. .	1859—1881
„ Secretary, Science and Art Department .. .. .	1881—1892
Edwards, Lieut.-Colonel Sir F. I., K.C.B., Private Secretary to Her Majesty Queen Victoria .. .. .	1878—1901

English, Lieut.-Colonel T., Superintendent of the Royal Carriage Factory, Woolwich Arsenal..	1887—1889
Ewart, Major-General C. B., C.B., Governor of Jersey	1883—1887
Festing, Major-General E. R., C.B., Science and Art Department, South Kensington ..	1864—1904
Haggitt, Major E. D., Assistant Bailiff of the Royal Parks .. .. .	1902—
Haig, Lieut.-Colonel A. B., C.M.G., C.V.O., Equerry to H.R.H. The Duke of Edinburgh ..	1864—1900
Harrison, General Sir R., G.C.B., C.M.G., Governor of the Royal Military Academy .. ..	1889—1890
Hewett, Lieut.-General E. O., C.M.G., Governor of the Royal Military Academy .. ..	1895—1897
Hussey, Major W. C., Bailiff of the Royal Parks..	1902—
Jekyll, Colonel Sir H., K.C.M.G., Private Secretary to the Lord Lieutenant of Ireland ..	1892—1895
Jelf, Colonel R. H., C.M.G., Governor of the Royal Military Academy .. .. .	1901—1904
Jones, Major-General R. O., C.B., Board of Agriculture .. .. .	1892—1893
McHardy, Lieut.-Colonel Sir A. B., K.C.B., Commissioner for Scottish Prisons .. ..	1886—1896
„ Chairman of Scottish Prison Commission .. .. .	1896—1909
Nathan, Lieut.-Colonel Sir M., G.C.M.G., Secretary of the General Post Office .. ..	1910—1911
„ Chairman, Board of Inland Revenue	1911—
O'Brien, Lieut.-Colonel D., Superintendent of Stores for India .. .. .	1889—1898
O'Meara, Major W. A. J., C.M.G., Assistant Engineer-in-Chief, General Post Office ..	1902—1903
Ottley, Colonel Sir J. W., K.C.I.E., President of Cooper's Hill Indian Civil Engineering College	1899—1906
Plunkett, Lieut.-Colonel G. T., C.B., Director of Science and Art, Dublin .. ..	1895—1907
Rogers, Major H. S., Surveyor to the Prison Commission .. .. .	1907—1909
Sankey, Lieut.-General Sir R. H., K.C.B., Chairman of the Board of Works, Ireland .. ..	1884—1896

Scott-Moncrieff, Colonel Sir C. C., K.C.M.G., K.C.S.I., Under-Secretary of State for Scotland ..	1891—1902
Smith, Major-General Sir R. M., K.C.M.G., Director of Science and Art, Edinburgh .. ..	1885—1900
Swinton, Major E. D., D.S.O., Assistant Secretary, Committee of Imperial Defence .. ..	1910—
Sydenham, Colonel Lord, G.C.S.I., G.C.M.G., Secre- tary, Colonial Defence Committee ..	1885—1902
„ Superintendent of the Carriage Factory, Royal Arsenal .. ..	1894—1901
„ Secretary, Committee of Imperial Defence .. ..	1904—1907
Taylor, General Sir A., G.C.B., President of Cooper's Hill Indian Civil Engineering College .. ..	1883—1899
Thomson, Colonel A. G., C.B., Governor of the Royal Military Academy .. ..	1908—1912
Tulloch, Major H. C. B., Chief Inspector of the Local Government Board .. ..	1888—1897
Waller, Colonel S., C.S.O., Extra Equerry to the Queen .. ..	1885—1890
Warren, General Sir C., G.C.M.G., K.C.B., Com- missioner of the Metropolitan Police ..	1886—1888
Washington, Colonel F. P., Registry of Deeds Office .. ..	1898—1908
Wheatley, Colonel M. J., C.B., Bailiff of the Royal Parks .. ..	1879—1902
Wray, Lieut.-General H., C.B., Governor of Jersey	1887—1892

*Egypt and the Sudan.*

After the occupation of Egypt by England in 1882, as described in Volume II. (see p. 69) the Egyptian Army, that then existed, was done away with, and a new army established under the command of General Sir Evelyn Wood, the first Sirdar, who asked for the services of twenty-two officers of the British Army to assist in the reorganization, of whom five were officers of the Royal Engineers.

Soon afterwards the reorganization of the Public Works Department was also taken in hand and the work was placed



in charge of Colonel Sir Colin Scott-Moncrieff, who commenced the reconstruction of the irrigation system in Egypt, and, during the following years did more for the prosperity of the Egyptians than perhaps any of the Englishmen who have devoted their energies to the well-being of the country.

Since the occupation of Egypt the number of Engineer officers in the employment of the Egyptian Government has steadily increased, especially since the re-conquest of the Sudan in 1898 (see Chapter III.), and, in 1912, there were a large number, employed not only in the Army but also in civil administration, on irrigation, on the railways and telegraphs, and on the survey of Egypt and the Sudan.

The names of the officers of the Corps, who have held appointments in Egypt and the Sudan from 1886 to 1914, and the more important positions held by them, are given below :—

Austin, Lieut.-Colonel H. H., C.M.G., D.S.O., Survey of the Sudan .. .. .	1900—1902
Blakeney, Major R. D. B., D.S.O., Deputy General Manager, Egyptian Railways .. .. .	1896—1899
Blunt, Lieut. W. S., Military Works Dept., Sudan	1911—
Bowman-Manifold, Major M. G. E., D.S.O., Egyptian Army .. .. .	1895—1899
Brown, Major Sir R. H., K.C.M.G., Inspt. of Irrigation	1884—1903
Buckland, Colonel R. U. H., A.D.C., Egyptian Army	1888—1889
Cator, Lieut. E. H. S., Egyptian Army .. .. .	1896—1897
Chermside, Major-General Sir H. C., G.C.M.G., C.B., Egyptian Army .. .. .	1883—1888
Chenevix-Trench, Lieut. R., Posts and Telegraphs Department, Sudan .. .. .	1913—
Coningham, Captain A. E., Assistant Director of Survey, Sudan .. .. .	1905—1912
Curtis, Colonel R. S., C.M.G., D.S.O., Egyptian Army .. .. .	1891—1893
Dale, Lieut. and Qr.-Mr. W. H., Posts and Telegraphs Department, Sudan .. .. .	1901—1911
Danford, Captain B. W. Y., Assistant Director of Military Works, Sudan .. .. .	1905—1910

Day, Lieut. W. E., Assistant Director of Military Works, Sudan .. .. .	1912—
Done, Lieut. R. J., Assistant Director of Military Works, Sudan .. .. .	1898—1909
Douglas, Lieut. W. F. E., Special Service ..	1898—1899
Edgeworth, Lieut. K. E., Assistant Director of Military Works, Sudan .. .. .	1905—1910
Egerton, Lieut. C. H., Military Works Dept., Sudan .. .. .	1910—1914
Ferguson, Captain F. A., Post and Telegraph Department, Sudan .. .. .	1911—
Fraser, Major-General Sir T., K.C.B., C.M.G., Egyptian Army .. .. .	1882—1885
Friend, Major-General L. B., C.B., Egyptian Army .. .. .	1900—1904
Gandy, Captain H. G., Assistant Director, Post and Telegraphs, Sudan .. .. .	1909—1912
Girouard, Lieut.-Colonel Sir E. P. C., K.C.M.G., D.S.O., Egyptian Army .. .. .	1896—1898
„ President of the Egyptian Railway Board .. .. .	1898—1899
Gorringe, Major-General G. F., C.B., C.M.G., D.S.O., Egyptian Army .. .. .	1893—1899 and 1901—1904
Godby, Colonel C., Egyptian Army .. .. .	1889—1895
Gordon, Lieut.-Colonel W. S., Egyptian Army ..	1885—1901
Gowlland, Lieut. G. C., Assistant Director of Military Works, Sudan .. .. .	1910—1912
Grant, Major P. G., Director of Mil. Works, Sudan .. .. .	1909—1914
Gwynn, Major C. W., C.M.G., D.S.O., Egyptian Army .. .. .	1901—1904
„ Survey of Sudan .. .. .	1908—1909
Hall, Captain G. C. M., D.S.O., Traffic Manager, Egyptian Railways .. .. .	1896—1899
Home, 2nd Lieut. R. D. E., Sudan Railways ..	1899
Huleatt, Colonel H., Egyptian Army .. .. .	1883—1890
Johnstone, Captain J. H. L'E., President of the Egyptian Railway Board .. .. .	1899—1906
Joly de Lotbinière, Major H. G., D.S.O., Survey Department, Egypt .. .. .	1906—1912
Kelly, Captain H. H., Assistant Director of Public Works, Sudan .. .. .	1903—1913
Kennedy, Captain M. R., C.M.G., D.S.O., Director of Public Works, Sudan .. .. .	1899—

Kincaid, Colonel W. F. H. S., C.B., Egyptian Army	1893—1896 and 1896—1899
Kitchener, Field Marshal Earl, K.P., G.C.B., O.M., etc., Egyptian Army .. .. .	1883—1885 and 1886—1889
„ Sirdar of the Egyptian Army .. .. .	1892—1899
Lawson, Major-Gen. H. M., C.B., Egyptian Army	1898—1899
Liddell, Major J. S., Egyptian Army .. .. .	1898—1904
„ Inspt.-General of Egyptian Telegraphs ..	1904—
Longfield, Captain W. E., Deputy General Manager, Sudan Railways .. .. .	1899—
Lord, Captain P. C., Assistant Chief Engineer, Sudan Railways .. .. .	1901—
Lyons, Captain H. G., Egyptian Army .. .. .	1891—1893
„ Director-General of Egyptian Survey ..	1896—1909
Macauley, Major Sir G. B., K.C.M.G., Egyptian Army .. .. .	1896—1900
„ Director-General of Egyptian Railways ..	1900—
Mackintosh, Captain E. E. B., Egyptian Army	1906—
Mackworth, Lieut. H. L., D.S.O., Posts and Telegraphs Department, Sudan .. .. .	1905—1909
McNeill, Captain A. G., Survey of Sudan .. .. .	1913—
Mantell, Colonel A. M., Egyptian Army .. .. .	1883—1887
Maud, Major P., Survey of Sudan .. .. .	1902—1903
Meyricke, Lieut. E. G., Posts and Telegraphs Department, Sudan .. .. .	1901—1905
Micklem, Lieut. H. A., Assistant Director of Military Works, Sudan .. .. .	1897—1899
Micklem, Captain H. A., Rly. Department, Sudan	1907—
Midwinter, Captain E. C., C.B., C.M.G., D.S.O., General Manager, Sudan Railways .. .. .	1897—
Moir, Major J. P., D.S.O., Director of Posts and Telegraphs, Sudan .. .. .	1912—
Newcombe, Captain E. O. A., Traffic Manager, Sudan Railways .. .. .	1896—1899 and 1905—1909
Newcombe, Lieut. S. F., Sudan Railways (Traffic Manager) .. .. .	1901—1911

Pearson, Major H. D., Director of Sudan Survey	1905—
Polwhele, Lieut. R., Egyptian Army .. ..	1895—1896
Powell, Major S. H., Egyptian Army .. ..	1901—1903
Pritchard, Major H. L., D.S.O., Egyptian Army ..	1896—1898
Rainsford-Hannay, Captain A. G., Military Works Department, Egypt .. ..	1911—
Roberts, Major G. B., Telegraph Dept., Sudan	1899—1900
Ross, Captain A. J., Assistant Director of Military Works, Sudan .. ..	1911—
„ Colonel J. C., C.M.G., Inspector of Irrigation	1883—1892
Russell, Captain R. E. M., Egyptian Army ..	1905—
Sandbach, Colonel A. E., C.B. D.S.O., Egyptian Army	1898—1898
Scott, Major A. O., Egyptian Army .. ..	1899—1901
Scott-Moncrieff, Colonel Sir C. C., K.C.M.G., K.C.S.I., Secretary for Public Works, Egypt ..	1883—1892
Settle, Lieut.-General Sir H. H., K.C.B., D.S.O., Egyptian Army .. ..	1886—1892
„ Inspector-General of Police .. ..	1892—1894
Sinauer, Lieut. E. M., Assistant Director of Military Works, Sudan .. ..	1908—1912
Sowerby, Captain M. E., Chief Eng., Sudan Rlys.	1898—
Stevenson, Major A. G., D.S.O., Egyptian Army ..	1895—1899
Stokes, Captain A. W., Assistant Director of Military Works, Sudan .. ..	1904—1911
Talbot, Colonel the Hon. M. G., Egyptian Army	1899—1905
„ Director of Sudan Survey .. ..	
Thwaites, Captain H. F. O., Assistant Director of Public Works, Sudan .. ..	1906—1913
Turner, Major E. V., Director of Posts and Tele- graphs, Sudan .. ..	1904—1912
Waller, Captain R. L., Survey of Sudan ..	1908—1909
Watson, Colonel Sir C. M., K.C.M.G., C.B., Egyptian Army .. ..	1883—1886
Western, Colonel J. H., C.M.G., Inspt. of Irrigation	1883—
Wilbraham, Captain B. H., Assistant Director of Military Works, Sudan .. ..	1908—1910
Wilson, Lieut. B. T., Assistant Director of Military Works, Sudan .. ..	1912—
Wollen, Lieut. W. R. C., Sudan Railways ..	1898—1901

## CHAPTER VIII.

## SHORT BIOGRAPHIES OF DISTINGUISHED OFFICERS.

- General Sir A. T. Cotton, K.C.S.I.  
Major-General Sir F. Abbott, C.B., F.R.S.  
General Sir F. E. Chapman, G.C.B.  
General Sir R. Strachey, G.C.S.I., F.R.S.  
Field Marshal Sir J. L. A. Simmons, G.C.B., G.C.M.G.  
Colonel Sir H. Yule, K.C.S.I., C.B.  
Lieut.-General Sir W. D. Jervois, G.C.M.G., C.B., F.R.S.  
Lieut.-General Sir T. L. J. Gallwey, K.C.M.G.  
Captain Sir D. S. Galton, K.C.B., F.R.S.  
General Sir A. Taylor, G.C.B.  
Lieut.-General Sir J. Stokes, K.C.B.  
Lieut.-General Sir A. Clarke, G.C.M.G., C.B., C.I.E.  
General J. T. Walker, C.B., F.R.S.  
General Sir E. Stanton, K.C.B., K.C.M.G.  
General Sir L. Nicholson, K.C.B.  
Lieut.-General Sir R. H. Sankey, K.C.B.  
Major-General Sir H. C. Elphinstone, V.C., K.C.B., C.M.G.  
General Sir W. O. Lennox, V.C., K.C.B.  
Lieut.-General J. J. M. Innes, V.C., C.B.  
General Sir G. T. Chesney, K.C.B.  
Major-General Sir W. Crossman, K.C.M.G.  
General Sir G. Graham, V.C., G.C.B., G.C.M.G.  
General Sir Æ. Perkins, K.C.B.  
Major-General Sir J. F. D. Donnelly, K.C.B.  
Major-General Sir P. H. Scratchley, K.C.M.G.  
Lieut.-General Sir R. Grant, K.C.B.  
Major-General Sir C. W. Wilson, K.C.B., K.C.M.G., F.R.S.  
Major-General Sir J. Browne, K.C.S.I.  
Major-General Sir J. C. Ardagh, K.C.M.G., K.C.I.E., C.B.  
Colonel M. S. Bell, V.C., C.B.

In Vol. II., Part IV., there were given short biographies of some of the eminent officers of the Corps of Royal Engineers, deceased prior to 1885. In this chapter are included similar short memoirs of some of the more distinguished officers, who have died since that date. Of many of these officers there have been published from time to time, in *The Royal Engineers Journal*, obituary notices, written by Field Marshal Lord Roberts, Colonel Sir E. Thackeray, Colonel Vetch, and others, and these notices form the basis of the following memoirs. In some cases, it has been necessary to abridge them, and, in others, additional information has been included.

These biographies are, of course, not intended to give a full account of the life and services of the different officers, as, for that, the space available is far too limited, and they only give a short *résumé* of the good work done for the country in peace and war. But they will serve to keep the names of these officers in remembrance, and to call the attention of future generations of Royal Engineers to what their predecessors have done, and show examples that they, in their turn, will have to follow.

The memoirs are given in the same order as was adopted in Vol. II., *i.e.*, they are placed in accordance with the dates of the first commission of the different officers, commencing with General Sir A. T. Cotton, K.C.S.I., who was gazetted as ensign in the Madras Engineers in 1820.

## GENERAL SIR A. T. COTTON, K.C.S.I.

Arthur Thomas Cotton, who was the son of Henry C. Cotton, Esq., was born on May 15th, 1803, and was gazetted as ensign in the Madras Engineers on June 16th, 1820. He arrived in Madras at the close of 1821, and was attached as assistant to the Superintending Engineer of the Southern Division of the Presidency, who employed him on the examination of the Paumben passage between the mainland of the peninsula and Ceylon, with a view to the improvement of its navigability for large vessels.

In 1824 Lieut. Cotton was ordered to join the expeditionary force from Madras in the first Burmese War. He was the only Engineer officer with one of the columns of the main army, and he led the storming parties against seven forts and stockades, served in the trenches during the operations against the great stockade at Donabru, and was present at most of the other actions in the war. His good services during the campaign were mentioned in despatches.

On his return to India he was appointed to the separate charge of the great irrigation works on the river Cauvery, upon which the rice crops in the districts of Tanjore and Trichinopoly were principally dependent. Here he designed the great works with which his name will ever be inseparably connected, and at a time when these districts were seriously threatened by the deterioration of the old irrigation works, constructed by the native rulers. His designs were so successful, that they led to a large increase in the Government revenue, while, at the same time, conferring great benefit upon the people. After the completion of the Cauvery Works, Cotton, who had been promoted captain in 1829, continued to be employed under the Public Works Department, and submitted a number of important reports on the value of the existing irrigation works, particularly on the vast system of reservoirs, upon which the crops in the Madras Presidency were mainly dependent, and he

also urged the necessity for improving the communications of the country.

In 1838, as at that time officers in the Madras service were not allowed leave to England, he went to Australia on medical certificate, and, while in that country, he met with a serious accident from the explosion of a boiler supplying steam to a rotary engine, with which he was conducting important experiments. On his return to India, he was stationed at Vizagapatam where he was employed on the erection of civil buildings, and on the construction of works to protect the town from the encroachments of the sea.

On the completion of these works he was sent to the Godavery Delta to report on the existing irrigation canals, and to ascertain why the district of Rajahmundry, which depended upon them, was deteriorating rapidly. His examination led to the formation of the grand comprehensive scheme known as the Godavery Delta project, and, later on, to a similar scheme for works on the adjoining river, known as the Kistna project, which latter was carried out by the late Colonel C. Orr. Both of these schemes were of great magnitude, requiring much care and skill in their construction. Shortly described, they consist of gigantic dams thrown across rivers from one to four miles wide with sandy beds, rising in times of flood from 30 to 40 ft. at the site of the dams. From these dams, large main canals, adapted for both irrigation and navigation purposes, are led, and the latter throw off minor branches, by which the water is led to the land for irrigation. From the Godavery 720,000 acres of land are irrigated, and navigation is carried along 500 miles of land to the port of Cocanada.

Cotton was promoted lieutenant-colonel in 1850, and colonel in 1854. In 1858, owing to the rules of the Service, he ceased to be eligible for routine appointments in the Public Works Department, but was retained in India in the capacity of Chief Engineer, and adviser of the Government on all public works matters, and the great reputation in which he was held is shown by the following extract from the Minutes of Consultation of the Government of Madras in May, 1858:—

“ If we have done our duty, at least to this part of India,



and have founded a system, which will be a source of strength and wealth, and of credit to us as a nation, it is due to one master mind which, with admirable industry and perseverance, in spite of every discouragement, has worked out this great result. Other able and devoted officers have caught Colonel Cotton's spirit, and have rendered invaluable aid under his advice and direction, but, for this creation of genius, we are indebted to him alone. Colonel Cotton's name will be venerated by millions yet unborn when many who now occupy a much larger place in the public view will be forgotten; but, although it concerns not him, it would be for our own sake a matter of regret if Colonel Cotton were not to receive due acknowledgment during his own lifetime."

Two years afterwards, Sir Charles Wood, then Secretary of State for India brought Colonel Cotton's name before the Queen, who, "in recognition of his long-continued and good services in the Public Works of Madras," conferred on him a Knighthood; and, in the following year, when the Order of the Star of India was inaugurated, he was one of those to receive the K.C.S.I.

In 1857, Cotton was directed by the Government of India to inspect the delta of the Mahanuddy River, in the Presidency of Bengal, principally with reference to the preservation of the city of Cuttack, which was exposed to destruction by the high floods of the river. His visit convinced him that the circumstances in the Province of Orissa were very similar to those of the Godavery and Kistna Deltas, and he drew up a comprehensive scheme for works which were afterwards carried out by the Government.

After he had retired he once again visited India to inspect a scheme of irrigation which had been designed by Colonel Dickens, and he took the opportunity to visit the Ganges and other rivers of Upper India upon which works of irrigation were being carried out. He never ceased to labour at the cause he had most at heart, the well-being of India. But there were many other subjects which interested him. Amongst these, the depressed state of agriculture in England engaged his attention, and he carried out some interesting and important experi-

ments to show the advantage of deep cultivation of the land. He also devoted much attention to the form of river steamers and canal boats, with the view to determine the relative amount of resistance due to various conditions of their lines, and the best method of reducing surface friction.

Sir Arthur Cotton was promoted major-general in 1862, lieut.-general in 1867, and general in 1876. He died at Dorking on July 24th, 1899, at the venerable age of ninety-six years.

His memoirs were written by his daughter, Lady Hope, and published by Messrs. Hodder & Stoughton, 1900.

## MAJOR-GENERAL SIR FREDERICK ABBOTT, KT., C.B.

Frederick Abbott, who was the son of H. A. Abbott, Esq., of Blackheath, was born on June 13th, 1805, at Littlecourt, Buntingford, Hertfordshire, and was commissioned as ensign in the Bengal Engineers in 1823. After leaving Chatham, he embarked for India, and, shortly after his arrival, the First Burmese War broke out, when he was employed as assistant field engineer under Capt. Cheape (the late General Sir John Cheape, G.C.B.). In this campaign he greatly distinguished himself, and, on one day, led the storming party in three assaults on the Burmese stockades. On the third occasion, when he had climbed to the top of the parapet, the ladder broke, and Abbott and one grenadier were left exposed to the enemy's fire. They both fell in the wet ditch but he scrambled out and assisted the grenadier, who was encumbered with arms and ammunition, whilst the garrison seemed petrified by their audacity. They then charged the defenders, of whom Abbott killed two, and by this time a fresh ladder having been fixed, the storming party entered the stockade and the garrison fled. In January, 1826, the attention of Government was specially attracted to his gallant conduct on this occasion.

After returning from active service in Burmah, Abbott was employed for some years on the public works and was promoted captain in 1832. He took leave to England in 1838, and when returning to India in 1840, was shipwrecked at Mauritius on the voyage out. In the following year he was appointed Superintending Engineer of the North-West Provinces, a very much larger charge than the title now suggests, as he was virtually the responsible head of the canals, military works, and civil works of the whole province, which included what is now part of the Punjab. The canals and the Grand Trunk Road were afterwards handed over to separate Superintending Engineers.

By this time, however, another war had commenced ; Afghan-

istan had been successfully invaded, its able and popular ruler replaced by one as incompetent as he was disliked, and we were holding the country with a reduced army. How that unfortunate army was destroyed is matter of history. The gloom was relieved in but two quarters; at Kandahar, where Nott stoutly held out; and, at Jalalabad, where George Broadfoot was successfully striving to prevent a repetition of the Kabul programme. To save this garrison in the first instance, and to bring back the surviving troops, an army, under General Pollock, of the Bengal Artillery, was formed and Capt. Abbott was selected to be its Chief Engineer. Before the army reached Jalalabad, Sir R. Sale, having yielded to the representations of his officers, made a successful sortie, which wholly discomfited the enemy.

The combined troops, the army of retribution as it was called, then advanced to Kabul. Though there had been some sharp fighting on the way, there were no special engineering operations until Kabul was occupied, when it was decided, as a retaliatory measure, to destroy the celebrated covered bazaar of the city, and the beautiful mosque, where the body of Sir W. Macnaghten, the British Envoy, had been exposed to the contempt and indignities of a fanatical mob. The duty of demolition devolved on Abbott, and he regretted having to perform it. He had next to arrange for the construction of the cantonments for the British troops, and, in his report on the subject, added the following remark for the benefit of young Engineers. In circumstances such as those at Kabul, and indeed in Indian frontier warfare generally, where the troops are "surrounded by a population that may, at any moment, become hostile, but who are deficient in artillery and in the science of engineering, our modern examples of fortifications in general, and the profiles of fieldworks in particular, are far inferior as defences to the lofty mud wall, properly flanked by towers or bastions, and surrounded by a moderate ditch. Such a defensive line will never be seriously assaulted by native troops of an Asiatic enemy and, while the garrison are at all times under sufficient cover from musket shot, the enceinte is held by a very small number of troops."

For his services in Afghanistan Abbott received a brevet majority. On his return to India he resumed the duties of Superintending Engineer in the North-West Provinces, which he continued to perform to the entire satisfaction of the Government until he was again in the field, having on January 1st, 1846, been attached to the Army of the Sutlej.

In those days the Punjab was a very powerful state on the north-west frontier of India. Consolidated by Maharaja Ranjit Singh, and possessed of a Sikh army, admirably equipped and drilled by European officers, the Punjab could be to British India either a useful friend or a dangerous foe. Whilst Ranjit Singh lived he was our friend, but, after his death, the state became disorganized, and its rulers, trembling for their own safety, persuaded the Sikh army to invade British territory. Sir Henry Hardinge was then Governor-General, with Broadfoot as his agent on the frontier, and Sir Hugh Gough was Commander-in-Chief. In rapid succession the Battles of Mudki and Firozshah were fought, the issue of the latter being for a time in suspense.

Then there was a period of inactivity whilst reinforcements and ammunition were being collected. This was followed by the Battle of Aliwal, and, when Abbott was appointed, the army was in position near Sobraon, where the Sikhs were entrenched in force, and had a bridge of boats across the Sutlej. The Governor-General was at Firozpur, some 20 miles distant, and Abbott was chiefly employed under him. He was put in charge of the military bridge establishment, and was, on important occasions, the bearer of messages from the Governor-General to the Commander-in-Chief. In that capacity he carried despatches on February 7th, and, next day, Gough called a council of war, and laid before it the Governor-General's proposals for attacking the Sikh Army. Sir Hugh, in great delight, proposed to attack next morning, but deferred operations until the 10th because the ammunition was not ready.

Abbott was present at the decisive action which was fought at Sobraon on February 10th, 1846, when the Sikhs were completely defeated after a terrific struggle. By 11 a.m. the

British had 2,383 men killed and wounded, whilst the Sikh loss was, at the lowest estimate, 8,000, and, at the highest, twice that number. By that time not a single Sikh soldier remained alive on the bank of the river, and the victory laid the Punjab at our feet.

Abbott got much credit for the rapidity with which he bridged the Sutlej after the battle, and, in the Commander-in-Chief's despatch of February 13th, the latter wrote :—" I have to acknowledge the services . . . of the following officers, and to recommend them to your Excellency's special favour, viz., Major F. Abbott, who laid the bridge by which the army crossed into the Punjab, and who was present at Sobraon and did excellent service." For his distinguished services in the Sikh Campaign Abbott was made a Companion of the Bath and promoted brevet lieut.-colonel.

Soon afterwards his service in India came to an end, as he retired in December, 1847. Shortly before his departure he received a letter from Lord Hardinge, in which the latter wrote :—" I cannot, however, allow you to retire from India, without expressing my sense of the loss which the East India Company's service will suffer by your retirement. In peace your conduct was regulated by the most anxious spirit of carefulness and integrity in the expenditure of the public money, and in the efficiency of the public works ; and, when the war broke out, and you hastened to join the army, I knew that I could not confide to any officer better than to yourself, the important operation of making the arrangements for the passage of the Sutlej, one of the most difficult rivers in the world, over which it was absolutely necessary that we should have the means of entering the Punjab. At this moment that you are about to retire for ever from that branch of the Indian Army, of whose professional acquirements I entertain the highest opinion, it is gratifying to me to bear my testimony to your distinguished services, and to express my professional respect and personal regard for an officer, who has in peace and war so ably contributed to uphold the reputation and the glory of the Indian Army."

After his return to England, Colonel Abbott, in 1851, was

appointed Lieut.-Governor of Addiscombe College, and did much to improve and raise the standard of efficiency of the institution. He was twice reappointed by the Board of Directors, and held the position until 1861, when the college was closed in consequence of the amalgamation of the British and East Indian military services. In 1854, he received the honour of knighthood, and, in 1858, was promoted honorary major-general.

Sir Frederick Abbott was appointed a member of the Royal Commission which assembled in 1859 to report on the defences of the United Kingdom, and, in 1866, was a member of the Committee which enquired into the organization of the Royal Engineer Establishment at Chatham. He was also for some time a member of the Council of Military Education. He died at Bournemouth on November 4th, 1892, at the age of 87.

## GENERAL SIR FREDERICK E. CHAPMAN, G.C.B.

Frederick Edward Chapman, the son of Richard Chapman, Esq., of Gatchell, Somersetshire, was born on August 16th, 1815, and received his first commission in the Royal Engineers on June 18th, 1835. As soon as his period of instruction at Chatham was completed, he was sent to Portsmouth from whence he was ordered, in 1837, to the West Indies, where he served for five years. On returning to England he was employed at Dover and in the London District until 1846, when he was selected for duty in the Ionian Islands, and was stationed at Corfu, where the Duke of Cambridge was in command of the British garrison. After five years' service in the Ionian Islands, he was stationed at Chatham until the beginning of 1854, when political relations between Russia and Turkey became very strained, and were approaching the breaking point.

The Russian troops had occupied the Dambrian Principalities and, as their advance into European Turkey appeared imminent, the combined British and French fleets proceeded to Constantinople, and the British Government decided to take preliminary steps for the defence of the Dardanelles, as, if that passage had fallen into the hands of the Russians, the safety of the allied fleets would have been endangered. It was therefore decided to send out a party of Royal Engineer officers to report on the situation, and Colonel Vicars, R.E., was selected as the senior, while Capt. Chapman, and Lieuts. the Hon. G. Wrottesley, and J. T. Burke were appointed as his assistants. They embarked on January 13th, 1854, and, as Colonel Vicars fell ill, and had to return to England from Gibraltar, Chapman took charge, and, on arrival at the Dardanelles, commenced an examination of the country in the vicinity of the straits.

Shortly afterwards, General Sir John Burgoyne, the Inspector-General of Fortifications, also proceeded to the East; and, after having had an interview respecting the military situation, with the Emperor Napoleon in Paris, landed at Gallipoli where



he was joined by Capt. Chapman and his two subalterns, whom he instructed to make a survey of the position which he had selected for the defence of the Dardanelles. As it was the depth of winter and the country was covered with snow, the work was severe ; but, notwithstanding the weather, the survey was completed by Chapman, Burke and Lieut. C. B. Ewart, who had accompanied Sir John Burgoyne from England, and who were then instructed to proceed to Constantinople and survey positions for the defence of that city on a line running from the Sea of Marmora to the Black Sea.

After the declaration of war with Russia and the formation of the British expeditionary force for duty in Turkey, Capt. Chapman was attached as senior Engineer officer to the 1st Division, which was commanded by H.R.H. the Duke of Cambridge, and he served with the division in Turkey until the British Army had landed in the Crimea, and had established itself at Balaklava prior to the Siege of Sebastopol. He was present at the Battle of the Alma, and was mentioned in despatches.

As soon as the Siege of Sebastopol commenced, the Royal Engineer officers and Sapper companies were formed into two divisions for the service of the right and left attacks respectively. Capt. Chapman was appointed Director of the left attack in October, 1854, and held that position until March, 1855, when he succeeded Major J. W. Gordon, who had been severely wounded, as Executive Engineer for the whole of the siege operations, under General Sir H. Jones, who had succeeded Sir John Burgoyne as Commanding Royal Engineer in the Crimea. Capt. Chapman held the position of Executive Engineer until the fall of Sebastopol and a large proportion of the arduous work in connection with the great siege devolved upon him. One of the principal batteries in the left attack was always known as "Chapman's Battery," a work which took its full share in the first and subsequent bombardments. His services in the Crimea were so conspicuous that he naturally received rapid promotion, and he was made brevet major in December, 1854, brevet lieut.-colonel in April, 1855, and brevet colonel in November, 1855. He was four times mentioned in despatches, was created a Companion of the Bath, and, besides

the British and foreign war medals, received the Cross of Officer of the Legion of Honour, the Sardinian Order of Valour, and the Turkish Order of the Medjidieh.

After the conclusion of the Crimean War, Colonel Chapman was appointed Commanding Royal Engineer of the Home District, whence he was transferred to the similar post at Aldershot in 1857, and in 1860 was selected for the position of Deputy Adjutant-General of Royal Engineers at the War Office, which he held until 1866. Then, after a year as Commanding Royal Engineer at Dover, he was appointed Governor and Commander-in-Chief of Bermuda. In 1870 the Duke of Cambridge offered him the appointment of Inspector-General of Fortifications at the War Office and he returned to England to take up the duties of the post.

It was rather an important epoch in the history of the appointment, as an attempt had been made to separate the military and civil duties after the resignation of Sir John Burgoyne in 1868, but the change had not proved successful, and the duties were once more united at the time Sir Frederick Chapman was selected for the position. He was able, by the exercise of the common sense, with which he was so largely endowed, to place the affairs of the Fortification Office on a satisfactory footing, and the Corps owes more to him than is perhaps generally known. He held the appointment until July, 1875.

Sir F. Chapman, who was made K.C.B. in 1867, and G.C.B. in 1877, was promoted major-general in 1867, lieut.-general in 1872 and general in 1877. He became Colonel Commandant of the Royal Engineers in 1872. He died in London on June 13th, 1893.

## LIEUT.-GENERAL SIR RICHARD STRACHEY, G.C.S.I., F.R.S., LL.D.

Richard Strachey, who was the son of C. Strachey, Esq., of Sutton Court, Somersetshire, and whose grandfather, Sir Henry Strachey, was private and political secretary to Lord Clive, was born on July 24th, 1818, and, after completing his course of instruction at Addiscombe College, was commissioned as second lieutenant in the Bombay Engineers on June 10th, 1836. After his arrival in India he was transferred to the Bengal Engineers on September 25th, 1839.

His active military service was during the Sikh Campaign of 1845-6, when he served on the staff of General Sir Harry Smith, and was present at the Battle of Aliwal, where he had one horse killed under him and another wounded, and at the Battle of Sobraon. He was mentioned in despatches, and received a brevet majority.

In his professional duties as an engineer, he was principally employed in irrigation works in connection with the Jumna Canal, in Bundelkhund, and on the Ganges Canal, where he commenced the construction of the head works at Hurdwar.

It was in 1856 that Strachey first became connected with the Secretariat of Public Works, as acting Under Secretary, and thus entered on the career of administrative work, for which his abilities were so eminently suited. The department was then in its infancy, having been created by Lord Dalhousie in 1854, under the pressure of the development of irrigation canals and railways. Colonel Sir William Baker, R.E., who was the first Public Works Secretary, was succeeded in 1857 by Major Yule (the late Colonel Sir H. Yule, K.C.S.I.), and, on the retirement of the latter in 1862, Strachey was appointed to the office. In the meantime, during the year of the Indian Mutiny, Strachey had accompanied Mr. J. P. Grant to Allahabad, the headquarters of the temporary Lieut.-Governorship of the Central Provinces, acting under him as secretary in all departments.

and, on his return to Calcutta in 1858, was appointed Consulting Engineer in the Railway Department.

The position of the Secretary for Public Works differed from that of the other Secretaries to Government, inasmuch as there was no member of the Supreme Council possessing expert knowledge of the matters with which the department had to deal. The Secretary was brought into close personal contact with the Governor-General, and had necessarily considerable departmental powers. But, in Strachey's case, it did not end here ; under three Viceroys, Lord Elgin, Lord Lawrence, and Lord Mayo, he exercised a far-reaching influence over public affairs altogether outside his special sphere. Perhaps the results of his nine years of office cannot be better summed up than in the words of his brother, Sir John Strachey, who, for the greater part of the time, was working beside him, and who, in the preface to the last edition of *India*, wrote :—

“ It is to him that India owes the initiation of that great policy of the systematic extension of railways and canals, which has been crowned with such extraordinary success, which has increased to an incalculable extent the wealth of the country, and has profoundly altered its conditions. To him is due the conception of those measures of financial and administrative decentralization which have had the most far-reaching consequences, and which were pronounced by Sir Henry Maine to be, by far, the greatest and most successful reforms carried out in India in his time. To his active support is largely due the initiation of the measures, which have proved of the highest value, for preventing the destruction of the Indian forests, and for their scientific protection and management. He it was who first organized the great Department of Public Works, and laid the foundations of the scientific study of Indian Meteorology.”

When Colonel Strachey left India in 1871, he received the unusual honour of a resolution from the Government of India, thanking him for his services, and, after acting for a time as Director-General of Stores at the India Office, was appointed by Lord Salisbury, in 1875, to a seat on the Indian Council. In 1877, during the vice-royalty of Lord Lytton, he was again sent to India, on a special mission connected with the purchase

of the East Indian Railway from the guaranteed company by the Government.

Before his return to England in 1879, he was appointed President of the first Famine Commission, and subsequently acted as Finance Member of Council, in place of his brother, whom ill-health had compelled to take leave to England. In the former capacity, he laid down those principles which have guided all subsequent efforts to combat the periodical famines from which India suffers ; and, as Finance Member of Council, he wrote a highly important minute containing proposals for a reform of the Indian currency, which, had they then been carried out, would have saved India from incalculable loss. Fourteen years later similar proposals were adopted in consequence of the report of the Committee on Indian Finance, presided over by Lord Herschel, of which Strachey was a member. He also acted as Military Member of Council for a short time at the beginning of the Afghan War.

Strachey was reappointed as a member of the Council of India, but resigned his seat in 1889, when he accepted the chairmanship of the East Indian Railway Company, to which he devoted the remainder of his life. His energy, his wide and public-spirited views made his management a remarkable one. Under him, the line—already, from its natural advantages and excellent management, the most prosperous in India—attained a level of financial prosperity, which alone has enabled the Government of India to reckon its railway policy a financial success. His rule has been commemorated in the name of the Strachey Bridge across the Jumna, which was opened a few weeks before his death.

Although thus actively engaged in the public service for a period of 70 years, this was not the only field in which Strachey's abilities were exercised. He attained distinction in various branches of science, as a scientific explorer and geographer, a geologist, a botanist, and a meteorologist. He was a President of the Royal Geographical Society, and an Honorary Member of the Italian, and Berlin Geographical Societies. He was a Fellow of the Royal Society, which awarded him the Royal Medal in 1897, and served for many years on the Council of that Society.

Strachey's meteorological work was specially valuable ; he was Chairman of the Meteorological Committee for 22 years, and received the Symons Medal from the Royal Meteorological Society. In 1884, he was a delegate to the International Congress, held at Washington, for settling the Prime Meridian, and, in 1892, was a delegate to the Monetary Conference held at Brussels. The University of Cambridge conferred upon him the Honorary Degree of LL.D., in 1892, when the late Duke of Devonshire, a former Secretary of State for India, was appointed Chancellor.

For his public services Sir Richard Strachey was given the C.S.I. in 1865, was granted a Distinguished Service award in 1866, and finally, in 1897, on the occasion of the Diamond Jubilee of Her Majesty Queen Victoria, was awarded the well-merited distinction of G.C.S.I.

Sir Richard Strachey died on February 12th, 1908.

## FIELD MARSHAL SIR J. L. A. SIMMONS, G.C.B., G.C.M.G.

John Lintorn Arabin Simmons, the son of Capt. T. F. Simmons, R.A., was born at Langford, Somersetshire, on February 12th, 1821, and was gazetted as second lieutenant in the Royal Engineers on December 14th, 1837. After passing through the usual course of instruction at Chatham, he was sent to Canada in June, 1839, and was stationed for nearly six years in the British North American Colonies, during which he was employed on the United States frontier and in the construction of works of defence in the colony. On his return to England in 1845, he was promoted second captain in 1846, and, in December, 1847, was selected for the appointment of Inspector of Railways under the Railway Commissioners, and succeeded to the position of Secretary of the Commission in June, 1850. In the following year the Railway Commission was done away with, and the duties, which had devolved upon it, were handed over to the Board of Trade, when Simmons was made the first Secretary of the Railway Department.

After he had been two years at the Board of Trade he obtained leave in the autumn of 1853 to travel in Eastern Europe, where the relations between Russia and Turkey were becoming strained. In October of the same year, war was declared and Capt. Simmons, who was then at Constantinople, placed himself at the disposal of Lord Stratford de Redcliffe, the British Ambassador, who requested him to proceed to the Danube to report on the defences of the Turkish frontier, and on the condition of the Ottoman army which had been sent under the command of Omar Pasha, to resist the Russian advance. This duty was carried out to the satisfaction of Lord Stratford, who then asked him to inspect the defences of the Bosphorus. While Simmons was engaged upon this, war had broken out between Russia and Turkey, and, on his return to Constantinople, he was directed to accompany Admiral Sir E. Lyons into the

Black Sea and to report on the state of the defences of Trebizond, Batoum, and the other Turkish ports.

His term of leave from the Board of Trade having expired, Simmons was on the point of starting for England, when intelligence was received by Lord Stratford that the Russian forces were about to cross the Danube near Galatz and he requested Simmons to proceed as quickly as possible to Omar Pasha and inform him of the approaching advance of the Russians. Proceeding to Varna, Simmons rode to Schumla, hoping to find the Turkish general there, but the latter had gone on to Tertuchan, whither Simmons followed him, and gave him his message in sufficient time to save the Turkish troops at Galatz from being cut off. While he was with Omar Pasha, he received a communication from the Board of Trade, directing him to return at once to London, or to resign his appointment at the Railway Department. He at once replied sending in his resignation, and remained in Turkey under the orders of Lord Stratford de Redcliffe, who wished him to serve with Omar Pasha as British military representative.

In February, 1854, England and France declared war against Russia and made a treaty of alliance with Turkey which continued the war alone until the allied troops could arrive in the East. Silistria was invested by the Russians in May, 1854, and Omar Pasha, feeling that it was of great importance to have the opinion of a skilful Engineer officer on the defences of the fortress, asked Simmons to proceed thither in command of a Turkish cavalry force, and to escort the new governor, who had been appointed to succeed the previous governor, killed during the siege. Simmons brought his force safely through the Russian lines, and took an active part in the defence of Silistria. After finishing his work in that place he again succeeded in passing through the enemy's position and rejoined Omar Pasha at Varna. For his important services at Silistria and on the Danube, Simmons was given a brevet majority and the C.B., while from the Turks he received the Gold Medal for the Danube and the Silistria Medal. He was also definitely appointed as British Commissioner with the Turkish Army, and given the local rank of lieutenant-colonel.



The siege of Silistria was raised on June 22nd and the Russians retired across the Danube, where it was decided that the Turkish Army should follow and cross the river at Giurgevo. Simmons took an active part in this operation, having to superintend the works on the north bank, which were constructed to cover the passage of the Turks. These works proved very useful and contributed largely to the defeat of the Russians on July 7th. In this action Lieut. J. T. Burke, R.E., who was also employed with the Turks, was killed. The Russian Army was withdrawn from the Danubian Principalities, and Omar Pasha remained with his army north of the Danube. In September, 1854, the allied armies proceeded from Varna to the Crimea, and, after defeating the Russians at the Alma, commenced the siege of Sebastopol. The invasion of the Crimea and investment of Sebastopol diverted the attention of the Russians from the Danube, thus leaving Omar Pasha free to act. The Emperor Napoleon had given instructions to the French Commissioner with the Turkish Army to recommend an advance northwards to the river Pruth, but Simmons opposed this project and advised Omar to join the allies in the Crimea, so as to unite the whole forces against Sebastopol. He carried his point and was sent to the Crimea to offer the assistance of the Turkish Army to Lord Raglan and General Canrobert, which the latter accepted, whereupon the Turkish advance guard was sent to the Crimea in January, 1855. Simmons accompanied this force, and placed Eupatoria, the point of landing, in such a state of defence that a determined attack made by the Russians on February 17th was successfully repulsed. The action was severe as the Turks had a comparatively small garrison, and the Russian general brought up about 40,000 men. After the defeat of the Russians, Omar Pasha brought over his army to Eupatoria where the Turks remained until after the evacuation of the south side of Sebastopol in September, 1855.

As the British and French Armies had received large reinforcements, it was decided at a meeting of the allied generals that Omar Pasha should transport his army to the eastern part of the Black Sea, with the view of operating across the Russian

line of communication south of the Caucasus, and thus relieve the pressure on the fortress of Kars, which was then invested by the Russians, and was in great straits. The Turkish Army landed and, advancing into Mingrelia, fought a severe action with the enemy on the river Ingur on November 6th. Simmons was the leading spirit on this occasion, having command of the column which crossed the Ingur, and took the Russians in rear, compelling them to retreat with great loss. Unfortunately, however, the campaign in Mingrelia had been commenced too late to save Kars, which was obliged to capitulate on November 26th, 1855.

In the beginning of the following year Omar Pasha requested Simmons to proceed to London in order to explain his views as to the best method of continuing the campaign against Russia, but he found, on arriving in England that negotiations for peace were already in progress, and that military operations were to be suspended. The Turkish Army was therefore withdrawn from Mingrelia, and Simmons' duties as British Commissioner came to an end. The episode of his work with the Turks during the Crimean War was very remarkable, and he displayed a knowledge of strategy and power of command, which leads one to regret that he never had an opportunity of leading a British Army in the field. He was made a brevet lieutenant-colonel in December, 1855, and the Sultan gave him the rank of Pasha in the Turkish Army, and presented him with a Sword of Honour as a mark of appreciation of his valuable services, and with the Order of the Medjidieh. He also received the Legion of Honour, and the war medals of the allied powers.

Early in 1857, Colonel Simmons was again ordered to Asia Minor, as British representative on the International Commission, which was assembled to delimit the new boundary between Russia and Asiatic Turkey, where he was accompanied by several other officers of Royal Engineers, including Lieut. E. Renouard James (the late Major-General James), Lieut. C. G. Gordon (the late General Gordon, killed at Khartum), and Lieut. H. Helsham-Jones (now Colonel Helsham-Jones). The British party proceeded from Constantinople to Trebizond in May, 1857, and thence by road to Erzerum and Kars. The

work of delimitation was satisfactorily carried out, notwithstanding considerable difficulties, and, on its conclusion, Simmons was promoted to the rank of brevet colonel.

His next appointment was also under the Foreign Office, as, on the termination of his work in Asia Minor, he was selected for the important position of Consul-General in Warsaw, which he held until November, 1860, when he was succeeded by Colonel E. Stanton, R.E. On his return to England he became Commanding Royal Engineer at Aldershot, and, while stationed there, took an active part in the work of the Armstrong and Whitworth Gun Committee, of which he was a member.

In 1865, a Committee was appointed to enquire into the Royal Engineer Establishment at Chatham, of which the Quartermaster-General, Sir Richard Airey, was President, and Simmons was one of the members. The Committee made a thorough investigation into the system of instruction, and reported that, on the whole, the courses of instruction were admirably arranged and required but little alteration. They proposed, however, some useful improvements and Colonel Simmons was appointed Director of the Establishment in September, 1865, with the view of carrying these into effect. He held the post until October, 1868, when he was obliged to vacate it, as it was a colonel's appointment, and he had been promoted to the rank of major-general on March 6th of that year. While he was in command of the R.E. Establishment, H.R.H. the Duke of Connaught joined at Chatham as lieutenant in the Royal Engineers, in order to go through a course of instruction.

It was not long before Simmons obtained fresh employment, as, in March, 1869, Major-General Ormsby, the lieutenant-governor of the Royal Military Academy at Woolwich, died suddenly, and the former was selected as his successor. His period of service at the Academy was an important epoch in the history of that institution. Previous to that time the Commander-in-Chief held the appointment of governor, and all important questions had to be referred to him, while the lieutenant-governor occupied a somewhat subordinate position. But Simmons found that this system gave rise to considerable

difficulties, and that, under it, discipline could not be satisfactorily maintained. After some discussion his view of the situation was accepted, and he was appointed governor, with full powers, while being made personally responsible for the education and conduct of the cadets. The results of his period of rule at the Academy may be best summed up by quoting from a report of the Board of Visitors, who said :—" We are convinced that, in this important national institution, there exists among those in authority a wise, genial, and hearty desire to co-operate in producing in the cadet a thoroughly good tone of moral and intellectual feeling. The influence of the Governor makes itself felt in every branch of the establishment, and is, in fact, the corner stone of success." In December, 1872, the Prince Imperial of France entered the Royal Military Academy as a cadet, and, from that time, the Empress Eugenie always regarded Sir Lintorn as a personal friend.

Simmons was created a K.C.B. in June, 1869, and was promoted to the rank of lieutenant-general on August 27th, 1872. He devoted much attention to the question of the efficiency of the British Army, and, in 1871, published a pamphlet on *The Military Forces of Great Britain*, which is of particular interest at the present time, when the question of the organization of the land forces of England is so much before the public, as many of the arguments put forward by him are as true as when they were written. During 1874-75 he was a member of the Royal Commission on Railway Accidents, a position for which his previous position as Inspector of Railways made him specially competent.

Sir Lintorn Simmons remained for six years as Governor of the Royal Military Academy, and was then selected for the post of Inspector-General of Fortifications, which he held for five years during which he fully maintained the importance of the office, for which his great knowledge and calm judgment particularly fitted him. While employed at the War Office, he was a member of the Royal Commission on the Defence of British Possessions abroad, and was also one of the most active members of the Commission on the Organization of the Army, of which Lord Airey was President.

But it was not within the War Office alone that he was employed by the Government. In 1878, after the Russo-Turkish War had come to an end, a treaty of peace between the two contending powers was signed at San Stefano, and an International Congress was assembled at Berlin to revise the treaty, and to settle many of the Eastern questions, that had arisen in consequence of the war and of the arrangements come to between Russia and Turkey. The Earl of Beaconsfield and the Marquess of Salisbury were appointed as the British representatives, and Sir Lintorn Simmons (who had been promoted to the rank of general in October, 1877) was selected to act as their military adviser, with Captains Ardagh and Edwards as his assistants. Many difficult questions had to be decided, especially as regards the boundaries of the Balkan States, which had to be entirely revised in consequence of the results of the war, and Simmons' services respecting these were so highly appreciated that, on the conclusion of the Congress, he was given the G.C.B. In 1880 he was again ordered to Berlin, in a similar capacity, to advise the British Ambassador, Lord Odo Russell, who acted as British representative on the International Conference, which was assembled to settle the disputed boundaries of Greece and Turkey.

Sir Lintorn's period of service as Inspector-General of Fortifications came to an end in 1880, and he was unemployed until 1884, when he was selected for the appointment of Governor of Malta. During his term of office, an important change was made in the constitution of the island. Up to that time the Council was composed of equal numbers of official and elected members, the Governor having a casting vote; but a new constitution was introduced by the Colonial Office, making the number of elected more than double the number of the official members, thus giving the Maltese much greater political power than before. The change naturally gave rise to a good many difficulties, but Simmons, with his usual skill, succeeded in making the new system work. In 1887 he was given the G.C.M.G. in recognition of his good services in Malta, where, besides settling the question of the constitution, he had done much to improve the condition of the island, especially as regards drainage, water supply, and the coinage. He remained

in Malta until 1888, when he was retired from the Army under the age clause of the Royal Warrant.

But, although his military career had come to an end he continued to be employed by the Foreign Office. There were certain questions regarding marriages in Malta, which it was considered desirable should be discussed with the Pope at Rome, and Sir Lintorn was selected for this delicate mission in 1889. No better choice could have been made, as, besides possessing tact in a remarkable degree, he was thoroughly acquainted with all the bearings of the question, from the experience he had gained when Governor of Malta. The negotiations were somewhat protracted but Sir Lintorn conducted them to the entire satisfaction of the Government, and showed throughout an honesty of purpose and consideration for the feelings of others, which had the best possible effect.

In the following year, 1890, he was promoted to the highest military rank to which a soldier can attain, the grade of Field Marshal, and thus returned to the Active List of the Army. This may be regarded as the termination of his public career, but he never ceased, up to the day of his death, to take a keen interest in military subjects, and in charitable objects connected with the Army. For example he was Chairman of the Gordon Boys' Home at Woking, which was established to perpetuate the memory of his subaltern in Asia Minor, General C. G. Gordon, the hero of Khartum.

After retiring from public life Sir Lintorn Simmons lived at Hawley House, near Blackwater, where he died on February 14th, 1903. He had left instructions that he desired to be buried at Churchill, in Somersetshire, beside his wife; but a military funeral, in accordance with his rank of Field Marshal, which was attended by a large number of troops from Aldershot, was held at Hawley Church by order of His Majesty the King. The King, the Prince of Wales, the German Emperor, and the Duke of Cambridge all sent representatives to the funeral, and the pall-bearers were some of his personal friends and officers who had been his aides-de-camp.

Sir Lintorn Simmons will always be regarded as one of the most distinguished officers, who served in the Corps of Royal Engineers during the nineteenth century.

## COLONEL SIR HENRY YULE, K.C.S.I., C.B., LL.D.

Henry Yule, who was the son of Major W. Yule, Bengal Army, was born at Inveresk, near Edinburgh, in May, 1820, and received his commission as second lieutenant in the Bengal Engineers on December 11th, 1838. He embarked for India in 1840, and was ordered to stop *en route* at Aden to report on the water supply and to deliver a set of meteorological and magnetic instruments for starting an observatory at that place. But on his arrival there he found that the observatory had not been commenced, that the intended observer was dead, and that all the instruments had been broken *en route*, so he proceeded at once to Bombay.

In the following year he was sent on a mission to the Kasia Hills on the frontier of Assam, a then practically unknown country, to find a way to bring the coal down to the plains; but he ascertained that this was not possible, as the coal-bearing district was among high and precipitous mountains covered with thick forest. He brought back useful surveys and reports, and wrote some account of the Kasia people, a Mongolian race of megalithic habits, the first of Yule's many interesting and graphic records of eastern countries.

In 1843 Yule was employed on the irrigation works on the upper waters of the Jumna and Sutlej Rivers, where a commencement had been made in the repair of the ancient works of the Mahomedan Emperors. During this period he assisted at the construction of a boat bridge over the Sutlej for the return of the army from Afghanistan to India, and took part in the arrangements for quelling a disturbance at Kythul, one of the smaller Sikh states.

Lieut. Yule was placed in charge of the construction of the head works of the great Ganges Canal in 1846, and, during the same year, was ordered for active service in the first Punjab War against the Sikhs, where he was engaged in making bridges across the Sutlej near Firozshah to facilitate the advance of the

British Army. In 1848 he was again called away from his civil duties to take part in the Second Punjab War, and was present at the Battle of Chilianwallah.

He took furlough to England in 1849, and on his return to India was immediately sent on a surveying expedition in Aracan, where British troops were then engaged in the second Burmese War, and here he made the acquaintance of Sir A. Phayre, the able and popular ruler of the British possessions in the Burmese Peninsula for many years. From Burmah Yule was sent on to Singapore to report on the defences of the settlement, which was at that time administered by the Indian Government.

After his arrival at Calcutta from Singapore, his ability and energy were recognized by his appointment as Deputy Consulting Engineer at headquarters for the railway system, then commencing in India. This was a novel subject to him, and therefore called for hard and anxious labour. He turned his strong common sense and unbiased views to the general question of railway communication in India, with the result that he was a vigorous supporter of the idea of constructing cheap narrow gauge lines in the parts of the country, which were outside the main trunk lines of traffic; these lighter kinds of railway are now extensively used throughout the peninsula.

In 1855 a separate department was established in India for the management of Public Works, of which Colonel W. Baker (the late General Sir W. Baker, K.C.B.) was appointed Secretary and Lieut. Yule Under-Secretary; and, in consequence of the introduction of railways, and the active promotion of irrigation works, the labour in the new department was very severe, and told upon the health of the two secretaries. At this time Sir A. Phayre, of whom Yule had made the acquaintance in Burmah, was directed by the Indian Government to proceed on an embassy to the King of Burmah, and Yule was appointed secretary to the mission. Thanks to the selection of the secretary, the report of the embassy, which was published by the Government of India, contained a fund of useful information about Burmah, and was illustrated by his clever sketches. It was probably this expedition which turned his thoughts in the direction of the geography of the East.



After the completion of the mission Yule returned to his post in the Public Works Department, but his labours were checked by the outbreak of the Indian Mutiny in 1857, when every available officer was called into the field. He was employed at Allahabad and the neighbourhood, where he had to improvise defences and other engineering works. He was called back to Calcutta by the press of work in the department, and soon after, on the retirement of Colonel Baker, was appointed as his successor. While in the Public Works Office, he was brought into personal intercourse with three Governors-General, Lord Elgin, Lord Dalhousie, and Lord Canning; and it is evident, from private as well as public records, that they all appreciated the Secretary. Indeed, his selection for so high a position when he had less than 15 years' service is sufficient evidence of this.

Yule held the post of Secretary of the Public Works Department until 1861, when he decided to retire from India, partly on account of his own state of health, and partly for family reasons. On his final departure from the country he resided for some years in Italy and finally settled at Palermo. Here he gave his mind to what had always been its congenial tendency, i.e., literature, especially as connected with the history and geography of the East. His first work was *Cathay and the Way Thither*, which contained extracts from the accounts of old travellers in China, and was published by the Hakluyt Society, of which he was a member, in 1866. This was followed by *The Travels of Marco Polo*, a very important work, published in 1871, which has been a text book on Eastern travel ever since.

Colonel Yule returned to England in 1875, and, soon afterwards, was appointed a member of the Council of India, a position which he held until a few months before his death, as, in 1885, when the ordinary tenure of the office, ten years, expired, the Secretary of State showed his great appreciation of his services by making him one of the permanent members of Council. In this high position he showed his power of application and ability, and his determination to deal with questions on their own merits, and not only by custom and precedent. On his retirement from the India Office, Lord Cross,

then Secretary of State, made a special request to Her Majesty to mark the high opinion of his services by creating him K.C.S.I.

In 1880, Colonel Yule was appointed a member of the Board of Visitors of the Indian Engineering College at Cooper's Hill. He was a Fellow of the Royal Geographical Society, of which he received the Gold Medal, and served at various periods as member of the Council, and as one of the Vice-Presidents. He was also a member of the Hakluyt Society (an offshoot of the Royal Geographical Society), and was President up to the time of his death. He was a member of the Royal Asiatic Society and President in 1885-7. He received the Gold Medal of the Geographical Society of Italy, and was a corresponding member of the French Institute.

Besides these employments he was continually at work on literary productions, a complete list of which was given in *The Royal Engineers Journal* for March, 1890, and the Corps owes him a debt of gratitude for the biographical notices of deceased eminent Indian officers of the Royal Engineers, which appeared from time to time in *The Royal Engineers Journal*.

Notwithstanding an illness, from which he suffered for ten years, he continued to work with unabated energy until his death on December 30th, 1889.

LIEUT.-GENERAL SIR W. F. D. JERVOIS, G.C.M.G., C.B., F.R.S.

William Francis Drummond Jervois, who was the son of General W. Jervois, K.H., was born at Cowes, Isle of Wight, on September 10th, 1821, and obtained his first commission in the Royal Engineers on March 19th, 1839. After completing his course of instruction at Chatham, he was ordered to the Cape, and, embarking in a small vessel of 350 tons, reached Cape Town in four months, and was sent to the eastern frontier of the colony to construct defensive posts on the Fish River in order to check Kaffir inroads into British territory.

Towards the end of 1842, Lieut. Jervois, who was then only twenty-one years of age, was appointed brigade major to a column, commanded by Colonel Hare, which was sent to Colesberg to control the Dutch Boers, who were attempting to cross the Orange River, with the view of establishing themselves beyond the reach of the British Government. There was no fighting on this expedition, and, after his return to the Fish River, he was employed in making a bridge at Fort Brown, and a road to Fort Beaufort, the principal station on the frontier. Jervois was next appointed Adjutant of Royal Engineers in South Africa, and accompanied the Commanding Engineer, Colonel R. S. Piper, R.E., on his inspection tours through Cape Colony, Natal, and the districts north of the Orange River.

During the Kaffir War in 1847, General Sir G. Berkeley, who was in command of the troops, took Lieut. Jervois with him into Kaffirland, and there he was ordered to make a survey of British Kaffraria from the river Keiskama to the river Kei, a survey, which proved of great value to the British troops in the Kaffir Wars. The survey was made under circumstances of considerable difficulty, as Jervois and his cavalry escort were frequently fired at by the Kaffirs, and, on one occasion, a party of six officers were cut off by the Natives at Komga Hill, and were all killed but one. But, notwithstanding all the obstacles,

the survey was satisfactorily completed, and, for many years, was the only map available for this part of the country. When he left the Cape in 1848, General Sir H. Smith, who was then Governor and Commander-in-Chief, wrote to Lord Raglan, the Master-General of the Ordnance :—

“ I beg to introduce to your Lordship, Capt. Jervois, of the Royal Engineers, who has, upon promotion, left this command, as one of the most able, energetic, and zealous officers I have ever exacted more than his share of duty from. He has been all over the northern and north-eastern parts of this colony, and can afford every information upon all military and geographical points. In these eventful times, I recommend him as an officer of activity and ability, fond of his profession, and proud to obtain the approbation of his superiors.”

From 1849 to 1852, Jervois commanded a company of the Sappers & Miners at Woolwich and Chatham, and, in June of the latter year, was ordered to Alderney with his company, for employment on the fortifications then in contemplation, on that island. This move had a great influence on his after career.

The Duke of Wellington had held strong views on the importance of the Channel Islands, and of Alderney in particular, and a harbour of refuge was begun at the latter place in 1852, from which the ports on the French coast could be watched. It was also determined to construct strong fortifications on the island in order to prevent an enemy taking possession of it, and the duty of providing these was entrusted to Capt. Jervois, and formed the chief business of his life for the next three years. He arranged that every detail of the fortifications should be designed by himself and the officers under him, and not by the clerks of works, as had been the system at some stations.

When the Crimean War broke out he naturally volunteered for active service, but was informed that the work he was engaged upon was too important to permit of his leaving it. In August, 1854, the Queen and Prince Consort paid a visit to Alderney, and, in accordance with the custom, by which a step in rank was conferred upon the commanding officer on such occasions, Jervois was given a brevet majority. He remained in Alderney

until January, 1855, when he was appointed Commanding Royal Engineer of the London District. In April, 1856, he was selected for the position of Assistant Inspector-General of Fortifications, at the War Office, and then commenced the most important period of his life.

After the conclusion of the great French War in 1815, it appears to have been assumed by the British Government that there would never be any more fighting, and the military establishment was largely reduced, while the fortifications were allowed to fall into such a condition as to be practically useless. The Duke of Wellington, then Commander-in-Chief, called the attention of successive governments to the possible consequences of the line of action which had been adopted, but without effect. In 1847, Sir John Burgoyne, the Inspector-General of Fortifications, submitted a paper to the Master-General of the Ordnance, setting forth the defenceless position of the United Kingdom; if there should be war with France, and this paper, when it came before the Government, attracted the special notice of Lord Palmerston, then Foreign Secretary, who, with the aid of Burgoyne, drew up a report to the Cabinet, showing the serious state of affairs, and proposing, with other necessary military reforms, a scheme of fortification for the defence of the dockyards, so as to give secure bases for the Navy in case of war. But these representations produced no result and it was not until Prince Napoleon, in 1852, made himself Emperor of the French, that any effective steps were taken in the direction of improving the defences of the United Kingdom. Then the works at Alderney were taken in hand, besides additions to the fortifications at Portsmouth and other places.

The state of affairs when the Crimean War broke out in 1854 was a convincing proof of the truth of what the Duke of Wellington, Sir John Burgoyne, and others, had said as to the total unpreparedness of England for war; at last it became recognized that something must be done to put the British dockyards and harbours in a proper state of defence, and it was decided by the Government that a complete scheme should be prepared in the office of the Inspector-General of Fortifications.

It was at this time that Major Jervois was appointed

Assistant Inspector-General, and it was arranged that he should have charge of the project and of preparing the necessary designs, a number of Royal Engineer officers being detailed to assist him. Particulars as regards the names of these officers and of the places where works were carried out, have already been given in Vol. II., page 221.

Major Jervois and his assistants worked with great energy, so that, although no money had yet been provided by Parliament, the plans might be ready when the proper time for action arrived. Three years passed before that time arrived. In 1859, Lord Palmerston became Prime Minister, and Mr. Sydney Herbert was Secretary of State for War. The former had for years been imbued with the importance of fortifying the naval bases, and it was decided to lay the matter before Parliament. Lord Palmerston sent for Major Jervois to consult him as to the necessary works, and was surprised and pleased when the latter produced a roll of plans, with the projects for the defence of Plymouth.

In order that the Government might be able to go to Parliament with sufficient authority for their proposals, a Royal Commission was appointed to consider what fortifications ought to be constructed, and of this Commission Jervois was appointed the Secretary. As he had been engaged on the question for some years, he was familiar with most of the positions requiring defence, and had prepared designs for works to occupy them. The Report of the Commission, which was mainly drawn up by him, was presented to Parliament in 1860. It recommended an expenditure of between eleven and twelve millions, but the Government reduced this to £7,460,000, which was to include the cost of completing the fortifications already in course of construction. After considerable discussion in Parliament, and much opposition, it was finally settled that the amount required should be provided by loan, and an Act was passed to this effect on August 28th, 1860.

After the Act had been passed, a Committee was appointed to examine the designs of the different works, and Major Jervois, who was made a member of the Committee, acted as Secretary. The difficulties of the task were much increased in consequence

of the great improvements in artillery which were then being introduced, and which necessitated changes in the designs of the fortifications while they were actually in progress. The War of Secession in the United States had brought to the front the question of applying armour plating to ships of war, and this led to a decision to use iron plating in the construction of the forts. The use of submarine mines was also brought forward in consequence of the success with which they had been used in the American War, and a Committee was named to consider how they could be utilized as auxiliary to the defence of British harbours.

Simultaneously with the works for the defence of the naval dockyards in Great Britain and Ireland, the defence of the commercial harbours was taken up, and also that of the naval bases and coaling stations abroad, required for the support of the British Navy in all parts of the world; of these also the whole of the designs were carried out under the superintendence of Major Jervois, who was appointed in 1862 as Director of Works for Fortifications. He had been promoted lieutenant-colonel in 1861, and in 1863, was nominated a Companion of the Bath, a well-earned distinction.

In 1863 Colonel Jervois was sent on a special mission to report upon the defences of Canada, Nova Scotia, New Brunswick and Bermuda, and also visited the principal ports on the Atlantic coast of the United States. He made further tours in these countries in the following years.

As might have been expected, the great fortification works, which were in course of construction under the Defence Loan, met with much criticism both in and out of Parliament; and, in 1868, a Committee was appointed by the Secretary of State for War, Sir John Pakington, under the presidency of Sir Frederick Grey, to examine into the works that were being built under the Loan, and to report "whether they had been well and skilfully constructed, whether the foundations were secure, and whether the estimates would suffice."

This Committee visited and examined every work in the United Kingdom and, in their report, testified their entire approval, both of their design and construction, saying that

great skill had been shown in adapting the original designs to altered circumstances, and to the great advance in the power of rifled artillery. This report was very satisfactory to Colonel Jervois, who, as the life and soul of the vast undertaking, was practically on his trial, and an adverse report would have been very serious for him.

Colonel Jervois again visited Halifax and Bermuda in 1869, in order to inspect the works in progress at these naval bases, and afterwards inspected the defences of Gibraltar and Malta. In 1871-72, at the request of the Government of India, he inspected and reported on the defence of Aden, Perim, Bombay, and the river Hooghly, and also visited and reported on the defences of Rangoon and Moulmein in British Burmah. During this tour he accompanied the Earl of Mayo, then Governor-General, to the Andaman Islands, and was close behind him when he was assassinated.

In 1874, he was created K.C.M.G. in recognition of his colonial services, and, in 1875, as the works under the Defence Loan had been completed, his services at the War Office came to an end, services which had lasted for a period of 19 years. It is not often than an officer of Royal Engineers has had the advantage of carrying out, from the commencement to the conclusion, an undertaking of such importance as the series of works of fortification constructed under the Defence Loan.

But, although his time at the War Office had concluded, he did not retire from official life, as he was appointed by the Secretary of State for the Colonies, Governor of the Straits Settlements, in succession to another distinguished Engineer officer, Colonel Sir Andrew Clarke, one of whose last duties, before leaving Singapore, had been to establish order in Perak, and the other small Malay States lying to the north of Singapore, which had been for years a cause of anxiety to the Government of this place.

Sir A. Clarke had appointed a British Resident in Perak to keep the Sultan in order, but, just at the time when Sir W. Jervois succeeded as Governor, this Sultan Abdullah began to give trouble, and to act in opposition to the treaty which had been made with him. Jervois therefore decided, three months



after his arrival, to visit Perak, and learn the state of affairs by personal observation. He found that the chiefs had begun to realize the meaning of British intervention in their affairs, and were preparing to resist. A conspiracy to assassinate him nearly succeeded, and the result of his enquiries was to bring him to the conclusion that the only solution of the difficult question was to have the government administered directly by British officers. This course was recommended by some of the better class of chiefs, and the matter ended by his appointing a British officer as Commissioner, with Assistant Commissioners in the different districts, to take over the government of the country, acting in the name of the Sultan. But the latter, while agreeing outwardly to the new *régime*, was determined to oppose it secretly, and, in November, 1875, Mr. Birch, the British Commissioner, was murdered, and his death was followed by the repulse of a small British force at Passir Sela, where Captain W. Innes, R.E., was killed.

Sir W. Jervois immediately ordered up all the available troops from Singapore under the command of Major-General Colborne, which were reinforced from Hong Kong, and by a brigade from India under Colonel Ross. After a short campaign, which was entirely successful, the Sultans Abdullah and Ismail, and the chiefs who were concerned in the murder of Mr. Birch were taken prisoners, and tranquillity was restored. For his energetic action on this occasion Jervois received the thanks of the Government, and the results of his policy have been seen ever since, not only in the increased prosperity of the British possession in the State of Malacca, but in the good government of the adjacent Native States.

While the troubles in Perak were being put an end to, there were outbreaks in other of the Malay States, which were suppressed with the same vigour.

In April, 1877, Sir W. Jervois was sent by the Government to enquire into the defences of Australia and New Zealand, and, while visiting the Australian colonies, was appointed Governor of South Australia. After taking up his duties at Adelaide, he visited Tasmania and New Zealand and sent in a report on the defences of all these colonies.

This report went fully into the whole question, and discussed the relative share in the defence which should be taken, in time of war, by the British Navy, and by the colonies themselves, who, up to that time, had done but little for their own protection, while relying upon the support of the British Navy, to the expenses of which they did not contribute. Sir W. Jervois' reports were of the greatest assistance to the Royal Commission which reported in 1882 on the Defence of British Possessions and Commerce Abroad. The Royal Commission stated that no substantial improvements could be made upon the system designed by him with regard to land works.

His position as Governor of South Australia, a self-governing colony with Ministers and a Parliament, was very different to that which he had occupied at Singapore, a crown colony, where the Governor had, to a great extent, autocratic powers; but he adapted himself at once to his new position, and gained the reputation of being one of the best Governors that the colony had ever had.

Sir W. Jervois held the appointment of Governor of South Australia for more than five years, and, in January, 1883, was made Governor of New Zealand, where his first care was to place the ports of Wellington, Auckland, Littleton and Port Chalmers in a state of defence, and he was cordially supported by the Ministry in his proposals for the protection of the colony from a possible hostile attack. In 1885 he had to act with great promptitude and decision in a matter which, but for his sound judgment, might have led to international difficulties. The King of Samoa had made overtures to the Government of New Zealand, with the view of placing the island under British suzerainty, and the Ministers proposed to send a vessel to discuss the question with the king without consulting their own Governor. But the latter heard of their intentions and stopped any action being taken without authority from England; on communicating with London by telegraph he received instructions that Samoa was not to be allowed to annex itself to New Zealand, as the treaties between Great Britain and other countries made this impossible.

In New Zealand, as in South Australia, Sir W. Jervois won the confidence and admiration of the people by the addresses which he gave on his frequent tours through the colony, while his hospitality and genial manners endeared him to all. In 1889, when the term of his government came to an end, he left the Dominion universally regretted, and, in the opinion of many, was the best Governor that had ever been in New Zealand.

On returning to England, his active public career came to an end, but he was a member of the Consultation Committee on Coast Defence Duties. In 1889 he was made a Fellow of the Royal Society, and in 1893 became a Colonel Commandant of Royal Engineers. He died suddenly from the result of an accident on August 16th, 1897.

**LIEUT.-GENERAL SIR T. L. J. GALLWEY, K.C.M.G., D.C.L., LL.D.**

Thomas Lionel John Gallwey, who was the son of Major J. Gallwey, Deputy Inspector-General, Royal Irish Constabulary, was born at Farm Hill, Killarney, on July 20th, 1821, and received his commission as second lieutenant in the Royal Engineers on March 19th, 1839. After passing through his course of instruction at Chatham, he was stationed for a year at Woolwich, and was then ordered to the West Indies, where he was employed in the island of Dominica. During his sojourn there an epidemic of yellow fever broke out, in which he nearly lost his life, but his naturally healthy constitution pulled him through.

After his return home in 1845, he was quartered in Ireland and was for some time employed under the Board of Works, in connection with the efforts made for the relief of the people during the great famine of 1847-48.

Gallwey was promoted to the rank of second captain in 1848, and was sent to Canada in 1849, where he served as Brigade Major at Montreal during the Crimean War. On his return to England in 1859, after nine years' service in Canada, he was employed on the construction of the forts at Brockhurst, and East Hill, Fareham, near Portsmouth. In 1859, he was given the rank of brevet major, and, in 1862 was promoted lieutenant-colonel in the Royal Engineers. During the same year he was appointed a member of the Ordnance Select Committee.

In 1864, Colonel Gallwey was selected as a member of a special commission which was sent to accompany the Federal Army during the civil war in the United States, and here he had rather a curious experience, as bearing a striking resemblance to General Blake of the Confederate Army, he was regarded with great suspicion wherever he went, and had considerable difficulty in establishing his identity as a British officer.

He was ordered to Canada again in 1865, having been selected

for the post of Commanding Royal Engineer, and was stationed at Quebec until 1868, when he was given the appointment of Director of the Royal Engineer Establishment at Chatham, the title being altered in the following year to that of Commandant of the School of Military Engineering. During the seven years that he remained at Chatham, submarine mining became a recognized part of the work of the Corps, and the Royal Engineers Institute was established.

After leaving Chatham in 1875, Colonel Gallwey was appointed Commanding Royal Engineer in Guernsey, and, in the following year, was transferred to the similar appointment at Gibraltar, where he remained until 1879, having, in the previous year, been promoted to the rank of major-general. His large experience of fortification works in Canada, at Portsmouth, and on the Ordnance Select Committee, proved valuable at Gibraltar, and so satisfactory was his work at that station that he was specially thanked by the General Officer Commanding, Lord Napier of Magdala. While at Gibraltar he was also appointed to act as agent to the Sultan of Morocco for the fortification of Tangier.

After the conclusion of his service at Gibraltar, Gallwey remained for a year and a-half on the unemployed list, and was then chosen for the post of Inspector-General of Fortifications in succession to Sir Lintorn Simmons; but he only held the appointment for two years, as, in June, 1882, shortly after his advancement to the rank of lieutenant-general, he was offered the Governorship of Bermuda, where he served until retired under the age clause in 1888.

In 1884 he received the reward for Meritorious Service, and, in 1889, was created K.C.M.G. He became a Colonel Commandant of the Corps in 1895, and died at Eastbourne in 1906.

## CAPTAIN SIR DOUGLAS S. GALTON, K.C.B., F.R.S.

Douglas Strutt Galton, who was the son of J. H. Galton, Esq., of Hadzor House, Droitwich, was born at Spring Hill, near Birmingham, on July 22nd, 1822, and received his first commission in the Royal Engineers on December 18th, 1840.

He was employed under Sir Charles Pasley in 1842, on the removal of the wreck of the *Royal George* at Spithead by blasting, when, for the first time, firing the charges by electricity was attempted. He was then ordered to the Mediterranean, and, after serving both at Malta and Gibraltar, returned home in 1846, when he was appointed to the Ordnance Survey.

His talents soon brought him to the front, and, in 1847, although a subaltern of less than seven years standing, Galton was appointed Secretary to the newly-formed Railway Commission, which had to deal with very important proposals. He also served as Secretary to the Royal Commission on "The Application of Iron to Railway Structures"; a commission created in consequence of the breakdown of a railway bridge over the river Dee. The experiments which he made on the strength of iron were of great practical utility, and his report on these placed Galton's reputation on a footing beyond his years. In 1854, he was appointed Secretary to the Railway Department of the Board of Trade, and, in 1856, visited the United States with Mr. Robert Lowe (afterwards Lord Sherbrooke), to inspect the railways of that country, after which he wrote an interesting report showing how the non-existence of roads had led to the rapid development of railways in the United States.

In 1857 Captain Galton was appointed Government referee, in conjunction with two civil engineers, Messrs. Simpson and Blackwell, for the consideration of plans for the main drainage of London, which had been proposed by the newly-constituted Board of Works. He was opposed to the discharge of the effluent into the Thames so high up as Barking and Crossness,

and advocated its discharge at Sea Reach, where it would mix with a larger body of water. His views have been justified by results.

The next duty upon which Galton was engaged was a specially important one. After the Crimean War had concluded public attention was directed to the health of the British Army and it was decided to take vigorous measures for the improvement of the health of the troops. In 1861, a Royal Commission was appointed by Lord Panmure, then Secretary of State for War, to enquire into the sanitary condition of barracks and military hospitals. Mr. Sydney Herbert (afterwards Lord Herbert of Lea), was President, and Capt. Galton was one of the most active members of the Commission. The Report of the Commission, which was presented in 1861, gave a most exhaustive account of the existing state of barracks and military hospitals, and suggested a number of important changes for bringing them up to modern ideas. This Report may be regarded as the basis of all the improvements which have been made since, and to no man does the British soldier owe more for his present comfort than to Sir Douglas Galton. In the same year, 1861, he accompanied the late Doctor I. Sutherland on a mission of enquiry into the sanitary condition of the barracks and hospitals at Gibraltar, Malta, and the Ionian Islands. In the following year he was appointed a member of the Barrack and Hospital Improvement Committee, which, a few years later, became the Army Sanitary Committee, a standing body under the Quarter-master-General, whose duty was to advise on all schemes and designs for barracks and military hospitals, drainage at military stations, and other similar questions connected with the health of the Army. Of this Committee Galton remained a member until his death.

In 1860 he was appointed Assistant Inspector-General of Fortifications at the War Office, for barrack services, and in 1863 was selected for the position of Assistant Permanent Under-Secretary of State for War, a position which he occupied for nearly eight years. Galton was a member of the Royal Commission on the Embankment of the river Thames, of the Committee, which was appointed in 1865, to advise on all

questions in connection with the laying of the Atlantic telegraph cable, and also of the International Telegraph Commission held at Paris the same year. Prior to this he had become thoroughly conversant with the subject of submarine telegraphy, as, while at the Board of Trade, after the abortive attempt to lay a cable across the Atlantic in 1858, he had been appointed Chairman of a Committee, which was instructed to investigate the question of submarine electric telegraph cables. This Committee collected information from every available source, and published a report in 1861 which has been described as "the most valuable collection of facts, warnings and evidence ever compiled concerning submarine cables."

Galton's work at the War Office did not prevent him continuing to interest himself in railway matters. In 1862 he read a paper on "Railway Accidents" at the Institution of Civil Engineers (of which he had been an Associate since 1850), and, in 1866, he was an active member of the Royal Commission on Railways, of which the Duke of Devonshire was President. He was created C.B., in 1865, as a recognition of his eminent services.

In December, 1869, Captain Galton's term of service at the War Office came to an end, and he was transferred to the Office of Works, as Director of Public Works and Buildings, from which position he retired with a pension in August, 1875.

On the occasion of the Queen's Jubilee in 1887, Galton was promoted to K.C.B., and, in 1889, was made an Officer of the Legion of Honour, and a Knight of Grace of the Order of St. John of Jerusalem; he also received the Turkish Order of the Medjidieh. He was elected a Fellow of the Royal Society in 1859, and served on the Council of that Society. In 1894 the Institution of Civil Engineers made him an Honorary Member—an usual distinction. He was an Honorary D.C.L. of Oxford, an Honorary LL.D. of Durham and Montreal, and a member of many literary and scientific societies at home and abroad.

Galton's name will always be honourably connected with sanitary science. The Herbert Hospital at Woolwich was mainly designed by him when at the War Office, and many improvements in barracks and hospitals are due to his initiative.



He invented a ventilating fire grate which was adopted for use in all barracks and military hospitals and was called by his name. He was among the first and most earnest supporters of the Parkes Museum, and was Chairman of the Council of this Institution. He was also a member of the Sanitary Institute of Great Britain, and, after the two bodies were amalgamated, was twice Chairman of the Council, Vice-President and Treasurer, holding the two last offices until his death. Galton was one of the most active members of the British Red Cross Society when it was founded, and, during the Franco-German War of 1870-71, was sent out as Commissioner to the sick and wounded of both nations. In recognition of his services to the German military hospitals, the Emperor conferred on him the Imperial Order of the Crown of Prussia.

In 1860, Galton became a member of the British Association, was one of the General Secretaries from 1871 to 1875, and was then elected as President. When holding this position he used the opportunity to bring to a conclusion the efforts which he and others had been making for years to obtain the establishment of a National Physical Laboratory. With persevering energy he carried on negotiations with the Government and the Royal Society, which were crowned with complete success.

Galton's interest in education was wide and varied. He was President of the Senate of University College, London, represented the Royal Institution on the Council of the London University Extension Society, was Vice-President of the Society of Arts, Member of Council of the Royal Drawing Society, and of the Princess Helena's College at Ealing, and was one of the original founders of the Girls' Public Day School Company.

There have been few men, who have done so much good work for the benefit of his own country and for humanity in general as Sir Douglas Galton. He died in London on March 10th, 1899.

## GENERAL SIR A. TAYLOR, G.C.B.

Alexander Taylor, the son of William Taylor, a gentleman of Scottish descent, settled in Ireland, was born in Dublin in 1826. He received his early education at Hofwyl, in Switzerland, and, after passing through the course at Addiscombe College, received his first commission in the Bengal Engineers on June 9th, 1843. On his arrival in India in January, 1845, Lieut. Taylor was posted to the headquarters of the Bengal Sappers at Meerut, and, shortly afterwards, to the command of a company of Sappers at Ferozpur, where he was stationed at the time of the outbreak of the First Sikh War in 1845. He had charge of the engineer defence of the place, which was threatened by an army of 30,000 Sikhs, and was employed on the construction of the bridge of boats across the river Sutlej, by which the British troops advanced into the Punjab after the victory at Sobraon.

In 1848, Taylor was in command of a flotilla of boats, which were used to bring the engineer stores required for the siege of Multan down the river Sutlej, and was in charge of the Engineer Park during the two sieges of that city. During the final assault, he led the columns that attacked the left breach and was severely wounded, but recovered in time to accompany the army into the Punjab, and was present at the Battle of Gujerat, where he acted as orderly officer to Sir John Cheape, the Chief Engineer, and at the final submission of the Sikhs to the Indian Government.

In May, 1849, Taylor was placed in charge of the new military road, which it was proposed to construct from Lahore to Peshawur, in order to keep up communication with the frontier of the newly acquired province of the Punjab, and was employed for eight years on this important task. He was promoted captain in 1857, just before the outbreak of the Indian Mutiny, when he was ordered to join the British force before Delhi, as second in command of the Engineers, the Chief

Engineer being Major R. Baird Smith, of the Bengal Engineers. Captain Taylor reached Delhi on June 27th, 1857, was present during the whole of the siege, and to him was largely due the success of the operations which led to the capture of the city. As Major Baird Smith was suffering from the effects of a severe wound, and was therefore unable to take so active a part as he would have desired, a large share of the outdoor work fell to the second in command; and fortunately Taylor was fully equal to the great responsibilities of his position, and he was always supported, and his proposals were backed up by the Chief Engineer.

During the summer months of 1857, the British Army before Delhi was in a very difficult position, as it consisted of less than 7,000 men, unprovided with siege artillery, while the rebels in the city had more than 30,000 well-trained troops, besides a large number of less disciplined men. They were well equipped with artillery and ammunition, and were in a better position to besiege the British than the latter were to besiege them. During this trying period Taylor was indefatigable in making reconnaissances right into the enemy's positions, and in projecting batteries on ground actually occupied by the latter, which he proposed should be erected when the siege train arrived. The manner in which he succeeded in getting into Ludlow Castle, the Khudsia Bagh, and other outposts held by the rebels, was marvellous, and it was not unnatural, that General Wilson, commanding the British Army, somewhat doubted the possibility of Taylor's exploits, and did not fully credit them until the latter had taken General Nicholson safely in and out of the two rebel outposts named above.

There has been considerable controversy, from time to time, as to whether it was to Major Baird Smith, or to Captain Taylor, that the credit of making the plan of attack, so successfully carried out, was due; but it is evident, from all the accounts, that the two officers acted loyally together, and that the Chief Engineer supported the proposals of his second in command, who, owing to the circumstances of the case, was naturally the more active of the two, but who could not have succeeded in

getting his proposals approved, had they not been backed up by Major Baird Smith. The position was clearly described in a letter from General Nicholson to Sir John Lawrence, written in September, 1857, when General Wilson was considering the advisability of giving up the attempt to capture Delhi. "Fortunately, after making all kinds of objections and obstructions, and even threatening more than once to withdraw the guns, and abandon the attempt, Wilson has made over everything to the Engineers, and they, and they alone, will deserve the credit of taking Delhi. The purport of his last letter, in reply to the Engineers ran thus; 'I disagree with the Engineers. I foresee great if not insuperable difficulties in the plan they propose. But, as I have no other plan myself, I yield to the urgent remonstrance of the Chief Engineer.' " It was fortunate for Baird Smith and Taylor, that there was a man like Nicholson, present to support them.

On September 4th, to the joy of the little British Army, the siege train at last arrived, and as reinforcements had brought up the strength of the force to over 10,000 men, the siege works were commenced, and No. 1 Battery was built on the site selected by Taylor, opposite to, and within 700 yards from the Mori Bastion. This was quickly followed by the construction of other batteries, all sited as arranged in accordance with the information which had been obtained by Taylor on his adventurous reconnaissances. The part taken by him in the operations is well summed up in Kaye's *History of the Mutiny*, where it is written; \* "It has been seen how, all this time, our Engineer officers worked, with unflagging perseverance, in the batteries. Alec Taylor was the heart and soul of every movement—always cheery, always active, never sparing himself—inspiring, aiding, animating all by his noble example. It was impossible not to admire—not to endeavour to imitate him. He never complained; he never faltered; almost, it may be said, he never rested. He had the sole executive direction of all the engineering department of the siege batteries, which opened the way to the interior of Delhi. The younger officers

\* *A History of the Sepoy War in India*, by Sir J. W. Kaye, F.R.S., Vol. III., p. 573.

of Engineers swore by him, and, in truth, there was something almost divine in his wonderful fertility of resource, and the self-sacrifice, which he continually displayed. He had studied the ground well, and he had seized, with quick soldierly eye, upon the exact points at which it would be desirable to erect our batteries. It was a happy stroke of genius to surprise and divert the enemy by running up a battery (No. 1), in a single night, to play upon the Mori Bastion. It was Taylor's unaided idea—as was also the location of No. 3 Battery, the idea of which came suddenly upon him as an inspiration, and was worked out with wonderful promptitude and effect."

In less than a week the fire of the batteries had produced such an effect upon the walls and bastions, that, by September 13th, Taylor was able to report that the breaches were practicable, and the assault was ordered for the following day, when four columns advanced to the walls, of which the first, commanded by Nicholson, stormed the breach near the Kashmir Bastion. Taylor accompanied this column, and was wounded by a bullet, but not seriously. This is not the place to describe how gallantly the assault was carried out, and how gloriously it succeeded, though marred by the death of John Nicholson, cut down in the hour of his triumph, and paid for by the loss of many gallant officers and men. By September 21st, the capture of the city was finally completed and the King of Delhi taken prisoner. Two days later, Major Baird Smith, who had held out so bravely until the work had been finished, was invalided, and Capt. Taylor took over the command of the Engineers, and commenced the restoration of the fortifications, and placing them in a state of defence.

He did not, however, remain long in Delhi, as, in November, he was ordered to Agra, and, on December 10th, joined a column at Alighur under Colonel Seaton, who was ordered to escort a convoy of supplies to Sir Colin Campbell's camp at Cawnpore. When with this column, Taylor was present at the brilliant cavalry engagement at Khasganj, and at the action of Mainpuri. At Cawnpore he organized the engineer park for the Siege of Lucknow, collected materials for the construction of a bridge across the Gumti River, and accompanied the British Army

to the siege. He led the assault on March 11th, 1858, and received a wound at the capture of the Begum Koti, from which he never completely recovered, and which prevented his taking a further part in the campaign. For his great services during the Indian War, he was made a brevet major on January 19th, 1858, and brevet lieutenant-colonel on July 20th, and, in addition, was created C.B.

As soon as he was well enough to travel Taylor took furlough to England, the first he had had since arriving in India fifteen years before, and returned in 1861, where he was appointed Superintending Engineer of the great road from Lahore to Peshawur, upon which he had been employed before the outbreak of the Mutiny, and which was due so largely to his energy and skill that it was commonly known as "Taylor's Road."

During the Ambela Campaign of 1863, when General Sir Neville Chamberlain led a force into the Yusafzai country to chastise the Hindustani fanatics, Taylor was appointed Chief Engineer of the expedition, and did some remarkable reconnoitring work, which led to the capture of the Ambeyla Pass. He was also sent on a dangerous task, accompanied by a few British officers, and some of the Bunerwal tribe, to destroy Malka, the headquarters of the fanatics, a hazardous undertaking which was carried out with complete success.

In March, 1864, Taylor was promoted brevet colonel, and, in the following year, was appointed officiating Chief Engineer of the Punjab, and Chief Engineer in 1872, a position he held until 1876 when an affection of the eyes necessitated a visit to England. After returning to India, he was made Deputy Inspector-General of Military Works, and, in 1878, Secretary to Government in the Public Works Department, but, in consequence of urgent private affairs, was unable to take up the duties of this post, and he retired on December 31st, 1878, with the rank of general. For his services in India, he was created K.C.B., and, later on in life, received the G.C.B.

Two years after his return to England Sir Alexander Taylor was appointed President of the Royal Indian Engineering College at Cooper's Hill, and filled that office for sixteen years, during

which he did much to improve the College, and increase the efficiency of the course of education given at that establishment. The work was attended with considerable difficulty, as soon after his appointment the number of students who received positions in the Public Works Department was reduced, and the College was thrown open so as to attract students in engineering other than those who were to take service under the Government of India. After his retirement from Cooper's Hill, Sir Alexander Taylor gave up public work and died on February 25th, 1912, at the age of eighty-six years. A memoir of this distinguished officer has been written by his daughter, Miss A. C. Taylor.

## LIEUT.-GENERAL SIR J. STOKES, K.C.B.

John Stokes, the son of the Rev. J. Stokes, Vicar of Cobham, was born in June, 1825, and received his first commission in the Royal Engineers on December 20th, 1843. After leaving Chatham he was sent to Woolwich to join a company of Sappers and Miners, then under orders for the Cape, for which colony he sailed in June, 1845.

The company landed at Port Elizabeth, going up country to Fort Beaufort, and, shortly after his arrival there, Stokes was ordered to proceed, with four sappers, to make a survey in the neutral territory between Cape Colony and Kaffirland. The Kaffirs objected to the presence of the four soldiers on the ground that it was a breach of neutrality, and Sandilli, the paramount chief, demanded their immediate withdrawal, supporting his demand with a force of 5,000 Kaffirs. British troops were assembled, but, thanks to the diplomatic skill of Lieut.-Colonel Hare, the Lieutenant-Governor of the district, a fight was avoided, and the forces on both sides were withdrawn. In the meantime, Stokes had completed his survey, and it was afterwards found that he and Colonel Hare had had a narrow escape, as Sandilli had arranged to assassinate the party during the negotiations, and it was only by an accident that his treachery was frustrated. Stokes was given much praise for his action in the affair, and was, in consequence, selected to make Victoria Camp defensible, not an easy task, considering the limited time at his disposal.

The Kaffirs became more and more aggressive, and a punitive expedition was sent into Kaffirland in two columns, under Colonel Somerset, who appointed young Stokes Deputy-Assistant Quartermaster-General of the column which started from Fort Beaufort. He distinguished himself in the ensuing operations, especially at the Relief of Fort Peddie, which was situated between the Fish and Keiskama Rivers, where he killed three Kaffirs in hand-to-hand fight. The senior Engineer officer, Major Walpole, was seriously wounded, and Stokes became acting Commanding Royal Engineer.



Shortly afterwards, when serving under General Sir Peregrine Maitland, he volunteered to carry despatches to Fort Hare, across the Anatola Mountains, which were held by the Kaffirs, and succeeded in getting back safely, after successfully accomplishing his task under great difficulties. He was next sent to the mouth of the Fish River, to maintain a flying bridge, by which communication was kept up with Fort Peddie, but the district was unhealthy, and he was incapacitated by fever from taking part in this campaign.

After recovering from his illness, he was employed on the fortifications at the mouth of the Buffalo River until December, 1850, when he was ordered to King William's Town to join the headquarters of Sir Harry Smith, who had succeeded Sir P. Maitland as Commander-in-Chief, and who appointed him Deputy-Assistant Quartermaster-General of the Second Division which was under orders to relieve Fort Cox, a post in the heart of the Anatola Mountains, then invested by the Kaffirs. After the fort had been successfully relieved, the Second Division was employed on keeping open the communication of the army, which gave Stokes incessant work as he accompanied every patrol, and had many narrow escapes from the Kaffirs.

When engaged upon this important duty, much to his surprise, Stokes was ordered home to England. The reason of this curious order is given in the following General Order of Sir Harry Smith :—

KING WILLIAM'S TOWN,

*July 9th, 1851.*

"His Grace the Commander-in-Chief having disapproved of officers of the Royal Engineers being appointed to the General Staff, the army is consequently deprived of the services of Lieuts. Jesse and Stokes as D.A. and D.A.Q.M.G.'s.

"These officers, returning to the duties of their corps, carry with them the Commander-in-Chief's most unqualified approbation and admiration of their services in their important positions, and it will be a most gratifying duty His Excellency owes them to bring their names to the Master-General's notice in the strongest terms."

After his return to England, Stokes was appointed Assistant Instructor in Surveying at the Royal Military Academy, and

was promoted to second captain in 1854. In the following year, on the outbreak of the Crimean War, he volunteered for service on the staff of the expeditionary force. His request met, at first, with no encouragement, but in 1855, he was offered employment by Lord Panmure, then Secretary of State for War, to organize an engineer corps for the Anglo-Turkish contingent, a force which was being embodied to act as auxiliary to the Allied Armies. This duty involved an immense amount of responsible work, as Stokes had not only to enlist the men for the corps, but to select and purchase the necessary stores, and to have everything complete and on board ship within three months. But the task was satisfactorily accomplished and he sailed for the East in August, 1855, arriving in the Crimea two days before the fall of Sebastopol.

His engineer train was sent first to Varna, and then to Yenikale and Kertch, on the Sea of Azov, where they were employed in strengthening the post. Early in 1856 Stokes was sent home to England to raise more recruits, but, while he was thus employed, peace was signed and he was sent back to Kertch to disband, not only his own corps, but the whole Anglo-Turkish contingent, which the Government was now as anxious to get rid of as they had been to raise it a year previously. It was a duty involving much anxiety and responsibility; but by June, Stokes was able to report the completion of the work in a manner which met with Lord Panmure's entire approval. For his services with the Turkish contingent he was mentioned in despatches, and received the brevet of major, and the Order of the Medjidieh.

On his arrival at Constantinople from the Crimea, Major Stokes was offered, and accepted, the appointment of British Representative on the International Commission, which was established under the Treaty of Paris to improve the navigation of the mouths of the Danube. This appointment materially affected Stokes' after life. The duration of the Commission by the Treaty was limited to two years; but, owing to the unexpected difficulties that had to be grappled with, and the magnitude of the works to be undertaken, its life was prolonged indefinitely. The members were changed from time to time, with the exception of Stokes, who was thus better acquainted

with the political and engineering questions than his colleagues, and eventually took the lead in everything. He remained on the Commission until 1871, when the works at the Sulina mouth of the Danube were sufficiently advanced to render the channel available for vessels drawing 20 ft., at all states of the tide. He then felt justified in asking to be allowed to return to military duty, and was succeeded as British Commissioner at Galatz by the late General C. G. Gordon, R.E. On returning to England Stokes received the C.B. in recognition of his services on the Danube. He had been promoted to the rank of lieutenant-colonel in 1867.

After being stationed for a short time at Chatham, and at Pembroke Dock, as Commanding Royal Engineer, Stokes was selected by the Foreign Office as the British member of an International Commission, which was to assemble at Constantinople for the purpose of solving the difficulties which had arisen with the Suez Canal Company respecting the measurement of the tonnage of ships passing through the canal. The Canal Company, which, in accordance with its concession, was allowed to charge 10 francs per ton, had been in the habit of laying the charge on the net, or, as it is called in England, the register tonnage; but they suddenly changed the system, and began to charge dues on the gross tonnage, to the great consternation of shipowners, who appealed to their respective governments. The latter referred the question to the Sultan, who, as granter of the concession, could alone say what tonnage was meant. But the Sultan felt himself incompetent to decide such a technical question, and agreed to the appointment of an International Commission to advise him on the matter.

A somewhat similar difficulty had arisen in connection with the navigation of the Danube, and there the difficulty was met by calculating the net tonnage, on which dues were to be charged by a system of measurement, afterwards known as "The Danube Rule," which was a slight modification of the British method, and in the adoption of which Stokes had been mainly instrumental. His experience, therefore, was of the greatest value in dealing with the Suez Canal Company, and, thanks in great part to his exertions, a compromise was arrived at, which

was more or less satisfactory to all the parties concerned, and was approved by the Sultan, who, to show his approval, gave Stokes the Second Class of the Order of the Medjidieh.

After the International Commission had concluded its labours Colonel Stokes was instructed by the Foreign Office to proceed to Egypt and to report on the condition and local administration of the Suez Canal, and he completed this duty in March, 1874. As his presence was frequently required at the Foreign Office in connection with Suez Canal questions, he was transferred as Commanding Royal Engineer to Chatham. In November, 1875, he was appointed Commandant of the School of Military Engineering.

During the same month he was summoned to the Foreign Office in order to be consulted on the subject of the purchase of the Khedive's shares in the Suez Canal, a transaction which he most strongly recommended, and which, fortunately, the British Government decided to carry out, as by this act England obtained a powerful voice in the management and working of this important undertaking.

Shortly after the purchase of the Suez Canal shares, the Khedive requested the British Government to send out an able financier to examine into and report on the state of his treasury. Mr. Cave, of the Paymaster-General's Department, was selected for this purpose, and the Foreign Office applied for Stokes to accompany and assist him; the permission was granted by the War Office, and he again started for Cairo.

In addition to his financial work with Mr. Cave, Colonel Stokes received instructions from the Foreign Office to report on the working of the new tonnage system on the Suez Canal, and to see whether any arrangement could be made to improve it, as Mr. de Lesseps thought it had an unfair effect on the receipts of the company. De Lesseps went into the question amicably with Stokes, who, with his consent, made a new proposal to the Foreign Office. These proposals were submitted to the European powers, and, with their concurrence, the British Government authorized Stokes to make a formal agreement with de Lesseps. When this had been completed, he was recalled to England, and, not only received the thanks of the Government, but had the satisfaction of having his services mentioned in flattering terms in Parliament.

Colonel Stokes was created K.C.B., and, as the purchase of the Khedive's shares gave England the right to the nomination of three directors on the Board of the Suez Canal Company, he was the first to be named as one of these.

In May, 1879, when he went to Paris to attend the meeting of the Board of the Suez Company, he also served on the Congress respecting the Panama Canal, which Mr. de Lesseps was promoting at that time, and he met the leading European and United States engineers, who were assembled to discuss the feasibility of uniting the Atlantic and Pacific Oceans by a canal. Two schemes were proposed; one, by de Lesseps, to make a sea-level canal at the Isthmus of Panama; the second, favoured by the United States engineers, to construct a canal, rising by locks to the Lake of Nicaragua, and descending to the Pacific Ocean. The majority of the Congress decided in favour of the sea-level canal, and de Lesseps proceeded to form a Company for the purpose of raising the necessary funds. He pressed Sir John Stokes to become a director of the Panama Company, but the latter, very wisely, declined to have anything to do with the undertaking.

In the same year Stokes was appointed member of another International Commission which was convened to examine the works at the port of Alexandria and to decide on the dues to be levied on shipping, so as to furnish a fair revenue on the outlay and the harbour works, without overburdening the trade. The Commission took information on the subject of shipping dues at the principal ports of the Mediterranean, and sent in their report in April, 1880. Soon afterwards, Stokes was appointed on the Royal Commission on Tonnage Measurement, in consequence of the knowledge he had gained on the other Commissions, already mentioned.

In 1880 he was a member of the War Office Committee which considered the question of the promotion of Royal Artillery and Royal Engineer officers, a subject of great importance in the interests of the two corps. This he called the "committee for committing suicide," for the necessity of introducing the early compulsory retirement of senior officers, in order to ensure a sufficient flow of promotion for the juniors, seemed likely to lead to his own retirement at an early date.

Sir John Stokes was selected for the appointment of Deputy Adjutant-General, Royal Engineers, in April, 1881; and, in the following year, was made a member of the Committee to consider and report on the military aspects of the proposed Channel tunnel between England and France. After receiving the report of this Committee, the Government decided not to give any encouragement to the project.

The Egyptian troubles of 1882 gave Stokes much difficult work in his position of Director of the Suez Canal Company, as his French colleagues were very irate over the question of British policy in Egypt, and treated, in anything but a friendly spirit, the many questions that arose in consequence of the military occupation of the canal; but, with his usual tact and patience, he managed to overcome all the difficulties, and received the thanks of the Government for his action in the matter.

In March, 1885, Stokes was promoted temporary major-general, which enabled him to continue to hold his appointment to the following May. He retired from the Army in January, 1887, with the honorary rank of lieutenant-general.

Although his military career had come to an end, he continued to hold his important appointment under the Foreign Office in connection with the Suez Canal Company, of which he was made a vice-president in 1887, in recognition of the services which he had rendered to it for so many years; and he took an active part in the arrangements for the enlargement of the canal, which had become necessary in consequence of the greatly increased traffic passing through it.

In 1891, Lord Rosebery requested Stokes to go to Egypt to welcome the young Khedive Abbas on his first visit to the Suez Canal, and, at considerable personal inconvenience, as he was very unwell at the time, he undertook the mission and made it a complete success. On returning to England, he was congratulated by Lord Rosebery on the manner in which he had carried out the duty.

In his latter years Sir John Stokes resided at Ewell, in Surrey, where he died suddenly on November 17th, 1902, after a long and distinguished career, which reflected credit on the Corps of Royal Engineers, in whatever country, and in whatever capacity he was employed.

## LIEUT.-GENERAL SIR A. CLARKE, G.C.M.G., C.B., C.I.E.

Andrew Clarke, who was the son of Lieut.-Colonel Andrew Clarke, K.H., 46th Regiment, Governor of Western Australia, was born at Southsea on July 27th, 1824, and was commissioned as second lieutenant in the Royal Engineers on June 19th, 1844. After completing his course of instruction at Chatham, he was stationed for a year in Ireland.

In 1845 his father was appointed Governor of Western Australia, and, shortly after his arrival at Perth, wrote to Clarke, suggesting that he should apply for employment in one of the Australian colonies. Acting on this suggestion, Clarke applied for service in the colony. In July, 1846, he was given command of a detachment of sappers, ordered to Van Diemen's Land, and embarked in the following October in the *Windermere*, the vessel that was to take out the Governor, Capt. Denison, R.E., afterwards Lieut.-General Sir W. Denison, K.C.B.

The work upon which he was employed in Van Diemen's Land (now called Tasmania) was superintending the works carried out by convict labour, surveying the country round Hobart Town, and designing wharf accommodation for the port. In 1848, after the conclusion of the first Maori War, Sir George Guy, the Governor of New Zealand, decided to make a system of roads in the Maori districts, in order to improve the means of communication. The work was carried out by officers of the Royal Engineers, and as more of these were required, the Governor applied to the Governor of Tasmania for the loan of the services of Lieut. Clarke, which was readily granted, and he at once proceeded to New Zealand, and was employed on road-making and also on political work among the Maoris.

In 1849, Clarke returned to Tasmania, to take up the appointment of Private Secretary to Sir W. Denison, which he held until May, 1853, when he was selected for the important position of Surveyor-General of the colony of Victoria. The years which

he had spent under so able a master as Denison were of the greatest value to Clarke in his subsequent career, and it was with reluctance that he severed his official connection with his revered chief.

The fact that Clarke, who was still a subaltern, should have been chosen for so responsible a post gave rise to some comment, and was explained by Mr. Latrobe, then Governor of Victoria, in a despatch to the Duke of Newcastle in the following words :—

“ In making selection of Lieut. Clarke to fill a post, which is felt on all hands to be of the greatest public importance in the present circumstances of this colony, I have had in view the expediency of obtaining the command of qualities, which cannot be looked for in men who have grown grey in the service, and become more or less attached to old prejudices and usages, however respectable, capable, or experienced in the ordinary discharge of professional duty. I have judged it proper to seek the assistance of one, whose age, powers, and character would favour his discharge of the more active as well as the more passive duties of the office, and whose powers might be hoped to expand with the growing necessities and capabilities of the colony. In this view, and in making the selection of Mr. Clarke, I have been guided by the opinion and ready testimony of Lieut.-Governor Sir W. Denison, who, I am aware, has made no slight personal sacrifice in forwarding my wishes.”

In addition to his duties as Surveyor-General, Lieut. Clarke was nominated as a member of the Legislative Council, and, in this capacity, was engaged upon the preparation of the Bill for the Constitution of the Colony of Victoria, by which it was to be given representative self government. In his speech on the second reading of the Bill he foreshadowed the time when all the colonies of Australia would be united into one Commonwealth. In February, 1854, he was promoted captain, and in the autumn of the same year he introduced into the Legislative Council, a Bill termed “ The Additional Municipal Authorities Bill,” the object of which was to enable the inhabitants of populous localities, to form themselves, under certain conditions, into municipalities. The Act was passed, and is still known as “ Clarke’s Act.”



Under the new constitution for Victoria, which received the Royal Assent in July, 1855, Clarke ceased to be a nominated member of the Legislative Council, and presented himself as a candidate for the constituency of South Melbourne. Immediately after his election, he was selected by Mr. Harries, the Prime Minister, as a member of his Cabinet, and was reappointed Surveyor-General and Commissioner of Lands. In the same Cabinet, Captain C. Pasley, R.E., was Commissioner of Public Works; and Mr. Hugh Childers, afterwards Secretary of State for War, was Commissioner of Customs.

One of the subjects, to which Clarke devoted much attention, was the establishment of railways in the colony, and, in December, 1857, he brought forward resolutions in the Parliament, proposing to construct 185 miles of line at once, and these resolutions were carried in the following year. In the same session, Mr. Haines was defeated on the question of universal suffrage, in consequence of an amendment proposed by Captain Clarke, and sent in his resignation to the Governor, Sir Henry Barkly, who asked the latter to form a new administration; as, however, the Governor declined to dissolve parliament, Clarke refused to accept the responsibility, and, shortly afterwards, resigned his seat in the House of Representatives and returned to England in January, 1859.

At this time Clarke was very anxious to be nominated as Governor of the new colony of Queensland, which was about to be separated from New South Wales, and was strongly recommended for the position by Sir John Burgoyne. His application however was not successful as the appointment was given to Sir George Bowen, and Clarke was ordered to take up the post of Commanding Royal Engineer at Colchester. But he did not cease to take an interest in the colony of Victoria, and was employed on the purchase of war material for the defences, a duty which engaged his attention for some years. In 1862, Clarke was transferred to the Birmingham District, and, in the following year, was ordered to the Gold Coast, where the British Settlement was threatened by the King of Ashanti, and additional barracks were required.

In April, 1864, Mr. Childers, who had been Clarke's colleague

in Melbourne, and who was Agent-General in London for Victoria, was appointed to the Board of Admiralty, and, at his request, Clarke took up the position of Agent-General as a temporary measure until the arrival of a successor to Mr. Childers. In August of the same year, he was selected for the post of Director of Engineering and Architectural Works at the Admiralty, an appointment which he held for nine years, a period during which a very large amount of important work was carried out in the improvement and enlargement of the naval arsenals at home and colonial stations.

In 1869 Capt. Clarke was appointed a member of the Royal Commission of Enquiry into the accommodation required for the different public departments, and he submitted a scheme, which he had prepared to meet the requirements of the case. His proposals were embodied in the Report of the Commission, but were not adopted. Clarke was promoted lieutenant-colonel in July, 1867, and, in the same year, a suggestion was made that he should stand as Liberal candidate for the constituency of Chester, but, as this would have necessitated his leaving the Admiralty, the proposal fell through. The period of five years, for which he had been appointed, came to an end in 1869, but in consequence of the important nature of his services, he was reappointed for a further term of five years, and was created C.B. in recognition of his good work. In 1873, he received the further honour of being nominated as K.C.M.G.

As his time of service at the Admiralty was drawing to a close, Sir A. Clarke expressed a desire to be considered for a Colonial Governorship, and, in May, 1873, was appointed by Lord Kimberley, then Secretary of State for the Colonies, as Governor of the Straits Settlements, where he took up his duties in the following November. One of the important questions which engaged his attention soon after arriving at Singapore, was the position of affairs in the Malay Native states of Perak, Selangor, etc., which were then in an unsatisfactory condition, and he was able to do a great deal towards placing matters upon an improved footing. But he did not remain long at Singapore; as, in 1874, he was selected by Lord Salisbury to be member of the Council of the Viceroy of India, with

charge of the Public Works Department, and arrived at Calcutta in June, 1875. Lord Northbrook was then Governor-General, and was succeeded by Lord Lytton in the following year.

The time which Clarke spent in India was one of incessant labour for him, especially with reference to the question of railway communication. He was most anxious to have a line made through the Bolan Pass to Quetta, and pressed the matter again and again upon the Viceroy, but it was not until after the murder of Sir Louis Cavagnari, that authority was given to commence the railway.

Sir A. Clarke's service in India terminated in June, 1880, and, on April 1st, 1881, he was appointed Commandant of the School of Military Engineering at Chatham, in succession to Sir John Stokes, who had been transferred to the War Office. But this position he held only for a short time, as, in June, 1882, he was selected for the important post of Inspector-General of Fortifications, an unusual choice, as he only had the rank of colonel, and the position had always been filled by a general officer. It was in consequence of the great experience in public works which Clarke had had during his professional career that Mr. Childers, then Secretary of State for War, chose him for the high position, especially having regard to the large expenditure upon fortifications at home and abroad, which was, at that time, about to be taken in hand. He was given the temporary rank of major-general until promoted to the establishment of general officer in 1884.

Just at the time when Clarke became Inspector-General, the Royal Commission on the "Defences of British Possessions and Commerce Abroad" presented its report, and almost at the same time, the report of Lord Morley's Committee on the "Defence of Mercantile Ports of the United Kingdom" was submitted. The question of the improvement of the military ports of the United Kingdom was also under consideration, so that the amount of work which had to be dealt with in the Inspector-General's Office was very large. One subject in which he took a keen interest was Submarine-Mining Defence, and he established the system by which the services of local

Volunteer Engineer Corps were utilized for working the submarine mines at the important mercantile ports in the United Kingdom, a system, that has since, unfortunately, been done away with.

Besides his own immediate duties, Clarke was consulted by the Government on many important questions, such as the Suez Canal, the expedition to the Sudan in 1884, the Bechuana-land expedition in the same year, and matters connected with the Australasian colonies, and the New Hebrides. In 1884, when the late General Gordon was sent on his last mission to Khartum, Clarke did his best to press the immediate construction of a railway from Suakin to Berber, in order to enable the relief expedition to proceed as rapidly as possible to the assistance of Gordon. But his proposals were unheeded until too late, and, when, after the fall of Khartum, it was decided to commence the railway, the manner in which the work was undertaken was not in accordance with his suggestions and ended in failure.

In June, 1886, Sir A. Clarke, having received an intimation that he would shortly be retired under the age clause of the Royal Warrant, resigned his appointment as Inspector-General of Fortifications, and stood as Liberal candidate for the Borough of Chatham, but, as at two elections he failed to capture the seat from the Conservative member, he decided to give up the idea of entering Parliament. In 1891, he was asked to act as Agent-General in London for the colony of Victoria, and, after holding this position at intervals until April, 1894, was definitely appointed to the post in 1897. The most important question with which he had to deal while occupying the position was that of the confederation of the Australian colonies, which was authorized by Act of Parliament in 1900.

Sir A. Clarke was appointed Colonel Commandant of the Royal Engineers in 1902, and died on March 29th of the same year. His memoirs were written by Colonel R. Vetch, C.B., and published by Mr. John Murray, 1905.

## GENERAL J. T. WALKER, C.B., F.R.S.

James Thomas Walker, who was the son of J. Walker, Esq., of the Madras Civil Service, was born in 1826, and was commissioned as second lieutenant in the Bombay Engineers on December 9th, 1844. After going through a course of instruction at Chatham, he embarked for India and landed at Bombay in May, 1846. He served in Scindia as Executive Engineer until October, 1848, when he was appointed Assistant Field Engineer with the Bombay column under General Sir H. Dundas, which was sent to take part in the Second Punjab Campaign of 1848-9.

Lieut. Walker served throughout the whole of the operations of the siege of Multan, and commanded a party of sappers at the attack on the Mohan Gate. As the detachment advanced, a powder magazine exploded, killing 11 and wounding 33 of his men. At great personal risk, Walker dashed through the blazing woodwork and falling walls, and succeeded in rescuing three of the detachment. After the capture of Multan, he commanded a party of sappers at the Battle of Gujerat, and took part in the subsequent operations of the campaign, for which he received the medal with two clasps.

From 1849 to 1853, Walker was employed on a military reconnaissance of the Trans-Indus Frontier from Peshawar to Dera Ismail Khan, a work of considerable difficulty and danger, owing to the opposition of the independent hillmen, who frequently fired at him, and whom he had to circumvent while taking his observations. During this period he also served with distinction on some of the expeditions against the hill tribes on the frontier, and was mentioned in despatches for the services he performed. In May, 1852, Sir Colin Campbell wrote: "The Brigadier desires to return his thanks to Lieut. Walker for the able assistance he has voluntarily afforded towards the completion of the bridge across the Swat River. The materials, ropes, etc., were created on the spot, and when

all things had appeared to be wanting except the boats, the personal resources of Lieut. Walker were found amply sufficient to meet every demand on his service and ingenuity."

The Trans-Indus Survey covered an area of 8,760 square miles, and Walker managed, in addition, to obtain a fair amount of geographical information concerning the country which lay beyond the British borders. On the conclusion of the work, the Official Secretary recorded that in "the opinion of the Government of India, the conduct of Lieut. Walker indicated the possession of cool judgment and ready resource, united with great intrepidity, energy, and professional ability. He was also thanked personally for his services on the frontier by the Governor-General in Council.

After the completion of his work in the Trans-Indus territory, Walker was appointed an assistant on the Great Trigonometrical Survey of India, in 1853, and remained in this department for the rest of his service.

On the outbreak of the Indian Mutiny in 1857, he was appointed aide-de-camp to Sir Neville Chamberlain who commanded a column at the siege of Delhi. On July 14th, the enemy made a sortie and attacked the piquets, when Walker was shot through the thigh by a rebel firing from a loophole, and, at the same time, Sir Neville Chamberlain was wounded. Walker had recovered from his wound when Delhi was attacked, and had been told off for the duty of blowing in the Cashmere Gate, but was incapacitated by a severe attack of cholera. On the close of the campaign he was given a brevet majority for his services, and for his wound he received £100 as blood money.

After the Mutiny had been suppressed Walker returned to his duties on the Trigonometrical Survey and devoted himself to the work with the greatest energy. On the completion of the Jogi Tila meridional series he received the following high acknowledgment of his services from the Surveyor-General:—"The brilliant success which invariably attends your undertaking is a proof of the high professional qualification, the foresight, and judgment which you bring to bear on the important geodetical work on which you are engaged."

In 1860, Major Walker served, again with distinction, in the Mahsud Waziri Expedition, and, in 1861, he succeeded Sir Andrew Waugh as Superintendent of the Great Trigonometrical Survey. He was promoted lieutenant-colonel in 1864, and colonel in 1869. In January, 1878, he succeeded to the post of Surveyor-General of India.

It is difficult, in a brief notice like the present, to do justice to the immense amount of work performed by Walker throughout his service, and to the high state of efficiency to which he brought the Survey Department. The high qualifications and great abilities, which had ensured his success as a young man, found greater scope as he advanced in the department. Thoroughness was the leading note in his character, and he had so mastered the details of every branch of surveying that all under him felt that he could advise them in any special work they might be called on to perform. His early experiences on the North-West Frontier enabled him fully to understand the difficulties and limitations of exploration work, and the knowledge that he could appreciate these difficulties was a comfort and encouragement to those employed on such work, and his approval was never withheld from those who strove to do their duty to the best of their ability.

In addition to the multifarious duties which fell to his lot, first as Superintendent of the Great Trigonometrical Survey, and afterwards as Surveyor-General, he undertook a gigantic work, *The Account of the Operations of the Great Trigonometrical Survey of India*, to consist of 20 volumes. Of these he published the first nine, which contain his introductory history of the early operations of the survey, his account of the standards of measure and base lines, and of the triangulation and pendulum observations. Besides this, numerous valuable maps were published under his supervision, and *Walker's Map of Turkestan* was known and recognized as an authority throughout the geographical world.

The principal triangulation of British India was completed under General Walker. Of it the Duke of Argyll observed, in his despatch of 1871:—"This great survey, as a record of accurate geodetical measurements, and of arduous services well

performed, will yield to none, that has hitherto been published by any European nation, either in interest or in scientific importance, while the final harmonizing of the results necessitated the most elaborate calculations that have ever been undertaken for the reduction of triangulation."

Walker was promoted major-general in 1878, lieutenant-general in 1881, and general in 1884. He retired from the Service in February, 1883. But, with him, retirement did not mean cessation from work. He had been a Fellow of the Royal Geographical Society for many years, and contributed some valuable papers to the journals; on his return from India he was elected a member of the Council, on which he served for ten years, and was one of its most active and most valued labourers in the field of geography. He was elected a Fellow of the Royal Society in recognition of his important work in India, and was a member of the Russian and Paris Geographical Societies. He kept up a large correspondence with geodesists of all nations, and his advice was constantly sought. In a letter which he received shortly before his death from Sir David Gill, the Astronomer Royal at the Cape of Good Hope, to whom he had sent a copy of his paper on *India's Contributions to Geodesy*, Sir David wrote: "There are few men who can esteem it more highly than I do. If you will allow me to say so, I have never seen a summary of such a vast mass of work presented in so clear, neat and complete a manner. Nothing that is essential to know is omitted, and yet it seems impossible to have rendered an account of such a vast mass of detail in so small a space."

General Walker died in London on February 16th, 1896.



## GENERAL SIR EDWARD STANTON, K.C.B., K.C.M.G.

Edward Stanton, who was the son of William H. Stanton, Esq., of Stroud, Gloucestershire, was born on February 19th, 1827, and was commissioned as second lieutenant in the Royal Engineers on December 19th, 1844. After a short period of service in Ireland he was ordered to the Cape of Good Hope in April, 1847, and was stationed, first at East London, and then in Natal, which had become a British Colony in 1843. He was selected for employment on the staff of the force, which was sent against Moshesh, an important chief of the Basutos, in November, 1852, and, on his arrival at Grahamstown, was attached to the Quartermaster-General's department. The column, which was commanded by General Sir George Cathcart, was composed of one cavalry and two infantry brigades, and Stanton was posted to the former. After crossing the Orange and Caledon Rivers, the force marched up the right bank of the latter to Plattberg which was about 25 miles from Thaba Bosigo, the stronghold of Moshesh, and Stanton was directed to find a suitable place for the troops to cross the Caledon. The Basuto chief was summoned to restore all the cattle that had been stolen, and, as he refused to comply with the order, Cathcart advanced, and, after some severe fighting, during which a large number of cattle were captured, the Basutos tendered their submission. In Sir George Cathcart's despatch describing the action, Lieut. Stanton's name was honourably mentioned.

When Stanton returned to England at the end of 1853, war with Russia was imminent, and he was ordered to Woolwich to assist in the preparation of engineer stores for the approaching campaign. He was among the first of the Royal Engineers who were selected for service in the East, and arrived at Constantinople in March, 1854, when he was sent in H.M.S. *Sampson* to reconnoitre the southern and eastern coasts of the Black Sea. On his return to Constantinople he was transferred to H.M.S. *Agamemnon*, and was present at the bombardment of

Odessa by the British Fleet under Admiral Sir E. Lyons on April 22nd. The fleet next proceeded to blockade the Russian coast from the Dnieper round by the south of the Crimea to the shores of Circassia and Mingrelia, and Stanton landed at Soukkum Kaleh in order to get into communication with some of the native chiefs, as it was thought that their hatred of the Russian Government might be utilized with advantage by the allies. But the attempt was not successful, as the tribes were afraid of the consequences to themselves if Russia was victorious, and Stanton returned in the *Agamemnon* to the Crimea, where he arrived in time to land with the British Army at Kalamita Bay on September 14th, and to join the headquarters of the Royal Engineers under Sir John Burgoyne. He was present at the Battle of the Alma and accompanied the army in its flank march round Sebastopol to Balaklava Bay, which had been selected as the base for the British operations during the great siege. He was employed in strengthening the defences round Balaklava, and was then sent to take part in preparing the works of attack on Sebastopol. The first operation in which he assisted was the erection of a battery for a Lancaster gun, a new weapon from which much was expected, that was intended to fire at a range of 3,600 yards against the Malakoff Hill, and he was also employed in the construction of the first parallel of the British right attack, and in building a battery for naval guns, known as the 21-gun battery. During the severe winter of 1854, trench duties for the officers and men of the Royal Engineers were very heavy and Stanton had his full share of them; he had the satisfaction of being given a brevet majority in December, which showed that his good work was known and appreciated.

For eight months he worked in the trenches, and, early in June, 1855, was selected to accompany the expedition to the Sea of Azov, when the towns of Kertch and Yenikale were captured by the Allied Forces, and the Russian lines of communication with Taganrog was intercepted. After the capture of Yenikale, he was employed in putting that place in a state of defence, and did not return to Balaklava until after the fall of Sebastopol. On the conclusion of the war he was made brevet lieutenant.

colonel, and received the British, French, Turkish, and Sardinian medals, besides the Legion of Honour, and the Turkish Order of the Medjidieh.

After taking a much-needed leave to England, Stanton was again ordered to the East, having been appointed British representative on the International Commission for the delimitation of the new boundary between Russia and Turkey in Bessarabia; two other Engineer officers, Lieut. E. Renouard James (the late Major-General E. R. James) and Lieut. C. G. Gordon (the late Major-General C. G. Gordon, C.B.), were nominated as his assistants. Under the Treaty of Paris it was arranged that the frontier was to be laid out so as to deprive Russia of her control over the navigation of the Danube, and of the Fortress Ismail, on the north bank of the Kilia branch of the river, the new line passing through Bessarabia from the Pruth to the Black Sea. There were several difficult questions to settle with regard to the frontier, and Stanton showed great diplomatic skill in their adjustment, while a large part of the survey work was carried out by his two assistants. The Commission completed their labours in May, 1857, when Stanton returned to England and had the satisfaction of receiving the C.B.

In the following autumn he was sent by the Foreign Office to the Republic of Honduras to report upon a scheme for a line of railway to connect the Atlantic and Pacific Oceans, the working of which the British Government had been asked to guarantee. The line was intended to run from Puerto Cortez to Fonseca Gulf on the Pacific, but, though commenced at the two extremities, it has never been completed. After the conclusion of his work in Honduras, Stanton was selected for the position of Assistant Adjutant-General of the Royal Engineers in London, which appointment he held for two years, and then, in 1860, was chosen by the Foreign Office for the important post of Consul-General at Warsaw, in succession to another Engineer officer, Sir Lintorn Simmons. It was a very troubled time in Poland, as an insurrection of the Poles was suppressed with great severity by the Russian Government and Warsaw was frequently in a state of siege. Although the sympathies of many people in England were with the Poles, the British

Government decided not to interfere. With his usual diplomatic skill Stanton appears to have kept on good terms with both parties, though it must have been exceedingly difficult.

After remaining for more than four years in Warsaw, Stanton was selected in 1865 for the appointment of British Agent and Consul-General in Egypt, and the fact that he was chosen for this difficult post is a proof of the high opinion that the Foreign Office had of his abilities. The Suez Canal, which was to revolutionize the trade routes of the world was approaching completion, and the Khedive Ismail was commencing the career of extravagance, which led to his downfall, and, later, to the occupation of the country by the British. No better man than Stanton could have been sent at such a period and, during the period of his service in Egypt, he maintained British interests in a remarkable way, while, at the same time, keeping on the best of terms with the Khedive and the Egyptian Ministers. The admirable manner in which he carried to a successful conclusion the difficult negotiations in connection with the purchase of the Khedive's financial interest in the Suez Canal Company can never be forgotten and there can be no doubt that England owes much to Stanton for her present position in Egypt. In 1874, Colonel C. G. Gordon, R.E., who had acted as his assistant on the Bessarabian Boundary Commission was appointed by the Khedive as Governor of the Equatorial Provinces in the Sudan, and Stanton, who took much interest in the mission, did all he could to assist Gordon in commencing his difficult work in opening up the districts of the Upper Nile.

While stationed in Egypt Stanton was promoted to the rank of major-general at the early age of forty-one, and, in 1876, was appointed British Minister in Bavaria, a post which he held until his retirement from official life in 1882. He was created K.C.M.G. the same year, and was given the further distinction of K.C.B. in 1905. After leaving the diplomatic service he resided in Gloucestershire, his native county, and died on June 24th, 1907, deeply regretted by all who knew him.

## GENERAL SIR LOTHIAN NICHOLSON, K.C.B.

Lothian Nicholson, the son of G. T. Nicholson, Esq., of Waverley Abbey, Surrey, was born on January 19th, 1827, and was commissioned as second lieutenant in the Royal Engineers on August 6th, 1846. Shortly after completing his course of instruction at Chatham, he was ordered to Nova Scotia, and, on his return to England, was stationed at Portsmouth, where he was serving at the time the Crimean War commenced. He was promoted second captain in 1855, and, in the summer of that year, embarked for the Crimea, where he landed some weeks before the fall of Sebastopol, and was afterwards employed, as Commanding Royal Engineer, on the successful expedition against Kinburn. During the winter of 1855 he had charge of the demolition of the docks of Sebastopol, a difficult and dangerous task. The execution of the work was left entirely in his hands, and his energy was conspicuous everywhere, especially where loading mines in watery shafts and galleries had to be done. It was in an operation of this kind that, on one occasion, he risked his life to save a sapper from drowning. For his services in the East, Nicholson, who had been twice mentioned in despatches, was given a brevet majority and the Order of the Medjidieh, besides the British and Turkish war medals.

After returning from the Crimea Nicholson was stationed at Aldershot, and employed on the construction of the camp until the summer of 1857, when, on the outbreak of the Indian Mutiny, it was decided to send four companies of Royal Engineers, as part of the reinforcements for service in India, and Major Nicholson was ordered to Chatham to take command of one of these, the 4th Company. He embarked in October with the 4th and 11th Companies and proceeded to Alexandria, where the men were dressed in civilian clothes, and travelled as ordinary passengers to Cairo, and thence in vans across the desert to Suez, where vessels were ready to take them down the Red Sea. The 4th Company, Nicholson's, went on to

Calcutta, while the 11th, under Capt. Cumberland, landed at Bombay.

Major Nicholson was attached to Lord Clyde's force and greatly distinguished himself throughout the Indian Campaign. He was present at the Siege of Lucknow, at Futtehgurh, the Alumbagh, Barri, and in the operations in the province of Oude. His name was mentioned in despatches by Lord Clyde, Sir James Outram and Sir Hope Grant, and, on the conclusion of the war, he was made a brevet lieut.-colonel, and received the C.B. This was rapid advancement for an officer of only twelve years' service.

His first station, after coming home from India, was at Portsmouth, from which he was transferred, in 1861, to fill the appointment of Commanding Royal Engineer of the London District, which he held for five years. He was ordered to Gibraltar in 1866, when he was made brevet colonel. His next appointment was that of Assistant Adjutant-General of Royal Engineers in Ireland, and, in 1872, he became Commanding Royal Engineer at Shorncliffe Camp, where he remained until 1877 when he was promoted major-general at the early age of fifty-one and had to go upon the unemployed list. He was then in the curious position of suffering from too early promotion.

In 1878, General Nicholson was offered and accepted the post of Governor of Jersey, where he was much liked, and respected. Then followed another long period of non-employment, which was very trying to a man of his active temperament. But, in 1886, on the somewhat unexpected retirement of Sir Andrew Clarke from the office of Inspector-General of Fortifications, Nicholson was selected to fill this position.

He took office at a very important juncture. At that time public attention had been drawn to the defective condition of many of the barracks and great camps, and a Parliamentary Committee on the Army Estimates, presided over by the late Lord Randolph Churchill, went thoroughly into the question. General Nicholson was called to give evidence before the Committee, and this he did in the most outspoken and uncompromising manner. He pointed out that the reason why the barracks

were not in a proper condition was because successive Secretaries of State for War would not ask Parliament for sufficient money to keep them in order, and that the Royal Engineers, however willing, could not do what was required without the money to do it. He was asked to produce an estimate of the sum that he considered would be required and submitted a detail, which showed that £8,913,000 could be expended with advantage in order to place the existing barracks and camps at home, and abroad, in a proper condition and in accordance with modern ideas. Nicholson's evidence, and the manner in which he gave it, which was probably unusual before a Parliamentary Committee, had the best possible effect, as the Hon. Edward Stanhope, then Secretary of State for War, decided to ask his colleagues to agree to bring a bill into Parliament, with the view of providing the necessary funds by loan, as the sum required was far too large to include in the Annual Estimates.

This was the origin of the Barrack Loan Act of 1890. But, when the bill was finally brought in, the amount proposed for expenditure was £4,100,000, or only a little more than half of what General Nicholson had pointed out was required. The thanks of the Army are due to Nicholson for having succeeded in bringing the important question to a practical conclusion. Particulars of the works carried out under the Barrack Act have been given in Chapter V., p. 162.

Nicholson had been created a K.C.B. in 1887, the year of the Queen's Jubilee. After holding the position of Inspector-General of Fortifications for five years, he was offered, in 1891, the appointment of Governor of Gibraltar, which he occupied until his death at that station on June 27th, 1893, at the comparatively early age of sixty-six years.

## LIEUT.-GENERAL SIR R. H. SANKEY, K.C.B.

Richard Hiram Sankey, who was the son of Matthew Sankey, Esq., of Bawnmore, co. Cork, was born at Rockwell Castle, co. Tipperary, on March 22nd, 1829, and received his first commission as second lieutenant in the Madras Engineers on December 11th, 1846. On his arrival in India in November, 1848, he was posted to the Madras Sappers at Mercara, and, in 1850, was appointed as Officiating Superintending Engineer of the Nagpore Subsidiary Force. While holding this position he had a severe illness, and was invalided home, not returning to India until 1856, when he was placed in charge of the East Coast Canal, and, in the following year, was ordered to Calcutta, to take up the appointment of Under Secretary of the Public Works Department.

On the outbreak of the Indian Mutiny, Lieut. Sankey was sent to Allahabad in September, 1857, when he was engaged on the construction of defences, and then acted as field engineer with the force commanded by Major-General Windham at Cawnpore, during the investment of that place by the Gwalior rebels under Tantia Toppe in November. After the relief of Cawnpore by Sir Colin Campbell, and the defeat of the rebels, Sankey was ordered to join the Nepaul force, which had been organized by Jung Bahadur to assist the British, and was placed under the orders of Brigadier-General Macgregor, the Commissioner for the Governor-General. As there were only two Engineer officers with the force, Lieuts. Sankey and Garnault, the work was arduous, as they had to organize an engineer park with scanty materials in a hostile country, and some rivers of considerable size had to be bridged. In February, 1858, Sankey built the bridge of boats, more than 300 yards in length, across the Ghaghra at Phulpore, over which the Nepaul Army marched to join Sir Colin Campbell at the Siege of Lucknow. There was some fighting during the advance, and, at the attack on the fort at Jumalpore, which was strongly held



by the rebels, Sankey distinguished himself by the manner in which he led the assault upon the breach. In his despatch to the Government, General Macgregor wrote : " The conspicuous gallantry of Lieut. Sankey was the admiration of every one ; it was by his advice that the gun was brought up which breached the wall, and he was the first man in the fort."

General Macgregor recommended Sankey for the Victoria Cross, and Lord Canning, the Governor-General, strongly supported the recommendation, and forwarded it to England, but this was regarded as an informal way of making the application, and it was referred back to India for the opinion of the Commander-in-Chief, who, in his turn, sent it for the consideration of a Committee, which reported that, " while considering the action a gallant one, yet from the circumstance of Major Sankey having been made a brevet major while a subaltern, they could not support it." As a matter of fact, Sankey was made a brevet major on July 20th, 1858, but, when it was discovered that he was *only* a lieutenant, the date was changed to August 28th, the day after he had been promoted captain in the ordinary course.

After the capture of Jumalpoore the Nepaul Army crossed the river Gumti at Sultanpore, across which Lieut. Sankey built a bridge, and received the thanks of the Government for the able manner in which he had carried out the work. The Nepaulese reached Lucknow on March 5th, 1858, and, joining the army under Sir Colin Campbell, which was engaged upon the siege, were employed on the left flank of the main attack, and rendered excellent service in the capture of the city. Soon after Lucknow had been taken, Sankey was attacked by a severe illness, and was incapacitated from further service during the campaign.

In 1859 Major Sankey was appointed Executive Engineer and Superintendent of the Convict Gaol at Moulmein, Burmah, and, in 1861, Assistant to the Chief Engineer at Mysore, succeeding to the post of Chief Engineer of that province in 1864, with which was joined the appointment of Secretary to the Chief Commissioner. He had charge of the Public Works in Mysore for thirteen years, and did much to extend the irrigation

system, and, in many ways, to improve the condition of the country. In 1869 he was promoted lieutenant-colonel, and, shortly afterwards, was sent to Australia to report upon the best method of distributing water to the gold mines in the colony of Victoria.

Sankey was promoted colonel in 1875, and, two years later, was ordered to Simla, to take up the appointment of Under-Secretary to the Government of India. In 1878, when war with Afghanistan was expected, he was selected as Commanding Royal Engineer of the troops, which were concentrated at Multan under Lieut.-General D. Stewart to form the 1st Division of the Kandahar Field Force. The division crossed the Indus at Sukkur on November 18th, and moved by the Bolan Pass to Quetta, in support of the 2nd division, commanded by Major-General M. A. S. Biddulph, which was advancing by the Khojak Pass on Kandahar. As it was considered desirable that the two divisions should march by different roads, Sankey thoroughly reconnoitred the mountains and recommended that the 1st Division should move by the Khwaja Pass, which up to that time, had been little known. He went ahead with the advance guard and was present at the cavalry action near Takht-i-pul, when the Afghans were defeated and retired to Kandahar. Shortly afterwards this city surrendered to Sir D. Stewart, who continued his advance as far as Khelat-i-Ghilzai, the furthest point reached by the 1st Division, as the flight of the Amir, Shere Ali, from Cabul, brought the war to a conclusion. For his services in this campaign, Colonel Sankey was made a Companion of the Bath.

On returning to Kandahar he received the news that he had been appointed Chief Engineer and Secretary to Government for the Public Works Department in Madras, a position which he held until 1883, when he was promoted major-general, and retired from the Service in the following year, with the honorary rank of lieutenant-general. But his work under Government did not come to an end, as, immediately after his return to England, he was selected for the position of Chairman of the Board of Public Works in Ireland, an appointment which had previously been held by two other officers of the Royal Engineers,

Field Marshal Sir J. Burgoyne, G.C.B., and Colonel Sir J. G. McKerlie, K.C.B. The duties of the Irish Board of Works have always been of an important character since it was established in 1837, as it had charge of all Government buildings in Ireland, of the systems of canal and river navigation, and of the Royal harbours; duties which were continually increased by new Acts of Parliament, such as the Land Act of 1881, and the Tramways Act of 1882. It was therefore no light task that Sankey had undertaken and he carried it out in a manner worthy of the highest praise, during the twelve years he held the appointment. For his eminent services he was created K.C.B. in 1892. After leaving Ireland in 1896, he resided in London until his death at the age of seventy-nine on November 11th, 1908.

MAJOR-GENERAL SIR H. C. ELPHINSTONE, V.C., K.C.B., C.M.G.

Howard Crawford Elphinstone, who was the son of Capt. A. F. Elphinstone, R.N., was born at Cumenhoff, near Riga, in Russia, and was commissioned as second lieutenant in the Royal Engineers on December 18th, 1847. After going through the usual course of instruction at Chatham, Elphinstone was stationed in the Scottish District, and was then selected for employment on the Ordnance Survey.

But the time he spent in that department was short, as, on the outbreak of the Crimean War, he was ordered to the East, and arrived at Balaklava on September 29th, and was posted to the right attack on Sebastopol under Captain Gordon (the late Sir W. Gordon). Here he had his full share of the hard work which devolved upon the Royal Engineers during the severe winter of 1854-5, and, in the following spring, was attached to the division commanded by General Sir Colin Campbell, and was employed on strengthening the lines of Balaklava by throwing up additional redoubts, batteries, etc., to resist a possible attack by the Russians.

At the assault on the Quarries on June 7th, 1855, Elphinstone rendered conspicuous service when in charge of working parties, and when the Redan was attacked on June 18th, he displayed such gallantry in bringing in the wounded that he was awarded the Victoria Cross. The description of his action on this occasion was thus recorded in the *London Gazette*:—"For fearless conduct in having, on the night of the unsuccessful attack on the Redan, volunteered to command a party of volunteers, who proceeded to search for and bring back the scaling ladders left behind after the repulse; and, whilst successfully performing this task, of rescuing trophies from the Russians. Captain Elphinstone conducted a persevering search, close to the enemy, for wounded men, twenty of whom he rescued and brought back to the trenches." At the final assault on Sebastopol on September 8th, Elphinstone was severely

wounded and lost an eye. He was twice mentioned in despatches, and received for his service in the Crimea, a brevet majority, the Legion of Honour, the Turkish Order of the Medjidieh, and the war medals. His name was also on the list of those Engineer officers, whose names were specially brought to notice by General Sir Harry Jones, the Commanding Royal Engineer, in his report of September 20th, 1855.

On Elphinstone's return to England from the Crimea, he was employed in the Topographical Depôt at the War Office, on the compilation of the official *Journal of the Operations, conducted by the Corps of Royal Engineers from the Invasion of the Crimea to the close of the Winter Campaign of 1854-5*. After the conclusion of this task he was sent to Edinburgh for duty.

In 1858 the Queen honoured him by selecting him to supervise the education of Prince Arthur, now Duke of Connaught. Every step taken by the Queen's command with reference to His Royal Highness's military career, was regulated, under Elphinstone's care, with the object of rendering the young Prince familiar with the four arms of the Service. Elphinstone accompanied His Royal Highness when he went through a course of instruction at the Royal Military Academy as a cadet, and afterwards joined at Chatham as a lieutenant in the Royal Engineers. Then followed a period spent with the Royal Artillery, the 7th Hussars, and the Rifle Brigade, and, after the military education of the Prince had been completed, Elphinstone went with him on his many travels, to India, Canada, the Mediterranean, Palestine, and other countries. When the Prince came of age, Elphinstone was appointed Treasurer and Controller of His Household, and held the office until his death.

But, during his employment at Court, he did not lose touch with his own Corps. He commanded the Royal Engineer Troops at Aldershot from August, 1873, until March, 1877, and the Troops and Companies from the latter date to December, 1881; and he held the appointment of Commanding Royal Engineer at Aldershot from 1882 to 1886.

In 1865, Colonel Elphinstone was given the C.B. (civil division), and in 1870, the C.M.G. In 1877 he was created a K.C.B., and,

in 1877, was appointed Aide-de-Camp to the Queen. He acted as Military Attaché at Berlin in 1884-5.

He was promoted major-general in 1887, and was selected for the command of the Western District. But he had not held this appointment long before he lost his life by an unfortunate accident. He had started with his family on March 8th, 1890, for a month's holiday in Teneriffe, and, shortly after leaving England, during a heavy swell, he lost his footing on deck and fell overboard. A lifebuoy was thrown over, and the vessel was stopped as quickly as possible, and a long search made; but without effect, as he was never seen again.

In the *Court Circular* of March 14th, 1890, it was stated that :—" Her Majesty received with profound grief the terrible news of the untimely death of Sir Howard Elphinstone. Sir Howard enjoyed Her Majesty's entire confidence, esteem, and friendship for 31 years. He had been selected by the Prince Consort to be governor to His Royal Highness the Duke of Connaught when he was only eight and a-half years old. The Queen, and still more the Duke of Connaught, have lost a dear, valued, and most devoted friend, to whom the latter could always turn for wise advice and counsel. The lamented General, who was a very distinguished officer, and a very accomplished man, visited the Queen at Windsor Castle on the 6th, and took leave of Her Majesty on the morning of the 7th, having told her that he would be back in England in four weeks. All the Royal Family unite with the Queen in deeply deploring Sir Howard Elphinstone's loss, as he was greatly respected and beloved by all of them. The deepest sympathy is felt for Lady Elphinstone."

## GENERAL SIR W. O. LENNOX, V.C., K.C.B.

Wilbraham Oates Lennox, who was the son of General the Hon. A. F. Lennox, was born on May 4th, 1830, and received his first commission in the Royal Engineers on June 27th, 1848. Soon after leaving Chatham, he was ordered to Ceylon and was stationed there for some years. In 1854 he embarked for the Crimea, where he landed on September 30th, shortly after the Battle of the Alma, and served continuously until the end of the war in June, 1856.

As soon as the Siege of Sebastopol commenced, he was employed on the left attack under Captain Chapman, R.E., who directed the attack. He was put in charge of the engineer park belonging to the left attack, and was present at the Battle of the Inkerman on November 5th. He was also present at the capture of the rifle pits which the Russians had established in front of the second parallel; and, when Lieut. Tryon of the Rifle Brigade (who was killed) had seized these rifle pits, Lieuts. Lennox and Phillips, with a working party, advanced and entrenched themselves in the pits, and resisted all the efforts of the Russians to dislodge them. In recognition of his distinguished gallantry on this occasion, he was awarded the Victoria Cross.

Lennox had his full share of work during the severe winter of 1854-55 and the siege operations of the ensuing year, which finally led to the fall of Sebastopol in September, 1855. After the conclusion of the war he returned to England, and, in 1857, embarked as senior subaltern of the 23rd Company of Royal Engineers, under the command of Captain Clerke, which had been ordered to China to take part in the expected war. But while they were on passage, the Indian Mutiny broke out, and the company was stopped at Singapore and sent to Calcutta. At the action of Khujwa on the march to Cawnpore, Captain Clerke was severely wounded, and the command of the company devolved on Lennox who distinguished himself in the fight.

The 23rd Company was attached to the column, which advanced under Sir Colin Campbell to the relief of Lucknow, and, on this occasion, Lennox acted as Commanding Royal Engineer, and was of the greatest assistance in the relief of the Residency. The Commander-in-Chief, and the Chief of the Staff, formed the highest opinion of him, and the latter said that "he had never met a young officer so ready to give advice when it was wanted, so willing to accept responsibility, and so brave and energetic in carrying out the work he had to do as Lieut. Lennox." For his services at Lucknow Lennox was mentioned in despatches, and thanked by the Governor-General in Council.

He was then employed with the 23rd Company in the campaign against the Gwalior rebels, who were defeated at Cawnpore on December 6th, 1857, and also commanded the Engineers at the Battle of Khodagunj. Then followed the Siege of Lucknow by Sir Colin Campbell in March, 1858, when Lieut. Lennox acted as assistant to Colonel Harness, the Commanding Royal Engineer. Captain Clerke had rejoined the 23rd Company on recovery from his wounds, but was killed during the siege, and Lennox again took command of the company. He had been promoted to the rank of second captain in 1857, and, in March, 1858, was given a brevet majority for his distinguished services in the Crimea and in India.

Lennox took an active part in the campaign which followed the capture of Lucknow, and was Commanding Royal Engineer with the force under Brigadier-General Walpole. During this campaign he was present at the attack on Fort Roya, the action of Allegunj, the Capture of Bareilly, the action of Dundakera, the Capture of Fort Mudjideah, and the action near Bankee on December 31st, 1858. On the conclusion of the war, he was promoted brevet lieutenant-colonel and awarded the C.B.

After the suppression of the Mutiny, Major Lennox returned to England in 1859, and was stationed at Brighton until April, 1862, when he was selected for the appointment of D.A.Q.M.G. at Aldershot. He was chosen in 1865 for the post of Fieldwork Instructor at Chatham, which he held for six years, and then



became Assistant Superintendent of Military Discipline. During the Franco-German War of 1870-71, Lennox, who had been promoted brevet colonel in 1867, was sent by the War Office, as Military Attaché with the German Army, and, in this capacity, was present at the Sieges of Paris, Mezières, Belfort, New Breisach, and Strasburg, where he accumulated much information of great value to Engineer officers.

Leaving Chatham in 1873, Colonel Lennox was stationed at Portsmouth until November, 1876, when he was sent to Turkey as British Military Attaché. It was an exciting time in the Balkan Peninsula. The insurrection in Bulgaria in April was followed by the declaration of war with Turkey by Servia and Montenegro in July, and there were constant conflicts up to the end of October, the results of which were on the whole favourable to the Turks. But the principalities appealed to the Great Powers, and an armistice was arranged on November 1st, which was to be followed by a conference at Constantinople.

Colonel Lennox arrived in Montenegro, shortly after the armistice had been signed, and from thence proceeded to Constantinople to take up his duties as Military Attaché. The International Conference met and deliberated, but their proposals were rejected by Turkey, and, in April, 1877, Russia declared war. The same month Lennox joined the Turkish Army in Bulgaria and remained with it during the continuance of the war. He was present at the bombardment of Nicopoli, and when the Russian Army crossed the Danube at Simmitza, and defeated the Turks under Abd-el-Kerim Pasha. He was also present at the Battles of Karahassan Keui and Katzelevo, when Mohamed Ali Pasha was successful, and at Bejin Verboka where the Turks were defeated and had to fall back on their fortresses.

In November, Suleiman Pasha was appointed to the command of the army of Rumelia, and, when this general withdrew his army from Varna to Constantinople in December, Colonel Lennox returned with him to the capital. An armistice between Russia and Turkey was signed at Adrianople on January 31st, 1878, and the following month Lennox returned to England and rejoined at Portsmouth, where he remained until June,

1878, when he was appointed Commanding Royal Engineer at the Curragh Camp. This position he only held for three years, as, in consequence of his early brevets, his promotion had been so rapid that he became major-general in August, 1881, and was placed on the unemployed list.

Major-General Lennox was ordered to Egypt in August, 1884, to take command of the British Brigade at Alexandria. During the same month, the expedition for the relief of General Gordon at Khartum was decided upon, and, as Alexandria was the base of operations when the troops and stores for the Nile force were landed, an enormous amount of work was thrown upon Lennox and his staff.

He remained at Alexandria until January, 1887, and, in the following April, was appointed to the command of the garrison in Ceylon, but his promotion to the rank of lieutenant-general in February, 1888, brought his command at Ceylon to a close, and he again reverted to the unemployed list. For recognition of his distinguished services he was created K.C.B. on May 30th, 1891.

In January, 1883, Sir W. Lennox was selected for the important post of Director-General of Military Education at the War Office, and held the appointment for two years. He was promoted general in 1893, and died in London on February 7th, 1897.

## LIEUT.-GENERAL J. J. MCLEOD INNES, V.C., C.B.

James John McLeod Innes, who was the son of J. Innes, Esq., Surgeon, Bengal Army, was born on February 5th, 1830, and received his first commission in the Bengal Engineers on December 8th, 1848. Lieut. Innes arrived in India in November, 1850, and was employed in the Public Works Department, on the construction of the Barce Doab Canal, in the Punjab; but, on the annexation of Oude, he was transferred as assistant to the Chief Engineer of that province, and, consequently, served in Oude, throughout the Mutiny Campaign from May, 1857, to April, 1858, and was in Lucknow at the time of the rebel outbreak.

Innes was placed in charge of the Muchee Bhowan, and was ordered to put it in a state of defence, but, after the action at Chinhut, the post had to be evacuated, and the whole British force was concentrated in the Residency. The troops were withdrawn from the Muchee Bhowan, and the fort blown up under the direction of Innes, who then served throughout the defence of the Residency, and specially distinguished himself in the direction of the mining operations. One of the defences was known as Innes's post, and it was unsuccessfully attacked by the enemy on several occasions. After the relief of Lucknow by Havelock, Innes took part in several sorties, and was then placed in charge of the mining operations in the new positions taken up by the relieving force.

On the morning of July 20th, 1857, the officer on the look-out tower of the Residency reported that the enemy was preparing for a vigorous attack. Every man was at his post when a mine was exploded by the rebels in the direction of the Redan battery, leaving an enormous crater. Innes's post bore the brunt of the attack, when the enemy were repulsed and driven off by hand grenades. After this the heavy fire of the rebels reduced the Residency to a wreck. Capt. Anderson's post was knocked down, and Innes's post also fell in. These two were

the most exposed positions in the garrison, and were riddled with round shot. The effect of the ruins, too, was to bring all the shaky buildings to the ground, leaving the garrison only some shattered defences to cling to.

After the relief by General Havelock, the defence was chiefly confined to mining and countermining operations. General Outram wrote on this subject in his despatch dated November 25th, 1858 :—" I am aware of no parallel to our system of mines in modern war. Twenty-one shafts, aggregating 200 ft. in depth, and 3,291 ft. of gallery have been executed. The enemy advanced 20 mines against the palaces and outposts ; of these they exploded three, which cost us loss of life, and two which did us no injury ; seven have been blown in, and out of seven others the enemy has been driven, results of which the Engineer Department may well be proud."

After the second relief of Lucknow, Lieut. Innes was attached to the Jownpore Field Force, under the command of Brigadier-General Franks. This force joined the army under Sir Colin Campbell before Lucknow on March 5th, 1858, after a march of 150 miles. Whilst with it Innes performed the act of gallantry for which he was given the V.C. The incident was thus described by General Franks :—" I have already mentioned his distinguished conduct in the attack on Dhowara." (Innes had been severely wounded whilst endeavouring to burst open the door of a house, in which some mutineers had barricaded themselves). " It is now his due to relate that, at the action of Sultanpore, far in advance of the leading skirmishers, he was the first to secure a gun which the enemy were abandoning. Retiring from this, they rallied round another gun further back, from which the shot would, in another instant, have played through our advancing columns, when Lieut. Innes rode up, unsupported, shot the gunner about to apply the match, and remained undaunted at his post, the mark for a hundred matchlock men sheltered in some adjoining huts, and kept the artillery men at bay until assistance reached him. For this act of gallantry, surpassed by none within my experience, it is my intention to recommend him for the honourable distinction of the V.C."

When the Governor-General, Lord Canning, presented the V.C. to Innes, he said :—" I must add that it is a peculiar pleasure to me to present this cross to an officer of the Bengal Engineers, for I say to you—not as a compliment, but in the words of sober truth—that I do not believe that there has ever existed, in any army, a body of men, who have rendered, individually and collectively, more constant and valuable services to their country than the Engineers of Her Majesty's Indian Forces. Men, all of them of proved ability and highly cultivated intellect, they have been unceasingly called upon in peace, as much as in war, to achieve great tasks for the protection and advancement of India, and they have never been found wanting. That, when summoned to meet an enemy in the field, they can carry their lives in their hands as lightly as any man, your own deeds, and those of many of your brother officers have conclusively proved. It is, in itself, a distinction to belong to such a Corps, and you, Major Innes, have the proud satisfaction to know that, while you have derived honour from being enrolled among the Engineers of the Army of Bengal, you have done all that a gallant soldier can do to repay that honour, in augmenting, by your own acts, the lustre and reputation of your distinguished regiment."

Besides receiving the Victoria Cross Major Innes was given a brevet majority for his good service during the Indian Mutiny.

After the conclusion of the campaign Major Innes was appointed Garrison Engineer of Fort William, Calcutta, and then served in the Public Works Department in the Central Provinces and in the Punjab until 1867. In the following year he was employed on the Commission for investigating the failure of the Bank of Bombay, and, in 1868, commenced the upper section of the Indus Valley Railway. In 1870, he was appointed Accountant-General of the Public Works Department, and held this important position for ten years, after which, in 1881, he was selected for the post of Inspector-General of Military Works, when he had to prepare the designs for the defences of the coasts and of the frontier, and superintended most of the new internal defences of the country.

Innes was promoted lieutenant-colonel in 1869, colonel in 1877,

and major-general in 1885. He retired from the Army with the honorary rank of lieut.-general in March, 1886. In 1907, as one of the distinguished veterans of the Indian Mutiny he was made a Companion of the Bath.

After leaving the service, Innes devoted himself to literature, and published, among other works, *Lucknow and Oude in the Mutiny*, a *Memoir of Sir Henry Lawrence*, and a *Memoir of Major-General Sir J. Browne, K.C.S.I., Royal Engineers*.

General McLeod Innes died in London on December 13th, 1907.

## GENERAL SIR GEORGE T. CHESNEY, K.C.B.

George Tomkyns Chesney, who was the son of Capt. Charles C. Chesney, of the Bengal Artillery, was born at Tiverton, Devonshire, on April 20th, 1830, and received his first commission in the Bengal Engineers on December 8th, 1848. After going through the course of instruction at Chatham, he embarked for India, and landed at Calcutta in December, 1850.

For the first six years of his service Chesney was employed on ordinary Engineer executive work. Then came the outbreak of the Indian Mutiny in 1857, when he was posted to the first British force that advanced against Delhi. He was present at the Battle of Badli-ka-Serai on June 8th, when acting as Field Engineer under General Showers, and was then appointed brigade-major of Engineers, and was directed, in concert with Lieuts. Greathed and Maunsell, to prepare a scheme for the assault on Delhi. The scheme was accepted, but never carried out, and then ensued the tedious occupation of the Ridge until reinforcements arrived from the Punjab. In September the battering train arrived, and the breaching batteries were constructed forthwith, generally behind temporary cover, without any approaches or parallels; and the breaches were effected before the rebels had time to make retrenchments.

Delhi was stormed on September 14th, 17 Engineer officers being engaged in the operation, 14 of whom accompanied the columns of assault. Out of these ten were killed or wounded, among the latter being Chesney, who was hit slightly in the hip, and badly in the elbow, the bone being fractured. In all the operations at Delhi whether in the official arrangements, the field work, or assisting the Chief Engineer he had worked indefatigably, and was always spoken of in terms of praise. For his distinguished services he was given a brevet majority immediately after his promotion to captain in 1858.

After recovering from his wounds Chesney was posted to Calcutta, where he soon began to attract the notice of the

authorities, not only from the manner in which he carried out his duties, but from the clear insight he had into the merits of the questions of the day, and his sound judgment in dealing with them. His most important work was in connection with the financial and economic arrangements in connection with the Public Works Department. Formerly these works had been under the charge of a section of the Military Board, but the system of control had been so defective that it was determined to make a change, and, in 1855, a new office, the Public Works Department, was set on foot, of which Colonel W. Baker, R.E., was appointed Secretary.

In 1859, Mr. James Wilson was sent out from England as the first Finance Minister to introduce a budget system, and to put the finances and accounts of the Government of India on a more satisfactory footing. Shortly after his arrival Chesney discussed the financial question, so far as it referred to public works, in an article in the *Calcutta Review*, and this led to his being put in charge of the organization of tentative arrangements for keeping the local accounts of the public works expenditure. His proposals proved so successful that, in 1860, he was appointed Chief of that Branch of the Public Works Department, a position which he held until 1870.

The system which he organized enabled the accounts of expenditure to be quickly audited, so that, within a brief period, the Engineers were freed from anxiety with regard to them, while the Government obtained a satisfactory knowledge of the finances of the Public Works Department, as regards revenue and expenditure. His success led to Chesney's supervision being extended to the Railway Department also.

While occupied with his own special duties, he had been carefully studying the operations of other branches of Government work, and this led to his bringing out a book on *Indian Polity*, describing and discussing the administrative arrangements of the Government in its various departments, which was an invaluable and permanent text-book on the subject.

In 1869, Chesney took furlough, and while in England, had the opportunity of discussing with the India Office a matter, in which, from his connection with the Public Works Depart-



ment, he was greatly interested. This was the establishment of a college in England for training civil engineers for service on government works in India. The rapid expansion of railways, canals, roads, etc., after the suppression of the Mutiny, demanded the services of a larger number of men than the Corps of Royal Engineers could supply, and it had been necessary to engage the services of a considerable number of civilians to assist in the works. At first, these were engaged from the outside profession, but it was considered, and especially by Chesney, that it would be better to obtain recruits by open competition, and to give them a thorough professional and technical education at a special institution.

To the duty of founding this institution, Chesney, who had been promoted lieut.-colonel in 1869, was naturally appointed. He selected a site for the college at Cooper's Hill, in a healthy site, about 20 miles from London; he engaged a staff of efficient professors and instructors, and organized a course of professional education, so as to fit the students for the varied duties of the Public Works Department. Chesney remained at the head of the institution for about ten years, during which time he passed out 316 students; a body of men of whose efficiency and value to the Government of India, for buildings, roads, railways, canals, etc., there can be no question.

During the time that he was in charge of Cooper's Hill College, Chesney did a good deal of literary work; he published *The Battle of Dorking*, *The True Reformer*, and *The Dilemma*, a tale of the Indian Mutiny. These books were written with a purpose, and showed that he had a clear grasp of the military questions of the day, as they concerned both England and India.

In 1880, Chesney returned to India, having been selected for the post of Secretary to the Military Department of the Government, of which the Chief at that time was General T. F. Wilson. The work of the department was very heavy, changes were being made in the organization and equipment of the Army, the railway towards Kandahar was being started, and schemes for the defences of the coast and of the frontier had to be pre-

pared. In 1882, preparations had to be made for sending a division under General Sir H. Macpherson to take part in the British expedition to Egypt; then followed the Burmese expedition under Sir H. Prendergast, and several smaller campaigns on the North-West Frontier. In the arrangements for all these Chesney did good service, which was heartily recognized by the Government.

In 1887, he was appointed Military Member of Council, and received constant support in his work from Lord Roberts, then Commander-in-Chief, who, on one occasion, said:—"No Commander-in-Chief ever had so staunch a supporter, or so sound an adviser, in the Member of Council as I had." The tenure of office by Lord Roberts and Colonel Chesney was an epoch in the military administration of India. The British and Native Armies in India were brought into a state of the greatest efficiency, while the armies of the Native States were placed on a sound footing, and brought into the general scheme of defence. Chesney held this important appointment until 1892, when he returned to England.

Still full of energy, although his military career had come to an end, he decided to enter Parliament, in order to try to effect reforms in the British system of military administration, and was elected as Member for Oxford in 1892. Unfortunately his life was prematurely cut short, as he died suddenly on March 31st, 1895.

## MAJOR-GENERAL SIR WILLIAM CROSSMAN, K.C.M.G.

William Crossman, the son of Robert Crossman, Esq., of Cheswick and Holy Island, Northumberland, was born on June 30th, 1830, and received his first commission in the Royal Engineers on December 19th, 1848. After completing his course of instruction at Chatham, he was ordered to Woolwich in 1850. It was at that time that preparations were being made, under the direction of Prince Albert, for the Exhibition of 1851, the first great International Exhibition. Sir R. Stephenson, the chairman of the Executive Committee, died, and Sir William Reid, who was then Commanding Royal Engineer at Woolwich, was selected as his successor in this important position. He naturally decided to obtain the assistance of the Corps in carrying out the construction of the Exhibition, and Lieuts. Crossman and Du Cane, who were also at Woolwich, were chosen, and placed on the staff of the Exhibition. A detachment of sappers, under Lieut. G. Stopford, was, at the same time, quartered in Kensington Palace, so as to be close to the building in Hyde Park. Other officers of the Royal Engineers were afterwards employed on the same work.

Crossman's duties were principally connected with allotting space to exhibitors, superintending the ventilation, and acting as assistant secretary to the juries of award. At the close of the exhibition he accompanied the staff to Paris, to which they had been invited by the then President of the French Republic, Louis Napoleon, who received them very hospitably.

Crossman was next selected for a duty of a very different character. The Government was at that time in great difficulties with regard to the disposal of convicts who had been sentenced to transportation. These had formerly been sent to the colonies of New South Wales, Victoria and Tasmania, but the colonists were much opposed to the admission of convicts, and an attempt to send them to the Cape of Good Hope was a failure. The Government sent round a circular to the colonies to find if there were any that would be willing to receive con-

victs, and, at last, met with a favourable reply from Western Australia, which had failed so completely as a colony that it was on the verge of extinction, and the settlers jumped at the idea of obtaining convict labour as the only means of saving themselves from ruin.

Captain Henderson, R.E. (the late Colonel Sir Edmund Henderson, K.C.B.), was selected for the appointment of Comptroller General of Convicts, and embarked, with a detachment of sappers, in June, 1850. Captain Wray and Lieut. Du Cane followed with more sappers in September, 1851; and, in December of the same year, Lieut. Crossman embarked in the *Marion*, with a shipload of convicts and a sapper guard. The duty of the Royal Engineers was to superintend the labour of the convicts in the execution of public works, roads, bridges, etc., and in erecting prisons for those still serving their sentences; as well as depôts for the ticket-of-leave men while seeking employment, quarters for the sappers, and cottages for the pensioners.

Crossman was stationed principally at Albany, King George's Sound, and also at Perth, where, in addition to his other duties, he acted as assistant to the police magistrate. In February, 1856, the necessities of the war in the Crimea led to the subaltern officers of Royal Engineers, and a large number of the sappers being ordered home to England, where he arrived in June, 1856, and was sent to Chatham. But his stay there was of short duration, as he was soon selected for employment at the War Office in the office of the Inspector-General of Fortifications.

It was the time when the subject of the construction of works of defence for the dockyards in the United Kingdom, and at the naval stations abroad was being taken up with vigour. The French were restless; the Emperor Napoleon, who had been the friend of England in 1851, was not by any means trusted, and Lord Palmerston was an advocate for strengthening the fleet and the Army, and for fortifying the dockyards, and other vulnerable points of the Empire.

It was decided that in order to get the best plans, the preparation of the designs should not be left to the local Royal Engineer Staff, but should be prepared at the War Office, so as to ensure uniformity of method, and the adoption of the most

modern ideas for the new works. Major W. F. D. Jervois was brought over from Alderney to take charge of what was practically a new department under the Inspector-General, and Crossman was appointed one of his assistants.

The defence works upon which he was employed were the enlargement and reconstruction of the Hilsea Lines, the advanced lines of forts outside Gosport, and on Portsdown Hill, and the forts in the Isle of Wight. He was also engaged on designs for works for the protection of London on the south. While Crossman was at the War Office, trouble arose with the United States over the seizure of Messrs. Mason and Slidell from off the British mail steamer *Trent*, and preparations were made for the contingency of war. Crossman was sent to Canada in December, 1861, and, landing at Halifax, was ordered to prepare winter quarters for the troops on the winter march between Halifax, and the Rivière du Loup; and, after this duty had been completed, he was appointed Secretary to the Royal Commission on the defences of Canada, of which Sir William Gordon was President, and, with this Commission, he visited every post on the frontiers of the colony. He was promoted second captain in 1858 and first captain in 1864.

On his return from Canada he resumed his work at the War Office until 1866 when he was sent to the East on a special mission to report on the Legation and Consular buildings in China and Japan, and to make arrangements for providing such as were required. He remained until October, 1869, and during the time visited all the treaty ports in the two countries, and had charge of a considerable expenditure on the buildings. He also secured for the Admiralty at Shanghai a new dockyard, and was consulted respecting the new naval hospital at Yokohama. At the request of the naval officers in command, he accompanied the expedition to Nanking and Yung Chow, and was present at the landings at Formosa and Swatow in 1868-9. He received the thanks of the Government for his reports, and actions during his Eastern mission.

In June, 1870, Captain Crossman was sent to Constantinople, at the request of the Treasury, to report upon the Embassy buildings at that place, which had been destroyed by fire, and to make an estimate for their reconstruction. He was also

employed in conjunction with the Marquess of Lansdowne and Mr. H. Murray to enquire into the constitution of the Board of Works in Ireland.

In December, 1873, he was promoted lieutenant-colonel, and, in the following year, was selected for the appointment of Assistant Inspector-General of Fortifications at the War Office. In 1875, he was requested by Lord Carnarvon, then Secretary of State for the Colonies, to act as member of a special commission appointed to enquire into the resources and finances of Griqualand West, and to examine into the organization and working of the civil service of that colony. The duty was completed to the complete satisfaction of Lord Carnarvon, who wrote to the War Office expressing the high estimate he placed upon Colonel Crossman's services, and, in 1877, recommended him for a C.M.G. in recognition "of all that he had done in Colonial matters."

After the completion of his mission to Griqualand, Crossman was appointed Inspector of Submarine Defences at the War Office, and held the position until 1881, when he was sent upon a mission to inspect and report upon the defences of the colonies. During this mission he visited the Australian colonies, Hong Kong, Singapore, Penang, Fiji, Esquimaux and other places, returning to London in June, 1882, when he was appointed Commanding Royal Engineer of the Southern District.

Before he had been many months at Portsmouth, he was requested by the Colonial Office to undertake another mission of enquiry into the revenues and expenditure of Jamaica, St. Vincent, St. Lucia, and other of the West Indian Islands, and to report on various questions in connection with the local legislatures. The Report was completed in 1884, and, in the same year, Crossman was created K.C.M.G.

In the following year, Sir W. Crossman resigned his appointment as Commanding Royal Engineer, having decided to stand for Parliament, and was elected member for Portsmouth. He was a Liberal in politics, but separated himself from Mr. Gladstone when the latter brought forward the policy of Home Rule for Ireland, of which he entirely disapproved.

Sir W. Crossman retired from the Army in 1886, with the honorary rank of major-general, and died in London on April 19th, 1901.

## LIEUT.-GENERAL SIR GERALD GRAHAM, V.C., G.C.B., G.C.M.G.

Gerald Graham, the son of Robert H. Graham, Esq., M.D., of Eden Brows, Cumberland, was born at Acton on June 27th, 1831, and was commissioned as second lieutenant in the Royal Engineers on June 19th, 1850. After passing through the usual course of instruction of the Royal Engineer Establishment, he was stationed at Chatham for two years, and then at Portsmouth until 1854, when the Crimean War broke out.

War had been declared between Russia and Turkey in October, 1853, and, although the feeling in England was in favour of assisting the latter power, the British Government endeavoured to keep out of the struggle. But events moved fast, and early in 1854, although England was still nominally at peace with Russia, it was decided to prepare a force for the assistance of Turkey, and to send troops to Malta, in readiness to move to the Dardanelles if considered necessary. Among these was the 11th Company of Royal Engineers, commanded by Captain F. C. Hassard (the late Major-General Hassard, C.B.), and to this Lieut. Graham was attached. The Company embarked at Portsmouth in February, with a supply of entrenching tools, etc., and reached Malta on March 8th, where it was joined a little later by the 7th Company, commanded by Capt. C. J. Gibb. At the end of the same month, the two companies, which were attached to the first division, commanded by General Sir George Browne, sailed for the East, and landed at Gallipoli shortly before the declaration of war with Russia. Here Graham was employed well sinking at the camp of Boulair, some six miles from Gallipoli, and in throwing up defences across the peninsula which separates the Sea of Marmora from the Gulf of Saros.

On May 26th, Graham went on with the companies to Varna, on the Black Sea, which was the base of the British Army, and the depôt for Engineer stores. After the defeat of the Russians by the Turks at the Battle of Giurgevo, and the retreat of the

former from Wallachia and Moldavia, there was nothing further to do on the mainland, and the British and French Governments decided to employ the allied force in the invasion of the Crimea and the capture of Sebastopol; and large working parties were employed, under the superintendence of the Engineers, in preparing gabions, fascines, gun platforms, etc.

All the preparations for the embarkation of the expeditionary force were completed by the beginning of September, and, sailing from Varna, the army reached the Crimea on the 13th, and, the following morning, moved to the landing place at Kalamita Bay. The Engineers landed in the afternoon, and were agreeably surprised by the inhabitants bringing down bullock waggons to carry up their tools and baggage. No opposition was offered to the landing, and, on the 19th, the British Army, with the French on its right, marched to the Alma Valley, and the next day defeated the Russians and drove them back on Sebastopol. Graham, in his letters home, expressed the feeling of regret, which was pretty general in the Army, that Lord Raglan did not advance at once on Sebastopol after the Battle of the Alma. But it was decided to establish the British base of operations at Balaklava, and to open regular siege operations against the city. Then the works of the Engineers commenced in earnest.

On October 19th, Graham wrote: "We take the right of the attack, and the French the left, our own attack being again subdivided into right and left, I being on the left. The work of the Engineers is, of course, very heavy. Some of us are up in the trenches two, and even three, nights running." And on October 23rd he said, "The night work in the trenches is very hard and harassing. From six in the evening until four in the morning, the Engineer officer in the trenches must be constantly on his feet, directing and encouraging the men to work. He must, if possible, act up to his motto of *Ubique*, and be everywhere at once. Not only that, but, when working under fire, he must always expose himself *at least* as much as any of the men, so as to shame them into working in spite of the fire."

All through the winter of 1854-55, notwithstanding the heavy snow and severe cold, the work went on, and, by the end of



January, matters began to improve a little ; warm clothing and boots arrived, but the difficulty was to get them up from Balaklava, so wretchedly bad was the transport system. Gradually the British batteries were completed, and, after a heavy bombardment, it was decided to try to take the Redan by assault on June 18th, 1855.

In this attack Graham commanded the ladder party and the woolbag party, Lieut. Murray, R.E., leading a detachment of sappers with tools and powder bags. The skirmishers, at the given signal, advanced, Murray with his sappers bringing up the tools and powder bags, and close behind followed Graham with his ladders, some carried by sailors. The skirmishers advanced some 50 yards and opened fire ; this temporary halt brought Murray and Graham to a standstill. Then a tremendous fire was opened from the Redan ; Murray fell mortally wounded, and the command of the Engineers of both parties fell upon Graham. Soon afterwards, Lieut.-Colonel Tylden, R.E., was struck down, and Sir George Campbell, who commanded the assault, was killed. Lord West then succeeded to the command, and instructed Graham to take up the sailor ladder party again, as he was throwing forward a fresh line of skirmishers, and would advance on the Redan with the reserve. Graham advanced with his party, but neither skirmishers nor storming party came out, and he was under a murderous fire. Lord West wrote :—" I wish I could do justice to the daring and intrepid conduct of the party of sailors, . . . Lieut. Graham, of the Engineers, who led the ladder party, evinced a coolness and a readiness to expose himself to any personal risk which does him great credit." Graham's conduct at the assault of the Redan, and his gallantry in bringing in wounded officers and men on many other occasions, won for him the Victoria Cross, which was instituted in the following year.

On July 9th, Graham was severely wounded, when on duty in the trenches and was invalided to Therapia, but returned to the Crimea in time for the final bombardment and fall of Sebastopol, after which he was employed on the demolition of the dockyard. In July, 1856, Graham embarked for England

in the *Constance* which ran ashore off Cadiz, and he was then transferred, with the troops he commanded, to H.M.S. *Centaur*. For his good services in the Crimea, Graham was twice mentioned in despatches, received the Legion of Honour and the Turkish Order of the Medjidieh, and, after his promotion to second captain in 1858, was given a brevet majority.

On his return from the Crimea, Lieut. Graham was stationed at Portsmouth and Aldershot, and, in August, 1858, embarked for India to take command of the 23rd Company of Royal Engineers. In January, 1859, he took over the company from Major Lennox at Lucknow, and, in October 25th of the same year, embarked with it for Canton, which was then occupied by the British in consequence of the troubles with China. After the Second Chinese War, a treaty was concluded at Tientsin, but, when the Hon. F. Bruce, the British plenipotentiary, was on his way to Peking to ratify the treaty he found his passage barred by the Taku Forts at the mouth of the Peiho. Thereupon England and France decided upon a joint expedition against Peking, and a British Army, under Sir Hope Grant, was assembled at Kowloon, where Major Graham and his company joined it early in 1860. From Kowloon the force moved to Talienwan Bay, in the Gulf of Pechili, and thence to the rendezvous of the allied forces at the mouth of the Peiho River.

In August, after severe fighting in which Graham greatly distinguished himself, the Taku Forts were taken. During the assault on August 31st Graham received a ball in his leg, but, unwilling to give in, he mounted his horse and continued to lead his men, in spite of the greater risk he ran of being hit. After recovering from his wound, he rejoined and took part in the advance on Peking, and the advance on the summer palace. For his services in this war he was mentioned in despatches and was given a brevet lieutenant-colonelcy.

After the conclusion of the war Graham was ordered home, and was appointed as Commanding Royal Engineer, first at Shorncliffe and then at Dover. In May, 1866, he embarked for Canada, and held the post of Commanding Royal Engineer at Montreal for three years. During this period he was given the C.B. in 1867 for his distinguished war services, and was pro-

moted brevet colonel in February, 1869. After leaving Canada, he was stationed at Chatham and Manchester, and was then ordered to York in October, 1871, where he remained for six years. It was the time when the barrack works under the Military Forces Localization Act were being carried out, and he had much to do with the construction of new depôt centres in the Northern District. The experience thus gained during seven years on barrack works marked him out as a suitable officer for the post of Assistant Director of Works for Barracks, and, on a vacancy occurring, he was appointed to fill it on December 18th, 1877.

Before he quitted the Northern District he was selected to accompany General Lord Airey to the German Army manœuvres of 1877 and was presented to the German Emperor; on his way home he visited the barracks and fortifications of Strasburg and Metz, and the defences of Coblenz and Ehrenbreitstein. In 1879 he was sent to attend the manœuvres of the Swiss Army.

Colonel Graham had received such rapid promotion in recognition of his distinguished war service, that he was promoted major-general in 1881, and had, in consequence, to vacate his position at the War Office, and go on the unemployed list. But it was not long before he returned to active service. When the Egyptian troubles in 1882 led to the decision of the British Government to send an expeditionary force to Egypt under the command of Sir Garnet Wolseley, Graham was selected for the command of the second brigade of the first division, under Lieut.-General G. H. S. Willis, and he landed at Alexandria on August 3rd. His brigade consisted of the 2nd Battalion Royal Irish Regiment, the 1st West Kent, the 2nd York and Lancaster, and the 1st Royal Irish Fusiliers.

The second division was ordered to the Suez Canal, and Graham's brigade, which was made the advance guard, was the first to land at Ismailiyeh. He went on shore at 10 p.m. on August 20th, and the following day received orders from Sir Garnet Wolseley to push on to Nefiche, which the Egyptians had abandoned. Three days later the Egyptians were driven out of Tel-el-Mahuta and retired on the lines of Tel el Kebir.

Graham was then ordered to advance and occupy Kassassin, a place on the railway from Ismailiyeh to Cairo, 8 miles east of Arabi's position at Tel-el-Kebir. Graham's position here was somewhat *en l'air*, and, as the transport arrangement had broken down, his troops were badly off for food.

On August 28th a large force of the enemy advanced and tried to drive him out of Kassassin but was repulsed with considerable loss. The British troops were then moved up by degrees to Kassassin, and Arabi decided to make another attack on September 9th. The Egyptian scheme of operation was well designed but badly carried out. It was intended that a large body from Tel-el-Kebir was to attack the British at Kassassin while another body was to advance from Salihiyeh, which lay to the north, and cut the British lines of communication. The frontal attack was driven off by Graham, but the Salahiyyeh force did not move, and the British troops pursued the Egyptians up to within range of the guns at Tel-el-Kebir. One of Arabi's best generals, Rashid Pasha Husny, was wounded, and many of the Egyptian soldiers were so alarmed that they did not stop at Tel-el-Kebir, but fled into the country.

Sir Garnet Wolseley fixed September 13th for the attack on the lines of Tel-el-Kebir, and the whole British force marched out of camp on the night of the 12th, and halted in the desert until very early in the morning of the 13th, when they advanced, the first division on the right, the second division on the left, with the artillery between them, while the cavalry division, under Sir Drury Lowe made a *détour* into the desert, so as to reach the extreme point of the Egyptian lines. Graham's brigade advanced in face of a heavy fire, and carried the works in front of them with a rush, driving out the Egyptians, who continued to resist, until the cavalry had crossed the flanks of the line, when they fled in disorder, pursued by the cavalry. After the Battle of Tel-el-Kebir Graham's brigade remained there for a time and then moved on to Cairo.

For his services in the Egyptian campaign Graham was frequently mentioned in despatches and his name was included in the vote of thanks, passed by both Houses of Parliament; he was made a K.C.B. and was given the Second Class of the

Order of the Medjidieh. After the conclusion of the campaign it was decided to keep 10,000 British troops in Egypt, under General Sir Archibald Alison, as an Army of Occupation; and Graham remained at Cairo in command of one of the infantry brigades.

He was still in Cairo when the rebellion in the Sudan assumed serious proportions in 1883, and when Colonel Gordon came out on his mission in January, 1884. They were very old friends, and it was arranged that Graham should accompany him up the Nile as far as Korosko, when Gordon was to strike into the desert on his journey to Khartum.

Graham's description of the parting was as follows :—

"About eight o'clock he mounted his camel and said 'Good-bye,' but I walked beside him, and he shortly got down, and walked with me. Then he mounted again, and a handsome young Arab, Ahmed, son of the Sheikh of Berber, rode beside him on a beautiful white camel. At the head of the caravan rode Ahmed's brother, both armed with the great cross-hilted swords, and shields of rhinoceros hide, which Sudan warfare has made so familiar. These swords, together with a couple of very old double-barrelled pistols with flint locks, made up the Arab armament. Gordon carried no arms, but Stewart had a revolver. Before Gordon left me, he gave me a long, heavy, silver-mounted Kourbash, or Sudan riding whip, of hippopotamus hide, and told me to say that was a token that the reign of the Kourbash in the Sudan was over. In exchange he took my umbrella, having lost his own.

"The place where I last saw Gordon is wild and desolate. The desert there is covered with a series of volcanic hills, 'looking,' Scott (Graham's aide-de-camp) said, 'like a miniature Switzerland.' But here were no fertile valleys, no bright sun-clad peaks, no thriving population—nothing between the hills but black basins, or ravines, dry, dark, and desolate of all vegetation, looking like separate entrances to the pit, where those who entered might leave hope behind. I thought of Hicks with his doomed army coming into such a ravine after forty days in the wilderness, utterly spent and worn out, then finding the dark crests of the surrounding heights lined with a fierce, exultant enemy, and of the sickening feeling he must have had that all was lost for him, and those he had led there. I climbed

up the highest of these hills with Scott, and through a glass, watched Gordon and the small caravan, as his camels threaded their way along a sandy valley, hoping that he would turn round, so that I might give him one more sign ; but he rode on until he turned the dark side of one of the hills, and I saw him no more. Sadly we returned to our steamer, and I felt a gloomy foreboding that I should never see Gordon again."

While Graham was up the Nile with Gordon, serious events had taken place in the Eastern Sudan. Osman Digna, the rebel leader, had gained some important successes over the Egyptian troops in the vicinity of Suakin, and, towards the end of 1883, his action had become so menacing that Colonel Valentine Baker Pasha was sent from Cairo, with a force of 4,000 Egyptians, to crush him. Baker, after his arrival at Suakin, advanced from Trinkitat to attempt the relief of Tokar, an Egyptian post, which was beleaguered by the rebels, and his army was cut to pieces at El Teb, the Egyptian troops being completely demoralized.

Then at last, the British Government, notwithstanding their determination not to interfere in the affairs of the Sudan, decided that something must be done, and telegraphed to Sir F. Stephenson, then commanding in Egypt to organize an expedition for the defence of Suakin and relief of Tokar, under the command of Sir Gerald Graham. The latter, who reached Cairo from the Nile on February 15th, at once made his preparations and started for Suakin on the 17th. His force was sent direct to Trinkitat, and, although he had heard that Tokar had fallen, he decided to advance and recapture it from the rebels. The latter were determined to resist him, and entrenched themselves at El Teb where Baker Pasha had been defeated shortly before. The arrangements for the attack were admirably made, and, after a severe fight, the Arabs were completely overwhelmed and lost about 2,000 men, out of a total force of 6,000. The British loss in killed and wounded was under 200. The following day, Graham advanced to Tokar, which had been abandoned by the rebels, and was received with joy by the inhabitants. Graham received a telegram from the Queen, congratulating him on his brilliant victory and another telegram of congratula-

tion from General Gordon, to which Graham replied, expressing the hope that he would soon meet him on the road to Berber.

As soon as Tokar had been occupied, Graham embarked his troops at Trinkitat and moved them to Suakin to await further developments. Soon after his arrival at that place, a large force of Arabs collected, and he decided to move out and attack them. On March 13th, the British force advanced in two brigades, under Generals Buller and Davis. The second brigade, that commanded by Davis, first came in contact with the enemy, who, charging with reckless determination, succeeded in breaking the square, which was forced to retire. But the first brigade, under Buller, remained perfectly steady, and, with a heavy fire, checked the further advance of the Arabs, who, after a short time found their efforts of no avail against the British troops, and retired after suffering very great loss.

After the victory at Tamai Graham could easily have opened up communication with Berber and was most anxious to do so. As early as March 5th he had foreseen that, if he were successful, the road from Suakin to Berber would become safe, and, on that day, he telegraphed to Sir F. Stephenson suggesting that Gordon should be asked if he would recommend an advance on the Berber road, and the latter replied that he thought it most important to follow up the success near Suakin by sending a small force to Berber. The British Government, however, which had rejected every proposal put forward by Gordon, refused to allow the attempt. After Gordon's death Graham wrote as follows :—

“ On that same day (*i.e.*, March 13th, 1884, the day on which the Government had by telegram peremptorily forbidden Gordon to go to the Bahr Gazelle and Equatorial Provinces) the Battle of Tamai was fought, after which, at the price of much bloodshed, the road from Suakin to Berber was open for British or Indian troops, and the opportunity for rescuing Gordon and for saving Berber and Khartum was actually within England's grasp.

“ Though not allowed the honour of being Gordon's deliverer, though sorrowing with all England, with the added grief of one who has lost a dear friend, it is yet some small consolation to me to know that Gordon, in the midst of his bitter reflections

when alone at Khartum, acquitted me, and the gallant little force I had the honour to command of all unreadiness or disinclination to advance to his rescue."

Graham always regretted that, instead of telegraphing for permission to send troops to Berber, he had not taken upon himself the responsibility of sending them, reporting his action for approval.

After a further small fight with the Arabs at Tamānib, Graham received orders to bring his troops back to Cairo as soon as possible. This withdrawal had a bad effect upon the rebels, who believed that the British did not advance because they were afraid to do so. They could, however, hardly be expected to understand British politics. The expeditionary force was re-embarked, and, after seeing the last of them off, Graham returned to Cairo and to England, as he had been given two months leave. His despatches respecting the campaign of 1884 appeared in the *London Gazette* on March 27th and April 3rd, and 11th. He was thanked by both Houses of Parliament for his services, was promoted lieutenant-general for distinguished service and was given the First Class of the Order of the Medjidieh.

After the return of Sir Gerald Graham from Suakin in April, 1884, affairs in the Sudan went from bad to worse. Berber, which he had been so anxious to relieve, fell into the hands of the rebels in May, Khartum was besieged and Gordon's communications were cut off. Still the British Government did nothing for months, until, at last, in August, they sent an expedition for the assistance of Gordon, and then it was decided to take the long Nile route instead of the short road by Suakin-Berber. Owing to delays, all of which were foreseen by those who knew the country, and could have been avoided, the advance guard of the British Army did not arrive at Metemmeh on the Nile until January, 1885, when it was too late. Khartum fell and Gordon was killed on January 25th, notwithstanding his marvellous defence of the city, and Lord Wolseley withdrew to Korti. It was then proposed to make a campaign in the autumn against the Mahdi, and, with a view to assisting in this, it was decided to send a



force to Suakin for the protection of a line of railway from the Red Sea to Berber on the Nile.

Early in February, 1885, Graham was informed by the Duke of Cambridge that he was to be in command of this force, and was consulted as regards the construction of the proposed railway, which he, knowing the country, considered should be made by military labour. But his representations were disregarded and it was decided that the line was to be given to a British contractor, who was to bring the workmen from England for the purpose.

On February 19th the Queen sent for Graham and expressed her indignation at the abandonment of Gordon, and her regret that he should have to go to Suakin again to do what he could so easily have done a year previously. On the following day he started for Egypt and reached Cairo on February 26th, where he had to remain ten days, in consequence of an injury to his ankle from which he suffered severely. As soon as he had sufficiently recovered, he embarked for Suakin and arrived there on March 12th.

Here a force of about 13,000 men of all arms was assembled to enable him to carry out his instructions, which were as follows — To facilitate the operations of the railway contractors ; to make the best arrangements which the shortness of time, before the hot weather commenced, would permit ; to organize a field force for the destruction of Osman Digna's power by seizing the positions which he occupied ; to arrange for the occupation of the Hadendowa territory lying near the Suakin-Berber ; and to consider himself under the orders of Lord Wolseley, who was still on the Nile.

The railway was commenced the day after Graham arrived at Suakin, and he at once began to carry out his military operations against Osman Digna, who was reported to be at Tamai with 7,000 men, while there were 3,000 more at Hashin. After the enemy's position had been reconnoitred, Graham decided to attack Hashin first, and this place was captured on March 20th after a sharp action. Hashin was entrenched, and a garrison left to hold it, and Graham next commenced operations against Osman Digna at Tamai. On March 22nd,

General McNeil was ordered to advance with his brigade and establish a post at Tofrik about half-way from Suakin to Tamai, as the whole distance was too long for a day's march. McNeil reached Tofrik without opposition, and was in the act of constructing zeribas, when the Arabs, of whom a large force had secretly assembled in the bush, attacked the zeribas with the greatest determination. The fighting was very severe, but eventually the Arabs were repulsed with great loss, while, on the British side, there were 350 killed and wounded. It was afterwards learned that this fight produced a greater impression on the Arabs than any other battle near Suakin, as they knew that they had taken the British at a disadvantage, and yet were totally unable to defeat them. The result was that the majority of Osman Digna's followers left him and dispersed in the mountains, and Tamai was occupied with but little opposition, April 3rd, and Handub, on the line of the proposed railway, was taken possession of a few days later.

Then came a complete change of policy, as the British Government decided that there was to be no expedition to Khartum, and no further advance towards Berber, and that, in consequence, the railway was to be stopped and the British troops withdrawn from Suakin. Once more, many lives had been lost and much money spent on a useless expedition, while the Arabs again believed that the British went away because they were unable to conquer them.

Sir Gerald Graham left Suakin in May and arrived in England on June 15th, 1885. For his services in the second Suakin Expedition, he received the thanks of both Houses of Parliament, and was given the Grand Cross of the Order of St. Michael and St. George. After returning from the Sudan he reverted to the unemployed list, and retired from the Army on June 14th, 1890, after forty years' service. In 1896, he was given the Grand Cross of the Bath, and, in 1899, became a Colonel Commandant of Royal Engineers. He died the same year on December 17th, at Bideford, Devon, where he had resided for some years before his death.

His memoirs were written by Colonel R. H. Vetch, C.B., and published by Messrs. William Blackwood & Sons, 1901.

## GENERAL SIR ÆNEAS PERKINS, K.C.B.

Æneas Perkins was born at Lewisham on May 19th, 1834, and received his commission as second lieutenant in the Bengal Engineers on December 12th, 1851. He embarked for India in December, 1853, and was first employed as assistant engineer on the Bari Doab Canal for three years, after which he was transferred as executive engineer to the Umballa Division.

In May, 1857, the Mutiny broke out and Perkins joined the force which proceeded from Umballa under the command of General the Hon. G. Anson, Commander-in-Chief in India, to retake Delhi. He was present at the Battle of Badli-ka-Serai on June 8th, and the seizure of the Delhi Ridge, and did good work during the early period of the siege. On June 11th and 12th he constructed a mortar battery, known as "Perkins's Battery," which was well placed and caused the enemy considerable annoyance; and, on June 17th, he assisted in the capture of a battery, which the enemy were throwing up in the suburbs of Paharipur.

Early in July Perkins was employed in strengthening the right extremity of the British positions, which was greatly exposed to flank attack. The mutineers attacked this part of the position on July 14th, but, owing to the precautions taken by Perkins, they were repulsed with heavy loss. A few days later he was wounded near the walls of Delhi, and, his health having broken down, he was forced to return to Umballa whence he proceeded to England on sick leave in March, 1858.

On returning from England in 1859, Lieut. Perkins held various appointments in Bengal, including those of Assistant Principal of the Civil Engineering College in Calcutta, Assistant Consulting Engineer for Railways, and Executive Engineer of the Berhampur Division. He was promoted second captain in 1861.

In August, 1864, Perkins was selected for employment on the expedition to Bhutan, and, during the operations, greatly

distinguished himself by his military sagacity, as well as by his ability and resources as an Engineer. The following letter from the Adjutant-General in India to the Government of India, recommending Perkins for a brevet majority, will give some idea of the estimation he was held in by the military authorities ;—

“ This officer has now been mentioned in despatches for the third time for gallant and cool conduct in the field against the Bhutias, and, having read with much attention the reports of the three actions in which he was engaged, made by Brigadier-General Dunsford, C.B., and Brigadier-General Tytler, C.B., commanding the Left Column, H.E. The Commander-in-Chief feels convinced that this officer, besides high courage, possesses that extended scope of military qualifications, specified by H.R.H. the Field Marshal Commanding-in-Chief, as qualifying an officer for brevet promotion in the field. Capt. Perkins has also merited the special commendation of these two general officers for the manner in which he performed his duty as an Engineer officer.”

Perkins was promoted brevet major on June 30th, 1865, and was subsequently recommended by Brigadier-General Tytler for the Victoria Cross for his conspicuous gallantry in storming a stockade at the summit of the Baru Pass. But the latter recommendation was not successful on account of the delay in sending it in, although the Commander-in-Chief, Lord Napier, considered him worthy of the distinction.

At the conclusion of the Bhutan Campaign, during the latter part of which Perkins acted as Chief Engineer of the Field Force, he was appointed Executive Engineer in the Darjeeling Division of the Public Works Department. In 1870 he was transferred as Superintending Engineer to the North-West Provinces, and, in 1872, was posted as Superintending Engineer in the Military Works Branch of the Public Works Department. He was promoted brevet lieutenant-colonel in 1874, and regimental lieutenant-colonel in 1874. In November, 1878, he was recalled to military duty for service in Afghanistan, and was appointed Commanding Royal Engineer of the Kuram Valley Column, commanded by Major-General Roberts, V.C. (the late Field Marshal Earl Roberts).

Advancing by the Kuram Valley, General Roberts seized the Peiwar Kotal Pass on December 2nd. Perkins rendered valuable service at this operation in reconnoitring the position, and in constructing a battery for the mountain guns to shell the Afghan camp. After peace had been made with the Afghans, Perkins remained in the Kuram Valley erecting fortified posts, making roads, and forming a cantonment for the troops which were left as a garrison. For his services in the campaign he was given the C.B.

In September, 1879, the British Envoy at Cabul, Sir Louis Cavagnari, was murdered, and the war recommenced. Sir F. Roberts, was ordered to advance at once with the Kuram Valley Force, started from Alikhel on September 12th, defeated the Afghan Army at Charasia, and entered Cabul on October 8th. Colonel Perkins immediately commenced the repair of the Sherpur Cantonments, and put them in a state of defence, as an attack upon them was anticipated. The British force concentrated within the cantonments on December 14th, and, on the 23rd, the Afghans assaulted with great determination, but were repulsed and defeated with heavy loss. Sherpur was then converted into a strongly entrenched camp, bridges were thrown across the Cabul River, and many roads were formed. The manner in which the work was carried out, reflected the greatest credit on Colonel Perkins and the officers of Royal Engineers, who were employed under his command.

In July, 1880, General Burrowes marched into Southern Afghanistan and occupied Kandahar. On July 27th, he moved out of that place to attack Ayoub Khan, who had collected a force to resist the British, and after a severe battle at Maiwand, was compelled to retreat with heavy loss. As soon as the news of this disaster reached Cabul, Sir Frederick Roberts was ordered to proceed at once to the relief of Kandahar with a column of 10,000 men. Colonel Perkins accompanied him as Commanding Royal Engineer. The history of this remarkable march is well known; thanks to the energy and skill of General Roberts and his staff, the total distance of 321 miles from Cabul to Kandahar was covered in 23 days, the Battle of

Kandahar was fought on September 1st, and the army of Ayoub Khan was totally defeated and dispersed. This brilliant victory, in which Perkins took part, brought the war in Afghanistan to a close. He was made aide-de-camp to the Queen in recognition of his services.

On the conclusion of the Afghan Campaign, Colonel Perkins returned to India, and was appointed Superintending Engineer of the Military Works Department at Rawul Pindi. In 1881 he officiated as Inspector-General of Military Works in India, and, in 1883, he took two years' furlough. On his return to India, he was appointed Chief Engineer of the Central Provinces, and, in 1886, was transferred to the same position in the Punjab. During his tenure of the office, a number of important schemes were carried out, including the frontier road from Kushalgarh, *via* Kohat and Bannu to Dera Ismail Khan, a distance of about 200 miles; the water supply for the cities of Delhi and Rawul Pindi; and the protection of Dera Ghazi Khan from floods on the Indus.

In March, 1887, Colonel Perkins was promoted to the rank of major-general, and, after he had vacated the post of Chief Engineer in the Punjab, was selected by Lord Roberts, the Commander-in-Chief in India, for the command of the Oudh Division, an appointment which he held until promoted lieutenant-general in April, 1891. He became general in April, 1895, and, at the same time, was made Colonel Commandant of the Corps of Royal Engineers. In 1897 he was created K.C.B. in recognition of his distinguished services in India. He died, after a severe operation, on December 22nd, 1901.

## MAJOR-GENERAL SIR J. F. D. DONNELLY, K.C.B.

John Fretchville Dykes Donnelly, who was the son of Colonel Thomas Donnelly, Bombay Artillery, was born on July 2nd, 1834, and was appointed second lieutenant in the Royal Engineers on June 22nd, 1853. After completing his course of instruction at Chatham, he was stationed at Woolwich until August, 1854, when he was selected for service in the Russian War, and landed in the Crimea on September 23rd, two days after the Battle of the Alina. Balaklava was occupied on September 26th, and preparations for the Siege of Sebastopol were at once commenced.

In accordance with the orders issued on October 1st the British engineer operations were divided into the right attack, under Capt. J. W. Gordon, and the left attack under Capt. F. E. Chapman. Lieut. Donnelly was detailed for duty with the latter, and was one of the officers employed on October 10th the first night of opening the trenches on Green Hill, 1,300 yards from the right face of the Redan. He was again on duty the following night when the Russians opened fire.

The siege works were carried on under considerable difficulties, on account of the rocky nature of the soil, and the want of proper materials for the construction of gun platforms and magazines. As soon as the batteries were completed, the first bombardment of Sebastopol was commenced on October 17th, and the Redan was reduced to ruins under the fire of the British guns. But the French were not so successful, and it was decided by the allied generals to give up the idea of assaulting the Russian works, and to continue the siege operations. This delay greatly encouraged the enemy, who attacked the British position in front of Balaklava on October 25th, but without success, and were again defeated at Inkerman on November 5th. At the latter battle Donnelly was present.

The work in the trenches went on without intermission, and, on November 12th, Donnelly was engaged in constructing a

second parallel, 600 yards in front of the batteries of the left attack. This move was met by the Russians, who established a line of rifle pits in front of the second parallel, with the object of checking the advance of the British trenches, and preventing the repair of the batteries. These rifle pits were captured on the night of November 20th, after a severe fight, and formed into a third parallel the following night, when Donnelly was again on duty.

All through the severe winter of 1854-5, and the spring of 1855, the siege works were pushed on, and approached closer and closer to the Redan. New batteries were constructed in the second and third parallels of the left attack, and these, with the corresponding batteries in the right attack, had so much reduced the Russian fire by the beginning of June, that General Sir H. Jones, the Commanding Royal Engineer, pointed out to Lord Raglan that the time had come for an assault. It was then decided by the allied generals, that, after a heavy bombardment from all the available batteries, the British should assault the Redan, and the French take the Malakhoff on June 18th.

The British force was organized in four columns, to the second of which Lieut. Donnelly was attached, and, early on the morning of June 18th, the troops left the trenches and advanced to the assault. This unfortunately proved a failure, as the Russian strength was greater than had been anticipated. The only success gained on this occasion was that, owing to the promptitude and zeal of Lieut. Donnelly, a cemetery, which lay at the head of the Dockyard Creek, was captured the following morning, and a lodgment was made and connected with the trenches of the left attack. This strengthened the flank of the British position. For this service Donnelly was mentioned in Lord Raglan's despatch.

After the failure of June 18th, the siege was continued until September 8th, when a further attempt was made to gain possession of the Russian works, and, on this occasion, the French succeeded in capturing the Malakhoff, but the British assault on the Redan failed. As, however, the latter became untenable with the Malakhoff in the possession of the French, the



Russians abandoned it during the night, and retreated into the town of Sebastopol, and thence to the north side of the harbour. So ended the memorable siege, in the operations of which Donnelly had his full share, as he had been on duty in the trenches on 84 days or nights. In Sir Harry Jones' despatch of September 20th, he was mentioned as one of the subalterns of the Royal Engineers, who had particularly distinguished themselves. Nothing, however, was done for these distinguished lieutenants in the way of giving them promotion or other reward, except for three, who received the V.C. for special acts of gallantry.

Lieut. Donnelly remained in the Crimea until the conclusion of the war, and returned to England in June, 1856, when he was ordered to London to take command of a detachment of Sappers, which was stationed at the South Kensington Museum, an institution then in its infancy. This proved the turning point of his life, as it changed his career from a military to a civil one, and he applied himself with so much zeal and intelligence to his duties at South Kensington, that he soon attracted the notice of the officials in the newly constituted "Department of Science and Art." In 1859, he was appointed Science Inspector, by the then Lord President, the Marquis of Salisbury, and in this capacity was made responsible for the organization and administration of the Science Section. The duties of this section included the supervision of the science schools and classes through the country; the Government School of Mines; the Museum of Practical Geology and Mining Record Office; the Royal College of Chemistry; the Edinburgh Museum of Science and Art, and the Museum of Irish Industry, which developed later into the Royal College of Science for Ireland. The annual grants to the Royal Zoological Society of Ireland, the Royal Hibernian Academy and, afterwards, to the Committee on Solar Physics, were also administered by the Science and Art Department.

On receiving this important appointment, Donnelly, who had been promoted captain in April, 1859, was placed on the seconded list of the Corps of Royal Engineers, and, at a later period, on the reserve list. But his promotion in the Corps went on, and he became major in 1872, lieutenant-colonel in

1877 and brevet colonel in 1881. The title of his appointment at South Kensington was altered to "Inspector of Science" in 1866, and to "Director for Science" in 1879. In 1881 he was made Assistant Secretary of the Science and Art Department, and Chief Executive Officer at South Kensington, while still retaining the office of Director of the Science Division. At that time, the Science and Art Department was joined to the Education Department in Whitehall; but, in 1884, they were again separated, and Colonel Donnelly was appointed Secretary and Permanent Head of the Science and Art Department at South Kensington.

The growth of the Science Division, while Donnelly was in charge of it, was very rapid. The minute of 1859, which was drafted by him, provided that grants should be made to certificated teachers on the results of the examination of their pupils, and prizes awarded to successful students, whether they had been trained in recognized schools or otherwise. Grants had indeed been made to science schools since 1853; but, in 1859, besides a few navigation schools at seaports, where boys were educated for the mercantile marine, and seamen received instruction to enable them to get Board of Trade certificates, the only science schools, aided by grants, were at Aberdeen, Birmingham, Bristol, and Wigan. The total number of science students that year in these schools was 395. Ten years later, in 1869, there were 523 schools, comprising 1,489 classes and 24,865 students; while in 1899, the numbers were, 2,056 schools, 12,580 classes, and 174,670 students. The number of subjects of examination had increased from six to twenty-five.

The launching and development of a new system, which quickly acquired such large dimensions, was a work requiring no ordinary ability and carefulness. Judicious modifications had to be made from time to time, in order not only that improved methods of instruction should be adopted, but also that money should not be wasted too profusely in grants; and great care had to be taken in maintaining the efficiency of the administration. For all these matters Donnelly was responsible. He employed officers of the Royal Engineers to inspect the schools and to see that the examinations were properly

conducted, and he initiated the principle of employing soldier pensioners as clerks at times when there was a pressure of work in the department.

The different public institutions, already mentioned as being under the supervision of the Science Division, also claimed much of his time and energy, and, especially in the case of Ireland, of his tact and patience. He was a member of the Treasury Commission of 1862, which investigated the question of Science and Art in Ireland, and of the Departmental Commission of 1868, and gave much valuable assistance with reference to the matter. He was also employed by the Privy Council to enquire into petitions from different localities for charters under the Municipal Incorporation Act, and gave great satisfaction by his decisions with regard to these.

In recognition of his eminent services in connection with the Science and Art Department, Colonel Donnelly was given the C.B. in 1886, and was created K.C.B. in 1893. He retired from the Army with the honorary rank of major-general in 1887, and from his position in connection with the Science and Art Department in 1892. He died in London on April 5th, 1902.

## MAJOR-GENERAL SIR P. H. SCRATCHLEY, K.C.M.G.

Peter Henry Scratchley, who was the son of Doctor J. Scratchley, Royal Artillery, was born on August 24th, 1835, and received his first commission in the Royal Engineers in April, 1854. After a short course of instruction at Chatham he was stationed at Dover, and was sent to the Crimea in August, 1855. He had his share of work in the trenches on the Right Attack until Sebastopol fell in September, and, in the following month, accompanied the expedition which was sent to attack the fortress of Kinburn at the mouth of the river Dneiper. Kinburn was bombarded by the British and French Fleets and surrendered, after which the Allied Forces returned to Sebastopol. Scratchley remained in the Crimea until the conclusion of the campaign, and was then stationed at Portsmouth until October, 1857, when he was ordered to India, as acting adjutant of the companies of Royal Engineers, which were sent to that country for service during the Mutiny.

Lieut. Scratchley served on the staff of General Wyndham at Cawnpore, and afterwards as orderly officer to General R. Napier (the late Lord Napier of Magdala), who commanded the brigade of Engineers under Sir Colin Campbell during the siege and capture of Lucknow. He was mentioned by General Napier in his despatch among the officers deserving of honourable mention. After the capture of Lucknow in March, 1858, he served as adjutant of the Engineer brigade with General Grant's field force in Oude, and was present at the battle of Baree. After this he was attached, as Commanding Royal Engineer, to Brigadier-General Wetheral's column, and was present at the capture of Krissin Dampoor.

Lieut. Scratchley was mentioned in despatches by Lord Clyde, General Wyndham, and General Wetheral, and, after promotion to the rank of captain, was given a brevet majority in recognition of his services in the Crimea and in India.

After the suppression of the Mutiny he remained in India

until June, 1860, when he was ordered to Australia to assist in the organization of the Colonial Forces, and in the preparation of plans for the defences of Victoria. He was given the appointment of Commanding Royal Engineer and Military Storekeeper and was also a member of the Defence Commission. On the conclusion of his mission in December, 1863, he received the thanks of the Colonial Office for the valuable services that he had rendered to the Colony.

On his return to England Major Scratchley served for a short time at Portsmouth, and, in October, 1864, was selected for service under the War Office in the Manufacturing Department at Woolwich, where he held the appointment, first of Assistant Inspector of Works, and then of Inspector of Works until March, 1877. He was promoted brevet lieutenant-colonel in February, 1874.

When General Sir W. Jervois was sent in 1877 to report on the defences of the Australian Colonies and of New Zealand, Colonel Scratchley was appointed as his assistant, and, from his knowledge of the colonies, was able to render great services in the preparation of the reports, which went fully into the question of the action that would be taken by the colonies in time of war.

He was given the C.M.G. in 1879, and continued in the employment of the Colonial Office until October 1st, 1882, when he retired from the Army with the honorary rank of major-general. In October, 1884, he was appointed by the Colonial Office as Special Commissioner for the Protected Territory in New Guinea, a difficult and responsible post. This appointment was made in consequence of the Colony of Queensland having annexed the whole island of New Guinea, a proceeding which was repudiated by the British Government; and the matter was settled by England taking possession of a considerable part of the island and sending a Special Commissioner to administer it. In recognition of his services in New Guinea he was created a K.C.M.G. in 1885. While employed as Commissioner of the Protectorate Sir P. Scratchley travelled a good while in order to become acquainted with the country, which was but little known. Early in November, 1885, he started upon what

proved to be his last tour of inspection. Leaving Port Moresby on November 4th he proceeded to Sugari, a place situated at the foot of the Mount Owen Stanley Range, over a difficult and mountainous country. Rain fell in torrents, and Scratchley contracted fever, but, on his return to Port Moresby, proceeded on another expedition to Milne Bay. During the voyage he became worse, and died on board the steamer between Cookstown and Townsville on December 1st. His remains were brought to Australia, and were interred at St. Kilda Cemetery, Melbourne, on December 16th, 1885. His funeral, which was conducted with military honours, was attended by the Governor, and by all the public officials in Victoria, and by representatives of all the other Australian colonies.

## LIEUT.-GENERAL SIR R. GRANT, G.C.B.

Robert Grant, who was the son of the late Sir Robert Grant, G.C.H., was born at Bombay on August 10th, 1837, and received his commission as second lieutenant in the Royal Engineers on October 23rd, 1854. After completing his course of instruction at Chatham he was stationed for two years in the Scottish District, and was then ordered to the West Indies where he served in Jamaica and British Honduras until January, 1859.

In the following June he was appointed aide-de-camp to General Williams, who commanded the forces in Canada, and held that position for six years. He was promoted to the rank of second captain in August, 1860, and, in December of the same year, passed the final examination at the Staff College without having been through the Staff College course. After returning from Canada to England, Captain Grant was stationed at Chatham, Dover, and Portsmouth successively; and, on January 1st, 1871, was selected for the post of Deputy-Assistant Adjutant-General of Royal Engineers at the War Office, which appointment he held until December, 1876. He had been promoted major in 1872.

After completing his period of service as Deputy-Assistant Adjutant-General, Major Grant was ordered to Aldershot as second in command of the Royal Engineer Troops, which, at that time, included the Pontoon and Telegraph Troops and the Mounted Depot. He was promoted lieutenant-colonel in 1878, and, in 1880, was appointed Commanding Royal Engineer of the Plymouth Sub-District, from which he was transferred to the same position at Woolwich in December, 1881. He became brevet colonel in 1882, and, in the following year, was placed on the half-pay list on completing five years' service as lieutenant-colonel.

After waiting for a year on the unemployed list, Grant was appointed in May, 1884, as Commanding Royal Engineer in the Scottish District, with the rank of colonel on the staff. It was the year of the British expedition to the Sudan under Lord Wolseley, for the relief of Khartum. Colonel Grant did

not take part in the earlier stages of the campaign, but, in March, 1885, Lord Wolseley, who was then at Korti, telegraphed to the War Office, requesting that Grant might be sent out at once to take up the appointment of Commanding Royal Engineer. He started for Egypt immediately, and arrived at Wady Halfa shortly after it had been decided to cease from active operations against the Dervishes until the summer was over. But the idea of continuing the campaign lasted only a short time, and, in May, the British Government decided that, as Khartum had fallen, and General Gordon was dead, it was useless to do anything further, and accordingly sent orders to Lord Wolseley to withdraw altogether from the Sudan. This was a great blow to the inhabitants of the province of Dongola, who had been promised protection against the Mahdi's troops.

The evacuation was commenced on May 21st, and Colonel Grant was appointed Commandant of the district of Abu Fatmeh, which lay to the north of Dongola, and to take charge of the operations connected with the evacuation. This was no easy task, but his clear head and calm judgment smoothed over many difficulties, and he carried out his task to the entire satisfaction of Lord Wolseley, and his name was honourably mentioned in the latter's final despatch. The work went on until the middle of July when the British rear guard passed through Abu Fatmeh and the district was abandoned to the Dervishes who moved forward as the troops retired.

Just as the work was drawing to a close, Grant was taken seriously ill with fever, and was invalided to England, where he arrived in August, 1885. After waiting for nearly a year on the unemployed list, he returned to the War Office in July, 1886, as Deputy Adjutant-General for Royal Engineers. He was made C.B. in 1889, and the same year was given the rank of temporary major-general. In 1891 he was selected for the appointment of Inspector-General of Fortifications in succession to Sir Lothian Nicholson and was promoted substantive major-general, with the temporary rank of lieutenant-general. In 1896 he was created K.C.B.

Sir Robert Grant held the position of Inspector-General of Fortifications for the unusually long period of seven years, as



his great capacity was recognized by successive Secretaries of State, who had complete confidence in his judgment. He was a man of the highest ability, his quickness of grasp was phenomenal and his memory remarkable. A silent man, he always listened carefully to what was said, and then gave a carefully-formed opinion without hesitation. During his term of office, important works of defence, and of barrack construction, were carried out under the Military Works Loans, and he held the position of President of the Colonial Defence Committee. As regards the latter, when Sir R. Grant's appointment came to an end, the Colonial Office wrote to the War Office in the following terms:—

"As General Sir Robert Grant's term of office as Inspector-General of Fortifications has expired, and he has ceased to be President of the Colonial Defence Committee, Mr. Chamberlain desires to place on record, for the information of the Marquess of Lansdowne, his high appreciation of the valuable services, which he has rendered in the work of Imperial Defence during the period of seven years for which he has presided over the Committee.

"That the value of the services of the Committee are now so generally recognized throughout the Empire, and that its advice is now so freely sought by and appreciated in the Colonies, is, Mr. Chamberlain feels, in no small degree due to the able and ungrudging service which General Grant has willingly rendered, and he would be glad if Lord Lansdowne would convey to that officer an expression of Mr. Chamberlain's thanks for his services, and his sense of the cordial assistance rendered by General Grant to the Colonies, and to this department during his term of office."

Sir R. Grant was promoted substantive lieutenant-general in 1897, and vacated the appointment of Inspector-General of Fortifications in April, 1898. Shortly afterwards he was seized with an illness from which he never properly recovered, and this prevented any further continuous employment, although his experience and knowledge were called into request from time to time. He was made G.C.B. in June, 1902, and retired from the Army on March 23rd, 1903. He died in London on January 8th, 1904.

MAJOR-GENERAL SIR C. W. WILSON, K.C.B., K.C.M.G., F.R.S., D.C.L.

Charles William Wilson, who was the son of Edward Wilson, Esq., of Hean Castle, Pembrokeshire, was born in Liverpool on March 14th, 1836, and obtained a direct commission in the Royal Engineers by open competition, without going through the Royal Military Academy. He was gazetted second lieutenant on September 24th, 1855, and, after leaving Chatham, was stationed first at Shorncliffe Camp, and then at Gosport, where he was employed on the fortifications.

Early in 1858 he was selected for the appointment of Secretary of the Commission, which was appointed, under Capt. Hawkins (the late General Sir John S. Hawkins, K.C.M.G.), to delimitate that portion of the boundary between Canada and the United States, comprised between the Pacific Ocean and the eastern range of the Rocky Mountains. Besides being Secretary of the Commission, Wilson commanded the detachment of sappers, attached to the expedition, and also acted as transport and commissariat officer, no easy task, as the work had to be carried on through a very difficult, and, in many parts, practically unknown country. The delimitation of the boundary was commenced at Semiahmoo Bay, opposite Vancouver Island, and through swamps, forests, and over steep and rugged mountains to the summit of the Rocky Mountains in longitude 114° west. The work lasted four years, and, during some of the winters, the cold was intense, while the mosquitoes in summer added much to the discomfort of the British party.

After returning to England in 1863, Wilson was employed in London on the completion of the plans and reports, and was afterwards engaged on defence works at Chatham until August, 1864, when he volunteered for a duty which greatly affected his future career. At that time Miss Burdett Coutts, (the late Baroness Burdett Coutts), was interested in the question of providing a good water supply for the city of Jerusalem, and, having learned that it was necessary in the first instance to

have an accurate survey made of the town and surrounding country, offered the late Sir Henry James, the then Director-General of the Ordnance Survey, the sum of £500, which was to cover all the expenses connected with the Survey. It was arranged that an officer of the Royal Engineers would be allowed by the War Office to undertake the work, on condition that he received no extra pay while so employed, and paid his own expenses. The appointment was offered to several officers, who, not unnaturally declined it, but Wilson, hearing of the matter by chance, at once agreed to go on the conditions named, and his services were accepted. He proceeded to Jerusalem, and, notwithstanding many difficulties, completed the survey in less than a year, having expended only a few pounds more than the original estimate.

The work included not only a survey of Jerusalem and the surrounding country, but also large scale plans of the Haram area, so sacred to Mahomedans, of the Church of the Holy Sepulchre, and other important buildings in the city, and a series of levels from the Mediterranean to the Dead Sea. The plans and reports were published by the Ordnance Survey at Southampton, and have formed the basis of all modern exploration at Jerusalem.

Wilson's survey of Jerusalem led to the foundation of the Palestine Exploration Fund. This society was established in June, 1865, by the late Dean Stanley and Sir George Grove for the "prosecution of systematic and scientific research in all the branches of inquiry connected with the Holy Land." The first Committee, of which the late Archbishop of York, was chairman, fixed the principles upon which the work of the fund was to be carried out, which were as follow :—

1. That whatever was undertaken should be carried out on scientific principles.
2. That the Society should, as a body, abstain from controversy.
3. That it should not be started, nor should it be conducted, as a religious society.

Wilson had been promoted to second captain just before starting for Jerusalem, and, on his return to England, was

selected for duty on the Ordnance Survey. But he did not remain long at Southampton, as he was requested to return to the East, in charge of the first expedition sent out by the Palestine Exploration Fund, and thus commenced his connection with the Society, of which he was the mainstay up to the day of his death. He proceeded to Palestine in November, 1865, accompanied by Lieut. S. Anderson, and carried out a preliminary survey of a large part of the country from Bania to Jerusalem, fixing the latitudes and longitudes of important points, and making plans of many ancient sites and buildings. This reconnaissance was the starting point of the vast amount of survey work and archaeological researches, since accomplished by the efforts of the Palestine Exploration Fund. On coming back to England, he was elected a member of the Executive Committee of the Fund.

After the completion of his work in Palestine, Wilson was put in charge of the Ordnance Survey of Scotland, and was stationed at Inverness from 1866 to 1868. He acted as Assistant Commissioner on the Borough Boundary Commission in 1867. In 1868 he undertook the survey of the Peninsula of Sinai, the expenses of which were provided by public subscription. As the amount of money raised was scarcely adequate to meet the cost of this survey, Wilson agreed to go out on the same conditions as those which he had accepted when engaged on the survey of Jerusalem. The maps and reports which were published by the Ordnance Survey contain a mass of important information respecting Mount Sinai, and the surrounding districts.

After his return to England, Wilson was appointed Executive Officer of the Topographical Department at the War Office, which, at that time, was a branch of the Ordnance Survey. He devoted himself with great energy to the work of his new appointment, which, in the following year, was separated from the Ordnance Survey, and he was made Director. When he joined the department, it was comparatively small, but, thanks in great part to his efforts, it was gradually enlarged, and, in 1871, was expanded into the Intelligence Department, of which the late General Sir P. Macdougall was appointed Chief, with the rank of Deputy Adjutant-General, while Wilson was

made Assistant Adjutant-General, and remained at the War Office until March, 1876. He was created a Companion of the Bath for the services he had rendered in the formation and organization of the Intelligence Department, of which he may justly be regarded as the founder. He had been promoted major in May, 1873.

During the period spent at the War Office Wilson continued his work in connection with geography and exploration. He received the diploma of the International Geographical Congress at Antwerp in 1871, for the Jerusalem survey, and was elected Member of Council of the Royal Geographical Society, and of the Society of Biblical Archæology in 1872. In 1874 he received the distinguished honour of being made a Fellow of the Royal Society for his work in Jerusalem, Palestine and Sinai; and he was President of the Geographical Section of the British Association the same year.

After leaving the War Office, Major Wilson was employed at the India Office on the compilation of a map of Afghanistan, for which he received the thanks of the Secretary of State for India, and was then appointed Chief of the Ordnance Survey of Ireland. In 1878, he was selected to act as British representative on the International Commission for the delimitation of the boundaries of Servia, in accordance with the arrangements of the Treaty of Berlin. For this duty he received the thanks of the Government and was given the brevet of lieutenant-colonel in April, 1879.

Early in 1879 he was chosen for a very important position in the East, that of Military Consul-General for Anatolia. Under the Treaty of Berlin the Sultan had undertaken to carry out reforms in the administration of Asia Minor, and, in order to watch over the progress of these reforms the British Government decided to appoint military consuls under consuls-general, of whom the one, Lieut.-Colonel Trotter, was to have his headquarters at Erzerum, in Armenia, and the other, Lieut.-Colonel Wilson, at Sivas, in Anatolia.

Wilson's duties necessitated constant travelling through Asia Minor, frequently under very difficult conditions, and he obtained a knowledge of the country and the people, which was perhaps unique. During his time of service in Anatolia,

he was also employed by the Foreign Office on a special mission to Bulgaria, Eastern Rumelia, and Macedonia, and on a tour of inspection of the British consular stations in Asia Minor, and Palestine. For his services in Asiatic Turkey, which lasted until July, 1882, he was created a K.C.M.G., and received the thanks of the Government. In the same year he was promoted lieut.-colonel in the Royal Engineers.

In 1882 the political troubles in Egypt came to a head, and necessitated British intervention in the affairs of the country, in order to put an end to the military rebellion led by Arabi Pasha. When the expeditionary force under Sir Garnet Wolseley was sent to Alexandria, it was considered that the extensive knowledge of Eastern affairs which Sir C. Wilson possessed, would be of great value, and he was ordered to Alexandria. Here the first duty for which he was detailed was to act as British Commissioner with the Turkish Force, which it was proposed should be sent to Egypt to co-operate with the English Army; but the defeat of the Egyptians at Tel-el-Kebir, and the occupation of Cairo on September 14th put an end to the war, and, in consequence, the Turkish contingent never landed.

Wilson was then ordered to Cairo, immediately after that place had surrendered, and here his first duty was to take steps for the safety of the Museum of Antiquities at Boulac, and of the Public Library. He was then appointed as intermediary between the British Army and the Egyptian local government, and was charged with the custody of Arabi Pasha and his companions, pending a decision as to what action was to be taken with regard to them. After it was settled that the trial of Arabi was to be carried out by the Egyptian Government, under conditions arranged by England, Wilson was named as British representative, to be present at the trial, and to see that it was properly conducted. To him it was greatly due, that this affair, which presented great difficulties, was brought to a satisfactory conclusion. Both during and after this trial to Wilson was also given the duty of inspecting the Egyptian prisoners and seeing that justice was done.

When Lord Dufferin, the British Ambassador at Constantinople, was sent to Egypt to report on the reorganization of

the country, Wilson was attached to his staff and rendered much assistance in the preparation of his report. For the services which he gave in Egypt, Wilson received the thanks of the Government and was promoted brevet colonel in April, 1883. After returning to England he resumed his duties on the Ordnance Survey of Ireland.

While he was in Egypt Sir C. Wilson had devoted much attention to the state of affairs in the Sudan, when the rebellion against Egyptian authority, which had commenced in 1881, was assuming serious proportions. In September, 1882, he made a report to Sir E. Malet, the British Consul-General in Egypt, respecting the grave condition of affairs in the Sudan, and strongly recommended that British officers should be sent to Khartum to report on the steps that would be necessary to ensure pacification. This proposal was approved, and Lieut.-Colonel Stewart, one of Wilson's assistants in Egypt, who had previously served under him in Asia Minor, was ordered to proceed to the Sudan, respecting which he forwarded a valuable report in February, 1883, and pointed out the measures, which should be taken for improving the conditions of the country.

Most unfortunately the British Government refused to acknowledge the intimate connection between Egypt and the Sudan, and declined to take any responsibility for the suppression of the rebellion in this province. This is not the place to discuss the Sudan question. Suffice it to say that after the army sent by the Khedive under Hicks Pasha, a retired Indian officer, had been annihilated, and the power of the rebel leader had largely increased, early in 1884, the late General C. G. Gordon was sent to Khartum to report to the British Government, and on his arrival in Egypt, was appointed by the Khedive Governor-General of the Sudan, with full powers to arrange for the withdrawal of the Egyptian garrisons, and for the establishment of a Native Government. His task proved to be an impossible one, and he was besieged by the rebels in Khartum.

At last England woke up to the gravity of the situation, and it was decided to send an expedition up the Nile for the relief of Gordon and Khartum, under the command of Lord Wolseley. Sir C. Wilson was selected to act as Chief of the Intelligence

Department with the rank of Deputy Adjutant-General, and proceeded to Egypt in September, 1884. He went on at once to Dongola, where the Mudir, Mustapha Yawer, a fanatical Mohamedan, gave him much trouble.

At this time Khartum was in a very serious condition, and Gordon, who had heard of the proposed British expedition, decided to send down his papers, and to post three steamers at Metemmeh to help the British advance. Colonel Stewart started in a small steamer with the papers, and was instructed by Gordon to urge the British troops to hasten, but unfortunately the steamer was lost near Abu Hamed, and Stewart was murdered by the Arabs in the vicinity.

When Wilson arrived at Dongola he was ordered by Lord Wolseley to go up the Nile and ascertain all particulars concerning the death of Stewart. Having accomplished this duty, he returned to Dongola, and, after the arrival of Lord Wolseley, accompanied him to Korti on the Nile, whence the road to Metemmeh starts across the Bahuda Desert. Although Lord Wolseley had decided to continue the advance up the Nile in boats; and to take no steps for the relief of Khartum until the bulk of his force had reached Metemmeh, yet, as he desired to communicate with Gordon, he arranged that a small column, under Sir Herbert Stewart, should cross the desert to Metemmeh to meet the steamers, which Gordon had sent down four months previously. Wilson was instructed to accompany Stewart, and, on arrival at Metemmeh, to go up to Khartum in the steamers, and inform Gordon of Lord Wolseley's plan of operation; he was ordered not to remain in Khartum, but, as soon as he had seen Gordon, and discussed the situation with him, to return as quickly as possible to Lord Wolseley at Korti.

Stewart's advance was much delayed for want of camels, which had not been purchased in sufficient numbers, and the Arabs had, in consequence, time to learn of the march of the British column and assemble a force to oppose it. There was a severe fight at Abu Klea, in which the Arabs were totally defeated, but the British lost heavily. Stewart advanced after the battle towards the Nile, and was mortally wounded, when the command of the column devolved on Sir C. Wilson. His force was attacked by the Arabs, who were again driven off and



the column reached the Nile at Gubat near Metemmeh. Gordon's steamers, which had been cruising up and down the river, arrived on September 21st, and, after making the necessary arrangements for placing Gubat in a safe position, Wilson started with two steamers for Khartum to give his message to General Gordon. After a very difficult journey, in consequence of the low state of the river, he reached Khartum on January 28th, and found that it had been taken by the Arabs, and that Gordon had been killed two days previously. Wilson's steamers had to run the gauntlet of a heavy fire from both sides of the Nile, and the descent of the river was more difficult than the ascent. Both steamers were wrecked on the return journey, and Wilson had to land his force, and wait until Lord C. Beresford brought another steamer to meet him at Mernat, when he returned to Gubat and thence rode back across the desert to Korti.

It will be remembered that, at the time, an attempt was made in the English Press to throw upon Wilson the blame of arriving too late at Khartum, and being therefore responsible for the failure of the expedition. A more unjustifiable accusation was never made. The Nile expedition failed because it started too late, and Wilson was not sent to relieve Khartum, but to let Gordon know that it would be at least six weeks before the British troops could arrive. Even if he had arrived two days sooner he could have done nothing to help Gordon, as there were no provisions left in Khartum.

As soon as Wilson arrived at Korti Lord Wolseley telegraphed home an account of his perilous voyage to Khartum, and the Secretary of State for War replied:—"Express warm recognition of Government of brilliant services of Sir C. Wilson, and satisfaction at gallant rescue of his party."

After the fall of Khartum, it was at first proposed to continue the campaign against the Dervishes, but this intention was given up, and the Nile expeditionary force returned to England, much to the disappointment of Wilson, who realized that it was a mistake, and that, sooner or later, it would be necessary to recapture the Sudan. Subsequent events proved how correctly he had judged the situation. For his distinguished service in the Sudan he was created a K.C.B.

Wilson returned to his duties in Dublin in June, 1885, and,

in the following December, was appointed Director-General of the Ordnance Survey at Southampton. This was an important epoch in the history of the Survey, as the work to be undertaken in the future was not settled, and there was a probability that the staff would be reduced, notwithstanding the large amount of important work that remained to be done. He obtained authority for the revision of the Irish survey on the 2000 scale, and for the revision of the one-inch maps of the United Kingdom, and for bringing them up to date. He also devoted much attention to the organization of survey sections for employment with an army in the field, and the result has been that the military topographers, trained by the Ordnance Survey, have done excellent work in South Africa and other British colonies.

Sir C. Wilson was promoted temporary major-general in February, 1893, and major-general in February, 1894. While employed upon the Ordnance Survey he received the following civil distinctions:—Honorary D.C.L. Oxford, in 1883; Hon. LL.D. Edinburgh, in 1886; Hon. M.E. Dublin, in 1893. He was Member of Council of the Royal Geographical Society 1882—1890; President of the Geographical Section of the British Association in 1888; and Member of Council of the Royal Society, 1889—1890.

After his period of service on the Ordnance Survey had come to an end in 1894, he was unemployed for a year, and was then selected for the appointment of Director-General of Military Education at the War Office, a position which he held until retired, under the age clause of the Royal Warrant, on March 13th, 1898.

But although his career in the Army had come to an end, his interest in the subjects of geography and exploration continued unabated. He devoted much attention to the work of the Palestine Exploration Fund, and was elected Chairman of the Executive Committee in 1901, and held the post until his death. He paid several visits to Palestine to inspect the explorations in progress, and the Society owes him a debt of gratitude for the constant attention that he gave to the work.

Sir C. Wilson died at Tunbridge Wells on October 23rd, 1905, after a few months' illness. His memoirs by Colonel Sir C. M. Watson were published by Mr. John Murray in 1909.

## MAJOR-GENERAL SIR J. BROWNE, K.C.S.I., C.B.

James Browne, who was the son of Robert Browne, Esq., M.D., was born at Havre on September 16th, 1839, and received his commission as second lieutenant in the Bengal Engineers on December 11th, 1857. On his arrival in India in November, 1859, he was posted to the headquarters of the Bengal Sappers & Miners at Roorkee, which was fortunate for him, as, in the following March, he was appointed to command two companies of sappers, that were attached to the force of Major-General Sir Neville Chamberlain, organized for an expedition against the Mahsood Wuzeerees, a tribe on the Punjab frontier between Dera Ismail Khan and Bunnoo. He was present at the capture of the Burrera Pass, and had to carry out most of the demolitions and mining operations under Capt. Pollard, Commanding Royal Engineer, who spoke of him in high terms of commendation in his despatch.

On the conclusion of the campaign, Browne was posted to the Public Works Department at Attock, on the Indus, and had charge of the construction of the great road from that place to Peshawur. He built the bridge over the Bara River, and made the tunnel drift under the river Indus. Here, living among the native workmen, he acquired that knowledge of the language and life of the Afghans, which proved so useful in his after career. After serving for two years as Assistant Engineer, he was promoted to the grade of Executive Engineer, and given charge of the Kohat Division, to which the Peshawur Division was afterwards added, a large responsibility for a subaltern of six years' standing.

In the Ambela Campaign of October, 1863, Browne was employed as Assistant Field Engineer with Sir Neville Chamberlain's column, was present at every action during the campaign, and was twice wounded. He was several times mentioned in despatches by Sir Neville Chamberlain, and also by Brigadier-General Turner, who commanded at the attack on the Bonair

Pass, and, in recognition of his services was given a brevet majority in 1870, on promotion to the rank of second captain.

After taking furlough to England, Browne returned to India towards the close of 1864, and was appointed Assistant Principal of the Thomason College at Roorkee. This position, however, he only held for a few months, and in 1865, became Executive Engineer for the Lahore Division of the Punjab, from which he was shortly transferred to the Kangra Division, where he was employed on the construction of the Kangra Valley road. The route was very difficult, and the work called for great engineering skill, especially in the matter of bridge construction. Among the bridges were two of brick at Buneyr and Nigul, of 140 ft. space, another of concrete, 48 ft. space, and a timber bridge at Dehra, of 214 ft. space. For a paper on "Mountain Roads" based on his experiences in the Kangra Valley, Browne was awarded the Telford Prize by the Institution of Civil Engineers.

In 1871 Major Browne took two years' furlough and travelled in Europe, Canada, the United States and Mexico, with the view of studying the modern methods of railway construction, and especially, of railway bridge building. The information he thus acquired was of the greatest use to him in his after career. On rejoining the Public Works Department in 1873, he was given charge of the Dalhousie Division, and was also employed in designing important bridges for other parts of India. Among these was the suspension bridge on the Chakrata road across the Jumna at Khalsi, and other large iron bridges for the North-West Provinces. In 1874 he carried out the works for the water supply at Dalhousie, and in the following year made the design for the great railway bridge across the Indus at Sukkur, on the stiffened suspension principle; but, much to his disappointment, his plan was not carried into execution, and, some years subsequently, a cantilever bridge was erected.

At this time the question of constructing a railway into Biluchistan was under consideration, and, in 1876, Browne was sent to survey the line from Sukkur to Quetta, and to start the works for the new cantonment at the latter place. Here he

made himself thoroughly acquainted with the country and its inhabitants by whom he was regarded as a personal friend. In 1877 he was summoned to Simla to consult with the Viceroy, Lord Lytton, who was so much struck with his knowledge of the political situation, that he selected him for special employment under the Foreign Office to keep the Government informed of the state of feeling among the natives, and to use his influence with the latter to keep them on the side of the British in the coming troubles with Afghanistan. He carried out his instructions admirably, and, greatly in consequence of his exertions, there was no trouble in Biluchistan.

When the war with Afghanistan broke out in November, 1878, Browne, who had been promoted lieutenant-colonel in 1877, was appointed Political Officer with the Southern Division, which, under General Sir Donald Stewart, advanced from Quetta to Kandahar. He had to act not only as Political Officer, but as Commissariat Officer, as his knowledge of the people was of the greatest assistance in the matter of collecting supplies, and he captured the fort of Khelat-i-Ghilzai with a handful of men. After the conclusion of peace at Gandamak, Browne returned to India with a column under Major-General Sir M. A. S. Biddulph through the little-known Thul Chotali country to the Derajat frontier.

His name was frequently mentioned in despatches by Sir Donald Stewart and Sir Michael Biddulph, and, on the conclusion of the war, Browne was made a C.S.I. in recognition of his distinguished services.

After the Afghan War had come to an end, he took leave, and while in England was consulted by the British Government on the important question of the retention of Kandahar, and the defence of the North-West Frontier of India. In 1880 he read an interesting paper on the same subject at a meeting of the East India Association. He was promoted brevet colonel in October, 1881, and, on returning to India at the end of that year, was employed on railway surveys in the Central Provinces, and was then appointed Assistant Secretary of the Public Works Department in the Punjab.

In 1882, when the Arabi military revolt led to the despatch

of British troops to Egypt, Colonel Browne was appointed Commanding Royal Engineer of the Indian contingent, which landed at Suez and took part in the Battle of Tel-el-Kebir, and the subsequent advance to Cairo. For his services in this campaign he was twice mentioned in despatches and was given the C.B. and the Turkish Order of the Osmanieh. After the occupation of Cairo and conclusion of peace, the Indian contingent re-embarked and Browne joined the office of the Military Works Department at Simla, as Deputy Inspector-General.

In the following year Colonel Browne was selected to carry out the construction of the railway through the Hurnai Pass from Sibi to Peshin and Quetta, a most arduous undertaking.\* Five companies of the Bengal Sappers & Miners, and three battalions of Pioneers were placed under his orders, besides whom a large number of native workmen were employed. The engineering difficulties encountered in the construction of this railway, which had a total length of 224 miles, were very great; and the tunnels, bridges, and cuttings through the mountain gorges were masterpieces of railway design. The heat in summer was excessive, and at one period a severe epidemic of cholera added to the difficulties, but Browne and the Engineer officers, who served under him, worked indefatigably, and the line was completed on March 14th, 1887, and formally opened by the Duke and Duchess of Connaught a few days afterwards. For his distinguished services in connection with the construction of this railway Browne was created K.C.S.I. on January 1st, 1888, and, in the following year, was appointed Quartermaster-General of the Army in India by Lord Roberts, who was then Commander-in-Chief, and was promoted major-general. During the period that he held the office, there were numerous military operations against the tribes on the North-West Frontier, and his knowledge of the country and of the people made his advice invaluable.

In 1892 Sir James Browne returned to Biluchistan, having

\* For a description of the work on this railway, see paper on the "Frontier Railways of India," by Colonel G. K. Scott-Moncrieff, C.B., C.I.E., in *Royal Engineer Professional Papers*, Vol. XI., for 1885, p. 213.

been selected to succeed Sir Robert Sandemain as Agent-General and Chief Commissioner to the Government in Biluchistan, and here he remained, working with the energy which always distinguished him, until his death. He was taken ill at Quetta in June, 1896, and died on June 13th, deeply regretted by all who knew him. The natives felt that they had lost a true friend, a man who really could understand them. His memoirs have been written by General J. McLeod Innes, v.c., c.b., and published by Mr. John Murray, 1905.

MAJOR-GENERAL SIR J. C. ARDAGH, K.C.M.G., K.C.I.E., C.B., LL.D.

John Charles Ardagh, who was the son of the late Rev. W. J. Ardagh, vicar of Rossmire, was born at Comragh House, County Waterford, on August 9th, 1840, and received his first commission in the Royal Engineers on April 1st, 1859. After completing his course of instruction at Chatham he was ordered to Pembroke Dock for duty in connection with the new fortifications, which were then in course of construction under the Defence Act of 1860.

He remained at Pembroke until 1862, when the action of the United States in the matter of the R.M.S. *Trent* necessitated the despatch of a military force to Canada, and Ardagh was selected for service in connection with the construction of a line of telegraph through the colony of New Brunswick. He embarked in command of a detachment of sappers in the transport *Victoria*, which was chartered to convey the 96th Regiment to Canada. The vessel met with severe storms in the Atlantic, and would have been lost, had it not been for the exertions of Ardagh and his men, who constructed temporary pumps and managed to keep the ship afloat until her captain succeeded in bringing her to the Azores. For his good services on this occasion Lieut. Ardagh was thanked publicly on parade by order of the Commander-in-Chief.

On his return to England, Ardagh served at Chatham for a short time, and was then ordered to the Southern District for employment on the Defence Works. He was engaged on the Spithead Forts and the fortifications of the Isle of Wight; and also at Newhaven, where he was principally responsible for the design and construction of Newhaven Fort, and showed much ability in the invention of an equilibrium drawbridge at the entrance of the fort.

Ardagh's knowledge and skill in fortifications brought him prominently to notice, and, in 1868, he was selected to act as Secretary of the Committee, under the presidency of Admiral



Sir Frederick Grey, which was appointed to inspect and report on the fortifications in course of construction under the Defence Act of 1860. He accompanied the Committee on all their tours, and, after the issue of their report, received the thanks of the Secretary of State for War for the satisfactory manner in which he had performed his duties. In 1869 he accompanied Sir William Jervois on a tour of inspection of the fortifications at Halifax and Bermuda, and, during the same year, acted as Secretary of a Committee, of which Colonel Collinson was chairman, which reported on the defence of the southern and eastern coasts of England from Portsmouth to the Wash.

In 1871, Ardagh was sent to Malta for a few months, and, in 1872, was promoted captain. Just prior to his promotion he went up for the entrance examination to the Staff College, and passed the final examination with great distinction in December, 1874. On the completion of the Staff College course he was ordered to the War Office for duty in the Intelligence Department of which the Chief at that time was General Sir P. Macdougall.

He had not been long at the Intelligence Department, when he was selected to accompany the Marquess of Salisbury on his mission to Constantinople. Affairs in South-Eastern Europe were then in a critical condition. In April, 1876, an insurrection had broken out in Bulgaria, and had been suppressed with considerable severity by the Turkish troops; in June, the violent death of the Sultan, Abdul Aziz, was followed by the assassination of the Turkish Ministers for War and for Foreign Affairs, and, in July, there was a declaration of war by Servia, and constant conflicts in the Balkan provinces. War between Russia and Turkey was imminent, notwithstanding the efforts of the other European powers to prevent it. An International Conference was held at Constantinople in December, 1876, which proposed reforms for Turkey, but led to no satisfactory result, and war was declared by Russia in April, 1877.

Captain Ardagh was at Constantinople during this trying time, and was able to render valuable assistance to the British Ambassador, for which, on his return to England, he received the thanks of the Commander-in-Chief, the Secretary of State for War, and the Foreign Secretary. At the end of the same

year, he was sent on a special mission to Italy, and, soon after this duty had been completed, he was appointed one of the assistants to General Sir Lintorn Simmons, who acted as military adviser to Lord Beaconsfield and Lord Salisbury, the British representatives at the International Congress, which assembled at Berlin in June, 1878, to settle the terms of peace between Russia and Turkey, and the future organization of the Turkish provinces. Here Ardagh's knowledge of Turkey and of affairs in the East proved of great value, and, after the conclusion of the Congress, he was given the C.B.

In September, 1878, he was again ordered to Turkey, as assistant to Colonel Home, the British member of the International Commission, appointed to delimitate the boundary between Bulgaria and Eastern Rumelia in accordance with the terms of the Treaty of Berlin. The work was arduous, and, as usual, a large share of it devolved on the British officers of Royal Engineers. The survey was continued until stopped by winter, when the party returned to Constantinople and Ardagh received the pleasant intelligence that he had been given a brevet majority for his services in Turkey. Shortly afterwards Home contracted typhoid fever, and died, when his place as British Commissioner was taken by Sir Edward Hamley, to whom Ardagh continued to act as senior assistant. The work of the Boundary Commission lasted until September, 1879, after which Ardagh made a tour in Asia Minor and the Crimea, returning to England by way of Moscow and St. Petersburg.

The difficult question of the Græco-Turkish frontier had not been settled by the Berlin Congress, and, in June, 1880, an International Conference was assembled at Berlin to discuss this matter, to which Sir Lintorn Simmons, with Ardagh as one of his assistants, was sent as technical military adviser. A convention was agreed to as regarded the boundary between the two countries, and, shortly afterwards, Ardagh was selected to act as British representative on the International Commission, appointed to delimitate the boundary line on the ground. The work was both arduous and dangerous, as the Turkish authorities put considerable difficulties in the way of progress, and, on the other hand, the officer in command of the Turkish

escort was shot by Greek brigands at Dervendista. But Ardagh worked steadily along, and the marking out of the boundary line was completed in October, 1879. He was highly commended by Lord Dufferin, then British Ambassador at Constantinople, and received the thanks of the Foreign Office for the able manner in which he had carried out his difficult task.

After returning from Turkey to England Major Ardagh continued to serve in the Intelligence Department until February, 1882, when he was appointed Instructor in Military History at the School of Military Engineering at Chatham. But he had only held this post for a few months, when he was once more ordered to the East, in consequence of the crisis in Egypt which led to the war of 1882, and the occupation of Egypt by England. He left England on July 5th and was one of the early arrivals at Alexandria, where he was entrusted with the duty of placing the town in a state of defence, as only a small number of British troops had landed, and Arabi was at Kafr Dawar, with a considerable Egyptian Army. By July 19th Alexandria was made secure against any attack that the Egyptians could attempt.

When the base of the British expeditionary force was transferred to the Suez Canal, Ardagh was left at Alexandria in charge of the Intelligence Department, but was ordered round to Ismailiyeh just before the Battle of Tel-el-Kebir at which he was present. After the action, he was left for a time at Tel-el-Kebir in charge of the railway, and then joined the headquarter staff in Cairo. When the war was at an end, he was appointed Deputy-Assistant Adjutant-General on the staff of General Sir A. Alison, who had been placed in command of the British Army of Occupation in Egypt. For his services in the campaign he was promoted brevet lieutenant-colonel, and received the Order of the Osmanieh.

Early in 1883, Ardagh made a tour in Palestine, where he met General Gordon, and, in July, went on leave to England. But he was obliged to return to Cairo almost immediately, in consequence of the outbreak of cholera in Egypt, and worked hard for the health of the troops during the epidemic.

At that time, the rebellion in the Sudan, which had commenced in 1881, was assuming serious proportions, and the defeat of Hicks Pasha at Kashgil, and of Baker Pasha at El Teb in February, 1884, forced the British Government, much against their will, to take action. It was decided to send a British force to Suakin, under General Sir Gerald Graham, and Ardagh was attached to his staff as Commanding Royal Engineer and Chief of the Intelligence Department. He left Cairo on February 15th, landed at Trinkitat, and was present at the Battle of El Teb, where the Arabs were defeated with great loss. Tokar was then occupied, and Ardagh had to make the arrangements for the removal of the Egyptian inhabitants. After the occupation of Tokar, Graham and his force returned to Suakin, and had another fight with the Arabs at Tamai, after which the country round became fairly quiet, and the road to Berber was practically open. Sir Gerald Graham was strongly of opinion that an advance should have been made with the view of assisting General Gordon, and in this Ardagh entirely agreed, and he was always in favour of the Suakin-Berber route for the relief of Khartum. But the British Government refused to allow an advance, and recalled the British troops from Suakin.

In July, 1884, it was decided to send a force up the Nile, under Lord Wolseley, for the relief of Khartum, but Ardagh, much to his regret, was not allowed to accompany it, probably because he had expressed his views strongly in favour of going by way of Suakin. But he was appointed Commandant of the base in Cairo, and had a vast amount of work to do in connection with forwarding supplies and reinforcements to the front. He met all the difficulties which arose with a calm cheerfulness, which was the admiration of all who had dealings with him, and there can be no doubt that his energy and devotion to duty helped more than is generally known in the carrying out of the Nile expedition. At the conclusion of the campaign, he was mentioned in despatches, promoted to brevet colonel, and received the C.B. of the military division of the Order. As he had previously received the C.B. of the civil division, he had the unusual distinction of wearing both C.B.'s. He also received the 3rd Class of the Order of the Medjidieh.

After the withdrawal of the British force from the Nile and the abandonment of the province of Dongola, the Egyptian frontier was fixed at Kosheh, on the Nile, some miles south of Wady Halfa. In November, 1885, the Dervishes determined to attempt an invasion of Egypt, and advanced from Dongola. General Sir F. Stephenson, who commanded the British Army of Occupation, proceeded to Halfa to take steps for resisting the Dervish attack, and Ardagh accompanied him as Chief of the Staff. On December 30th, a combined force of British and Egyptian troops, under Sir F. Stephenson, advanced from Kosheh, and attacked the enemy at Ginnis, defeating them with great loss. The Battle of Ginnis was a great blow to the Khalifa, and checked the Dervish attempts at the invasion of Egypt for a considerable time. For his services in this campaign Ardagh was mentioned in despatches.

On returning to Cairo, besides his staff duties, he had much work to do in connection with Sir H. Drummond Wolff's mission, and also with the settlement of the financial questions between England and Egypt, which had arisen during the Nile Campaign. For his services with regard to this latter duty he received the thanks of the Treasury. In January, 1887, he was promoted to the rank of Colonel on the Staff, and at the end of the same year, was recalled to London to take up the appointment of Assistant Adjutant-General for defence and mobilization at the War Office. In 1888, he was made aide-de-camp to the Commander-in-Chief, and, in November, was asked by the Marquess of Lansdowne who had been appointed Governor-General of India, to accompany him as private secretary. In 1892, Ardagh suffered from a severe attack of fever, and was obliged to go to England to recover, returning to India by way of Canada, the United States, Japan, and China. He remained with Lord Lansdowne until the latter had completed his term of service as viceroy, and also remained for a time with the Earl of Elgin, the next Governor-General, finally returning to England in May, 1894. In recognition of his Indian services, he was given the C.I.E. in 1892, and was created K.C.I.E. in 1894.

In 1895, Ardagh was appointed Commandant of the School of Military Engineering at Chatham, and, in the following year,

was selected for the important position of Director of Military Intelligence at the War Office, and was given the temporary rank of major-general. He held this position for five years, years of incessant and arduous work, more especially as they included the period of the war in South Africa. At one time there was an idea that the British Government had not been sufficiently informed as to the state of preparation of the Boer Republics for war, and this notion, if correct, would have implied that Sir John Ardagh and the Intelligence Department had failed in their duty. But the publication by the *Standard* of the contents of "Military Notes on the Dutch Republics of South Africa," a secret work compiled by the Intelligence Department, of which a copy had fallen into Boer hands after the action at Talana, and the evidence given before the Royal Commission on the War in South Africa, proved conclusively that Ardagh had carried out his duties in a most thorough manner, and had, in spite of a very limited staff and inadequate funds, kept the authorities at the War Office and Colonial Office fully informed as to the military resources of the Boers, and the number of troops necessary for the defence of the British colonies. The latter he estimated at 40,000 men, while he considered that 200,000 men would be required for carrying the war into the enemy's territory. Subsequent events proved how accurately he had judged the situation. It was an undoubted trial to him to feel that he was unjustly accused when knowing that he had done his duty, but, at the time, with the loyalty which always characterized his actions, he would not say a word to justify himself in the eyes of the public.

Sir John Ardagh was nominated in 1899 as British representative on the International Commission for delimitating the boundary between the Republics of Argentina and Chile in South America, and, in the same year, was appointed British Military Delegate at the first Peace Conference at The Hague. There he took a leading part in drawing up the "Rules respecting the Laws and Customs of War on Land," which formed an important advance in international military law, and in which only one small amendment was made at the second Peace Conference.

Ardagh's knowledge of international law was of great service during the South African War, as owing to the misconduct of persons of foreign nationalities, a number of complicated cases arose. The deportation of many undesirable foreigners to Europe caused considerable irritation on the Continent, and a Commission was appointed to adjudicate on the claims made by foreign powers on behalf of these persons. Ardagh was nominated on this Commission, and succeeded, by the exercise of careful diplomacy, in settling a very complicated business to the satisfaction of the foreign governments, and also of his own. In October, 1901, he was sent to South Africa to investigate the claims for compensation made by subjects of friendly powers in consequence of the war, and proceeded again to South Africa in 1902, as a member of the Royal Commission for the revision of sentences, which had been passed under martial law during the progress of hostilities.

Ardagh was retired from the Army under the age clause of the Royal Warrant on August 9th, 1902, but continued to be employed by the Foreign Office, and, in that year was selected as member of the Permanent Court of Arbitration at the Hague, and was also appointed one of the British Government Directors of the Suez Canal. In December, 1902, he was made a K.C.M.G. In June, 1906, he was appointed senior British Plenipotentiary at the Conference for the revision of the Geneva Convention of 1864, respecting the treatment of wounded in time of war.

He was one of the representatives of the British Red Cross Society at the International Red Cross Conference in June, 1907, and this was his last public duty, as he died on September 30th, 1907, at Glynllim Park, Carnarvon.

A memoir of Sir John Ardagh, written by his widow, Susan, Countess of Malmesbury, was published by Mr. John Murray in 1909.

## COLONEL M. S. BELL, V.C., C.B.

Mark Sever Bell, who was the son of Hutchinson Bell, Esq., of Leconfield, Yorkshire, was born in Sydney, New South Wales, on May 15th, 1843, and was commissioned as lieutenant in the Royal Engineers on June 25th, 1862. After leaving Chatham in 1864, he embarked for India, and, in the following year, was appointed as Superintendent of the Park and Field Train, and Fieldwork Instructor at Roorkee.

In 1865, Lieut. Bell commanded the Bengal Sappers & Miners in the Bhutan Campaign, and acted as Assistant Field Engineer with the Right Column. He also commanded two companies of the Sappers & Miners in the Hazara Campaign of 1868, and greatly distinguished himself by the rapid march which he made from Chukrata to Abbotabad to join the field force under the command of General Wilde. This march was described in General Orders of the Government of India in the following words:—"Two companies of the Sappers & Miners actually covered nearly 600 miles by forced marches in 29 days in August and September, and were ready to take part in the advanced guard of General Wilde's force."

After the conclusion of the campaign Bell was appointed to the Public Works Department at Amritsar and, in 1871, was made Executive Engineer at Rupar. Returning to England in 1872, he was selected for service in the Ashanti Campaign of 1873, and landed at Cape Coast Castle on October 10th.

The country through which the British Force under Sir Garnet Wolseley had to march towards Coomassie was very difficult, as it was covered with dense forest and thick bush, through which roads had to be cut before the troops could advance; and the officers of Royal Engineers had to work in front of the advanced guard, and keep the native workmen to their task, frequently under a heavy fire. On January 31st, 1874, the force advanced in three columns, of which Major Home, R.E., led the centre, Captain Buckle, R.E., the left, and Lieut. Bell the



right. Buckle was shot through the heart, and a number of the workmen were killed and wounded, but Home and Bell cut the roads through and the village of Amoaful was captured.

The advance was then continued under the same difficult conditions. On February 3rd, a running fight was kept up all day during which Bell, with an unarmed and uncovered working party, cut his way into a strongly defensible position occupied of the enemy. On the following day, at the Capture of Ordahsu, his gallantry was so conspicuous that he was recommended for the Victoria Cross, and the despatch gave the reasons for this recommendation in the following words:—"For his distinguished bravery and zealous, resolute and self-devoted conduct at the Battle of Ordahsu, on February 4th, 1874, while serving under the immediate orders of Colonel Sir J. C. McLeod, K.C.B., of the 42nd Regiment, who commanded the advance guard. Sir J. McLeod was an eye-witness of his gallant and distinguished conduct on the occasion, and considers that this officer's fearless and resolute bearing, being always in the front, urging on and encouraging an unarmed working party of Fantee labourers, who were exposed, not only to the fire of the enemy, but to the wild and irregular fire of the native troops in the rear, contributed very materially to the success of the day. By his example he made these men do what no European working party was ever required to do in warfare—namely, to work under fire in face of the enemy without a covering party."

In Sir G. Wolseley's despatch on the conclusion of the campaign Lieut. Bell's valuable services were specially noticed.

After returning from the west coast of Africa, Bell was promoted captain and was stationed at Dover in command of the 1st Company, R.E., and, in 1876, was moved with the company to Shorncliffe Camp. The same year he passed the competitive examination for entrance to the Staff College, and, after completing the two years' course, passed the final examinations with honours in December, 1878. He was then attached to the Intelligence Department at the War Office until March, 1880, when he was selected for the appointment of Assistant Quartermaster-General of the Intelligence Department in India, and joined at Simla in April. But he did not remain tied to an

office chair at headquarters, for, during the next few years, he carried out a remarkable series of reconnaissances through eastern countries, including China, Kashgaria, Persia, Mesopotamia, and Armenia, during which he acquired a mass of valuable information.

Bell was promoted to the rank of major shortly after his arrival in India, and, in October, 1884, was given the brevet of lieutenant-colonel in recognition of his distinguished services. In 1885 he succeeded Colonel Lockhart as Deputy Quartermaster-General and Chief of the Intelligence Department in India, and, in the farewell order by General Sir C. Macgregor, issued when he vacated the post of Quartermaster-General, special mention was made of the work performed by him, and for the ability and zeal which he displayed in carrying out important reconnaissances in the face of dangers and hardships.

During the Burma War of 1886-7 Bell was employed in the Intelligence Department, and, in the latter year, was appointed aide-de-camp to the Queen with the rank of colonel in the Army. His time on the Staff in India came to an end in 1888, and, prior to his departure from the country, General Chapman, the Quartermaster-General, issued an order conveying to him the thanks of the Commander-in-Chief for his valuable services in the Intelligence Branch, which, after detailing the work that he had carried out, went on as follows:—

“The explorations completed by him have added largely to geographical knowledge, and the information secured for Government during the adventurous journeys which he has undertaken, is especially valuable; while numerous reports and compilations, which are on record in the office, bear testimony to the industry and care with which the observations of an experienced traveller and military reconnoiterer may be compiled.

“To Colonel Bell, the Intelligence Branch is mainly indebted for the system under which its work has been so largely developed, and for the vigour with which important enquiries made during the last three years have been pushed to conclusion; he has successfully ensured the accomplishment of large results with comparatively small means at his disposal. The spirit with which he has performed the arduous reconnaissances above

detailed, and the thoughtful attention which he has given to the administration of the Intelligence Branch, are deserving of special acknowledgment. Under his direction, the standard of work has been raised, and the plan of compiling our military topographical knowledge has been improved. His own efforts have been largely supplemented, it is true, by the labours of other officers; but his example and wise management have been mainly instrumental in placing the Intelligence Branch upon its present footing."

After his return to England in January, 1889, Colonel Bell was appointed Commanding Royal Engineer at Shorncliffe, from which he was transferred, in the following year, to the same appointment in the Dublin District. In June, 1893, he was given the C.B. He had received the Macgregor Gold Medal for his reconnaissance work in 1889, and, in 1890, had been elected a Fellow of King's College, London, of which he had formerly been a student, for his distinguished services.

In May, 1894, Bell vacated his appointment in Dublin, on completion of five years' service as lieutenant-colonel, and, after remaining unemployed for some months, was in December of the same year appointed Commanding Royal Engineer in the Western District where he remained until August, 1898, when he was compelled by ill-health to give up active work. He returned to the unemployed list until May 15th, 1900, when he was retired under the age clause of the Royal Warrant. After leaving Plymouth, he lived at Earlywood Lodge, Windlesham, where he died on June 26th, 1906.

## INDEX TO VOL. III.

- Abbasiyeh Barracks, Cairo, 172.  
 Abbott, Major-General Sir F. 247.  
 Abyssinian Frontier, The Survey of, 182, 184.  
 Abd el Mejid, The Emir, 55.  
 Abdullah, The Khalifa, 54, 72, 75.  
 Abney, Captain Sir W. de W., 234.  
 Abraham's Kraal, 103.  
 Abu Fatmeh, 364.  
 Abu Hamed, 67.  
 Abu Klea, The Battle of, 372.  
 Addiscombe College, 251.  
 Addison, Lieut.-Colonel G. W., 233.  
 Admiralty, The, 227.  
 Aeronautic Corps, The, 49.  
 Afghan War, The, of 1842, 248.  
 Afghan War, The, of 1878, 318, 352, 377.  
 Agar, Colonel E., 220, 228.  
 Ahmed Fedil, The Emir, 73.  
 Air Battalion, The, 27, 47.  
 Akashch, 56, 63.  
 Albert Lake, The, 185.  
 Albert Edward Lake, The, 213.  
 Alderney, 272.  
 Aldershot, 16, 21, 24, 27, 154, 156, 159.  
 Alexandria, 383.  
 Alexandria, International Commission on Port of, 297.  
 Aliwal, The Battle of, 249, 255.  
 Aliwal, North, 92.  
 Alleman's Nek, 119.  
 Alma, The Battle of the, 340.  
 Ambela Campaign of 1863, The, 290, 375.  
 Ambigol Wells, 63.  
 Ambukol, 65.  
 Anatolia, 369.  
 Anderson, Colonel F. J., 12, 230.  
 Anderson, Major J., 327.  
 Anderson, Major S., 368.  
 Arabi Pasha, 370.  
 Arbitration, The Hague Court of, 387.  
 Archer, Corporal G., 215.  
 Ardagh, Major-General Sir J. C., 55, 220, 224, 228, 265, 380.  
 Argin, The Battle of, 60.  
 Arkwright, Lieut.-Colonel L. A., 71.  
 Armstrong, Colonel R. Y., 2, 220.  
 Armstrong, Major B. H. O., 196.  
 Army Council, The, 8.  
 Army Sanitary Committee, The, 283.  
 Arundel, 92.  
 Ashanti, The, Campaign of 1873, 388.  
 Ashanti, The Survey of, 195.  
 Ashworth, Lieut.-Colonel P., 162.  
 Assistant Adjutants-General of Royal Engineers, 2, 6.  
 Assistant Directors of Works, 2, 12.  
 Assistant Inspectors-General of Fortifications, 3, 7.  
 Atbara, The Battle of the, 68.  
 Attfield, Corporal, 207, 210.  
 Austin, Lieut.-Colonel H. H., 182, 229, 237.  
 Australia, 277, 361.  
 Auxiliary Forces, The, of the Royal Engineers, 40, 42, 47, 48, 111.  
 Bagot, Colonel C. H., 6, 163.  
 Baker, Lieut.-General Sir W. E., 255, 268, 332.  
 Balloon Companies, The, 49.  
 Corps, The, 46.  
 Factory, The, 38.

- Balloon Section, The 1st, 38, 40, 80, 89, 100, 114.  
 Section, The 2nd, 40, 79, 85.  
 Section, The 3rd, 41, 111, 114, 118.  
 Section, The 4th, 41.  
 Section, The 5th, 41.  
 Section, The 6th, 41, 44.  
 Military, in British Service, 38.  
 in the South African War, 85, 90, 95, 102, 118.
- Balmoral, 121.
- Barbados, 20.
- Barberton, 123.
- Barker, Major-General Sir G., 7, 13, 222.
- Barker, Colonel J. C., 124.
- Barklie, Colonel R. M., 163.
- Barracks, 131.  
 Accommodation, 132, 152, 153, 160, 163.  
 Act of 1822, The, 149.  
 Act of 1890, 3, 21, 162, 164, 171, 315.  
 The Commissioners of, 147.  
 Committee of 1857, The, 153.  
 Construction, The Department of, 11, 169.  
 The Controller of, 147.  
 Department of 1792, The, 142, 148, 150.  
 and Hospital Improvements Committee, 154.  
 in Ireland, 134, 138.  
 The Irish, Act of 1697, 137.  
 The Irish, The Commissioners of, 140.  
 The Irish, The Overseers of, 135, 139.  
 The Irish, The Trustees of, 135, 139.  
 Master-General, The, 144, 146, 147, 149, 170.  
 The Royal, in Dublin, 137, 140.  
 in Scotland, 133.  
 System under the Board of Ordnance, The, 141.
- Basutoland, 112, 309.
- Bate, Colonel C. McG., 3, 220.
- Bechuanaland, The Survey of, 189.
- Behrens, Captain T. T., 216.
- Belfast, 18, 122, 163.
- Belfield, Colonel E., 154.
- Bell, Colonel M. S., 388.
- Belmont, 89.
- Bengal Sappers and Miners, The, 36, 49, 388.
- Berber, 65, 67, 348, 384.
- Bergendal, The Battle of, 122.
- Berlin International Congress of 1878, The, 265.
- Bermuda, 19, 30, 276, 281.
- Bethanie, 104.
- Bethell, Colonel E. H., 80, 128, 129.
- Bethlehem, 121.
- Bethulie, 87, 92, 104, 121.
- Bhutan Campaign of 1864, The, 351, 388.
- Biggarsberg, The, 119.
- Bigge, Lieut.-Colonel T. A. H., 224.
- Biluchistan, 376, 378.
- Blakeney, Major R. D. B., 64, 72, 111, 237.
- Blockhouses in South Africa, The, 125.
- Bloemfontein, 99, 103, 104, 110.
- Bloemfontein, The Survey of, 192.
- Blood, General Sir B., 224.
- Blunt, Lieut. W. S., 237.
- Board of Works, The Irish, 280, 318.
- Bodley, Sir J., 133.
- Boileau, Colonel F. R. F., 6, 130, 211, 222, 224.
- Bombay Sappers and Miners, The, 36, 50.
- Bombay Submarine Miners, The, 39.
- Bond, Colonel F. G., 127, 224.
- Boshof, 109, 113, 118.
- Botha, General, 119.
- Botha's Pass, 119.
- Boughhey, Colonel G. F. O., 233.
- Boundary Commissions, 203.  
 The Gambia, 1890-99, 203.  
 Sierra Leone—French Guinea, 1891-99, 204.

- Boundary Commission of 1911, The Anglo-Belgian-German, 215.  
 of 1903, The Anglo-Liberian, 204.  
 of 1898, Bechuanaland—German, 210.  
 of 1892, British-German East Africa, 216.  
 of 1904, British-German East Africa, 216.  
 of 1878, The Bulgarian, 382.  
 of 1839, Canada—United States, 259.  
 of 1858, Canada—United States, 366.  
 of 1902, The Chile-Argentine, 216.  
 of 1895, The Cross River (Nigeria), 208.  
 of 1907, The Cross River—Yola, 209.  
 of 1900, Gold Coast—French Sudan, 205.  
 of 1902, Gold Coast—Ivory Coast, 206.  
 of 1901, Gold Coast—Togo Land, 206.  
 of 1880, Græco—Turkish, 382.  
 of 1900, Lagos—Dahomey, 207.  
 of 1906, The Niger—Lake Chad, 207.  
 of 1898, Nyassa—Tanganyika, 211.  
 of 1911, Peru—Bolivia, 218.  
 of 1911, Rhodesia—Belgian Congo, 212.  
 of 1892, Rhodesia—Portuguese East Africa, 210.  
 of 1898, Rhodesia—Portuguese East Africa, 210.  
 of 1904, Rhodesia—Portuguese East Africa, 210.  
 of 1856, Russo-Turkish, 311.  
 of 1857, Russo-Turkish, 262.  
 of 1878, Servian, 369.  
 of 1907, Uganda—Belgian Congo, 213.
- Boundary Commission of 1902-04, Uganda—German East Africa, 216.  
 of 1903, Yola—Lake Chad, 208.  
 Bowen, Captain C. O. C., 92, 115, 122, 128.  
 Bowles, Colonel F. G., 172.  
 Bowman-Manifold, Major M. G. E., 63, 67, 128, 220, 237.  
 Boyd, Corporal S. A., 206.  
 Boyne, The Battle of the, 134.  
 Boys, Lieut.-Colonel R. H. H., 128.  
 Brabant, Major-General Sir E. Y., 91.  
 Brandwater Basin, The, 121, 124.  
 Breton, Colonel H. D'A., 7.  
 Bridging Battalion, The, 93, 100.  
 Bridging in South Africa, 96, 97, 98, 107.  
 Bridging Trains, The, 27, 47, 49.  
 Bright, Colonel R. G. T., 183, 187, 213, 216.  
 Briscoe, Sergeant A. R., 204.  
 Broke, Lieut.-Colonel H., 80.  
 Brompton Barracks, Chatham, 148.  
 Brown, Lieut. C. R., 104.  
 Brown, Captain G. A. P., 197.  
 Brown, Major Sir R. H., 237.  
 Brown, Colonel W. B., 12, 45.  
 Browne, General Sir J. F. M., 234.  
 Browne, Major-General Sir J., 375.  
 Buckland, Colonel R. U. H., 237.  
 Buckle, Captain R. N., 388.  
 Buckle, Captain S., 230.  
 Buller, General Sir R., 79, 85, 95, 98, 99, 118.  
 Burgh, Lieut.-Colonel T., 135, 136.  
 Burgoyne, Field Marshal Sir J. F., 148, 150, 252, 273, 310, 319.  
 Burke, Lieut. J. T., 252, 261.  
 Burmese War of 1824, The, 243, 247.  
 Burmese War of 1851, The, 268.  
 Burmese War of 1886, The, 390.  
 Burn, Lieut.-Colonel E. M. J., 106, 224.  
 Burn-Clerk-Rattray, Colonel P. R., 8, 93.  
 Buston, Colonel P. T., 99, 128.

- Cabul, 353.  
 Cadell, Sergt.-Major, 109.  
 Cager, Lance-Corporal, 200.  
 Cairo, 370.  
 Caledon River, The, 112, 121.  
 Call, Lieut.-Colonel C. F., 234.  
 Cameron, Colonel J., 163.  
 Cameron, Major Sir M. A., 230.  
 Camps, The Great, 154, 161.  
 Canada, 275.  
 Cape Colony, 18, 78, 90, 109, 163, 271, 292.  
 Cape Colony, The Survey of, 194.  
 Capper, Colonel J. E., 107, 120, 127, 129, 224.  
 Cardew, Major P., 233.  
 Carmichael, Major J. F. H., 230.  
 Carter, Corporal C., 184.  
 Casgrain, Major P. H. du P., 111, 192, 224.  
 Cator, Lieut. E. H. S., 64, 66, 237.  
 Cæsar's Camp at Ladysmith, 85.  
 Ceylon, 30.  
 Chancellor, Major Sir J. R., 230, 234.  
 Channel Islands, The, 18, 29.  
 Chapman, General Sir F. E., 252, 323, 355.  
 Charles, Captain J. R. E., 103, 115, 128.  
 Chatham, 16, 27.  
 Chelsea Barracks, 156.  
 Chenevix-Trench, Lieutenant R., 237.  
 Chermiside, Major-General Sir H. C., 56, 58, 113, 225, 229, 230, 237.  
 Chesney, General Sir G. T., 331.  
 Chief Engineer, The, 25.  
 Chief Engineer, The Irish, 133.  
 Chieveley, 98.  
 Chilianwallah, The Battle of, 268.  
 China, 19, 30, 342.  
 Clarke, Lieut.-General Sir A., 2, 299.  
 Clauson, Major Sir J. E., 231, 234.  
 Clayton, Lieut.-Colonel A. G., 61.  
 Clayton, Major Sir E. G., 234.  
 Clayton, Colonel V. G., 220.  
 Cleeve, Colonel S. D., 7, 12.  
 Clerke, Captain A. J., 323.  
 Clode, Mr. C. M., 145, 152.  
 Close, Colonel C. F., 111, 177, 178, 179, 192, 208, 211, 220, 229.  
 Clyde, Field Marshal Lord, 316, 328.  
 Coast Battalion, The, 35, 39, 46.  
 Coast Defence Areas, The, 23, 27.  
 Cochrane, Major T. H., 12.  
 Coffin, Major Clifford, 122, 225.  
 Colchester, 154.  
 Colenso, 95.  
 Colesberg, 87, 92, 109.  
 Collins, Sapper, 116.  
 Collinson, Major-General T. B., 381.  
 Colonial Defence Committee, The, 365.  
 Colonial Office, The, 230.  
 Colonial Survey Committee, The, 174, 180.  
 Colonial Survey Section, The, 44, 180, 193, 197, 200.  
 Colvin, Major J. M. C., 130.  
 Commands, The Army Corps, of 1902, 22.  
 Command System of 1905, The, 23, 26.  
 Commanding Royal Engineer, The Duties of, 14, 25.  
 Company, The 2nd Field, 30, 49.  
     The 5th Field, 27, 41, 44, 111, 114.  
     The 7th Field, 35, 40, 78, 83, 89, 100, 101, 102, 103, 114, 115, 117, 121, 123.  
     The 9th Field, 27, 41, 44, 99, 100, 101, 103, 114, 117, 118, 121.  
     The 11th Field, 27, 37, 40, 80, 89, 114, 118, 121.  
     The 12th Field, 29, 35, 40, 44, 80, 91, 112, 114, 115, 116, 122, 123.  
     The 17th Field, 16, 29, 35, 40, 80, 95, 96, 97, 98, 115, 119.  
     The 23rd Field, 16, 27, 35, 40, 78, 82, 84, 86, 119, 123.  
     The 24th Field, 19, 35, 61.  
     The 26th Field, 16, 27, 35, 40, 44, 80, 92, 100, 103, 114, 115, 116.  
     The 37th Field, 37, 41, 44, 47, 88, 96, 98, 115, 119.

Company, The 38th Field, 29, 37, 41, 44, 99, 100, 101, 103, 114, 121.  
 The 46th Field, 41, 44, 47.  
 The 54th Field, 30, 41.  
 The 55th Field, 30, 41.  
 The 56th Field, 28, 41.  
 The 57th Field, 28, 41.  
 The 58th Field, 41, 49.  
 The 59th Field, 29, 41.  
 The 60th Field, 41, 44.  
 The Composite Field, 122, 123.  
 The 1st Fortress, 20, 31, 35, 45, 389.  
 The 2nd Fortress, 17, 35, 49, 68, 71.  
 The 3rd Fortress, 17, 27, 35.  
 The 4th Fortress, 28, 45, 313.  
 The 5th Fortress, 20, 35.  
 The 6th Fortress, 19, 28, 35, 40, 46, 80, 105, 114.  
 The 7th Fortress, 339.  
 The 9th Fortress, 20, 35.  
 The 11th Fortress, 19, 35, 56, 313, 339.  
 The 15th Fortress, 20, 31, 35.  
 The 18th Fortress, 20, 28, 35, 46.  
 The 20th Fortress, 20, 28, 35, 40, 44, 81, 105, 106, 114.  
 The 21st Fortress, 27.  
 The 22nd Fortress, 28.  
 The 23rd Fortress, 27, 323, 342.  
 The 24th Fortress, 31, 37.  
 The 25th Fortress, 18, 30, 35.  
 The 27th Fortress, 30.  
 The 28th Fortress, 31, 45.  
 The 29th Fortress, 18, 35, 40, 78, 83, 89, 114.  
 The 30th Fortress, 28.  
 The 31st Fortress, 19, 30, 35, 40, 81, 89, 105, 106, 114.  
 The 32nd Fortress, 18, 31, 35.  
 The 33rd Fortress, 29, 46.  
 The 35th Fortress, 28, 46.  
 The 36th Fortress, 31, 37.  
 The 39th Fortress, 27.  
 The 40th Fortress, 30, 45.

Company, The 41st Fortress, 31, 38.  
 The 42nd Fortress, 28, 38, 40, 81, 105, 106, 114.  
 The 43rd Fortress, 31, 39.  
 The 44th Fortress, 31, 41.  
 The 45th Fortress, 31, 41, 45, 81, 114.  
 The 47th Fortress, 30, 41, 44, 93, 114.  
 The 49th Fortress, 41, 44.  
 The 50th Fortress, 41, 44.  
 The 51st Fortress, 41, 44.  
 The 52nd Fortress, 41, 44.  
 The 16th Fortress (Coast, Battalion), 28, 46.  
 The 49th Fortress (Coast Battalion), 29, 46.  
 The West Indian Native Fortress, 38.  
 The 8th Railway, 19, 27, 35, 40, 55, 56, 78, 89, 105, 106, 114.  
 The 10th Railway, 17, 27, 35, 40, 44, 80, 105, 106, 114.  
 The 53rd Railway, 27, 41.  
 The 1st Searchlight, 46.  
 The 4th Submarine Mining, 19, 20, 35.  
 The 21st Submarine Mining, 35.  
 The 22nd Submarine Mining, 19, 35.  
 The 27th Submarine Mining, 17, 19, 35.  
 The 28th Submarine Mining, 17, 35.  
 The 30th Submarine Mining, 35.  
 The 33rd Submarine Mining, 19, 35.  
 The 34th Submarine Mining, 20, 35.  
 The 35th Submarine Mining, 36.  
 The 39th Submarine Mining, 37.  
 The 40th Submarine Mining, 37.  
 The 48th Submarine Mining, 42.  
 The 13th Survey, 35.  
 The 14th Survey, 35.  
 The 16th Survey, 35, 46.  
 The 19th Survey, 35.  
 Companies, The Balloon, 49.  
 The Bridging, 46.  
 The Dépôt, 35, 49.



- Companies, The Signal, 27, 29, 49.  
 The Telegraph, 27, 29, 30, 46.  
 The Telegraph (Airline), 47.  
 The Telegraph (Cable), 47.  
 The Telegraph (Wireless), 27, 47.  
 49.  
 Conference, The Bloemfontein, 79.  
 Congress of 1878, The Berlin, 265, 382.  
 Coningham, Captain A. E., 185, 195.  
 206, 237.  
 Connaught, The Duke of, 263.  
 Coode, Captain A. M., 185.  
 Cooke, Lieut.-General A. C., 179.  
 Coomassie, 388.  
 Cooper's Hill College, 236, 290, 333.  
 Cotton, General Sir A. T., 243.  
 Courtney, Major D. C., 234.  
 Cowan, Colonel J. H., 12, 221.  
 Cowie, Colonel C. H., 129, 225.  
 Cox, Captain E. W., 185, 204, 210.  
 Craster, Colonel S. L., 229.  
 Craven, Major A. J., 130.  
 Crimean War, The, 252, 259, 294, 309.  
 313, 320, 339.  
 Cronje, General P., 82, 83, 101.  
 Crook, Sergeant W. F., 196.  
 Crossman, Major-General Sir W., 335.  
 Crosthwaite, Major H. L., 216.  
 Crusher, Corporal, 210.  
 Cumberland, Major-General C. E., 314.  
 Cunningham, Major-General T., 148.  
 Curragh Camp, The, 18, 29, 154.  
 Curtis, Colonel R. S., 13, 80, 128, 129.  
 231, 237.  
 Custom House, The Dublin, 138.  
 Cyprus, 19.  
 Dale, Lieut. and Qr.-Mr. W. H., 237.  
 Dalgety, Lieut.-Colonel, 112.  
 Danford, Captain B. W. Y., 237.  
 Danube, The River, 294, 311.  
 D'Arcy, Major-General R., 148.  
 Dardanelles, The, 252.  
 Darling, Colonel C. H., 7.  
 Davidson, Colonel S., 7, 172, 228.  
 Davies, Colonel J. G. S., 2, 221.  
 Davies, Lance-Corporal E. F., 209.  
 Davy, Major C. W., 231.  
 Dawson-Scott, General R. N., 2.  
 Day, Lieut. W. E., 238.  
 De Aar Junction, 82, 87, 108, 110.  
 Defence Act of 1860, The, 274.  
 Defences of Canada, The, 337.  
 De Gomme, Sir B., 132.  
 De Lancey, General O., 142, 146, 149.  
 Delhi, The Siege of, 287, 306, 331, 351.  
 Denison, Lieut.-General Sir W., 299.  
 Denison, Captain G. W., 207.  
 Denniss, Lieut. G. B. B., 86.  
 Dépôt Companies, The, 49.  
 Dépôt, The Field, 27.  
 Deputy Adjutant-General, 2, 6.  
 Deputy Directors of Works, 2.  
 Deputy Inspectors-General of Fortifications, 3, 6.  
 Dervishes, The, 55.  
 Des Vœux, Major H. B., 206, 231.  
 Devonport, 152.  
 De Wolski, Colonel F. R., 231.  
 Diamond Hill, 120.  
 Dickinson, Colonel E., 6.  
 Dillon, Lance-Corporal C. H., 204.  
 Directors of Fortification and Works,  
 The, 11, 12, 169.  
 Director of Works, The, 10.  
 District Organisation, 13, 26.  
 Division Officers, 15, 26.  
 Dobbs, Chief Engineer A., 138.  
 Done, Lieut. R. J., 238.  
 Dongola, 53, 65, 372.  
 Donnelly, Major-General Sir J. F. D.,  
 234, 355.  
 Doornkop, 117.  
 Dordrecht, 91.  
 Dorward, Major-General Sir A. R. F.,  
 225.  
 Doucet, Captain L. C. A. de B., 197,  
 208, 210.  
 Douglas, Lieut. W. F. E., 238.  
 Drutt, Colonel E., 231, 233.  
 Dublin, 18, 29, 150, 163.

- Du Cane, Major-General Sir E. F., 234, 335.  
 Dumaresq, Major A. H., 12, 111.  
 Dumbleton, Colonel H. N., 8.  
 Dundee in South Africa, 82.  
 Dunman, Captain T. N., 181, 190.  
 Durban, 94.  
 Durnford, Colonel A. G., 3.  
  
 East Africa, The Survey of, 185, 186.  
 East London, 90.  
 Eastern Battalion, The, 37.  
 Eastern Command, The, 24, 27.  
 Edenberg, 104.  
 Edgeworth, Lieut. K. E., 238.  
 Edmonds, Colonel J. E., 221.  
 Edwards, Lieut.-General Sir J. B., 225.  
 Edwards, Lieut.-Colonel Sir F. I., 234, 265.  
 Egerton, Lieut. C. H., 238.  
 Egypt, 19, 30, 236.  
 Egypt, The Survey of, 181.  
 Egyptian Campaign of 1882, The, 343, 370, 377, 383.  
 Electric Lights, Inspector of, 11, 12.  
 Electrical Engineers, The Corps of, 39, 42, 47, 111.  
 Elliot, Colonel G. S. McD., 80, 108, 129, 198, 207, 225, 229.  
 Elphinstone, Major-General Sir H. E., 179, 222, 320.  
 El Teb, The Battle of, 346, 384.  
 Engineer, The Chief, 132.  
 Engineer, The Irish Chief, 133.  
 Englehart, Sergeant, 103.  
 English, Lieut.-Colonel T., 2, 235.  
 Enthoven, Major C. H., 221.  
 Eupatoria, The Battle of, 261.  
 Evans, Captain G. F., 194, 199, 207.  
 Evans, Captain L., 117.  
 Ewart, Major-General C. B., 235, 253.  
 Exham, Colonel S. H., 228.  
 Eyre, Lieut.-Colonel T., 140.  
  
 Falcon, Major C. G., 97, 130.  
 Famine Commission, The Indian, 257.  
 Farquharson, Colonel Sir J., 178.  
 Fashoda, 72.  
 Ferguson, Captain F. A., 238.  
 Ferket, 63.  
 Ferrier, Major-General J. A., 55, 225.  
 Festing, Major-General E. R., 235.  
 Field, Sergeant-Major, 91.  
 Fiji, The Survey of, 202.  
 Firozshah, The Battle of, 249.  
 Fishbourne, Lieut. C. E., 186.  
 Fisher, Major-General B., 140.  
 Foley, Colonel A. C., 61, 80, 90.  
 Ford, General C. E., 157.  
 Foreign Office, The, 228.  
 Foster, Colonel H. J., 221, 229, 231.  
 Foulkes, Major C. H., 92, 115, 207.  
 Fourteen Streams, 113, 117.  
 Fowke, Colonel G. H., 13, 85, 129, 162, 229.  
 Fowler, Lieut.-Colonel J. S., 108, 130, 222.  
 Frankfort, 116.  
 Fraser, Major-General Sir T., 7, 222, 238.  
 Fraser, Lieut.-Colonel T., 130.  
 Frazer, Lieut.-Colonel A., 141.  
 Fredericks, Captain D. A., 229.  
 French, Field Marshal Sir J. D. P., 88, 90, 92, 100.  
 Frere, 95.  
 Friend, Major-General L. B., 12, 71, 222, 238.  
 Frith, Captain G. R., 207.  
 Fuller, Major F. G., 81, 130, 221.  
  
 Gale, Lieut.-Colonel H. R., 129, 130, 225.  
 Gallipoli, 252.  
 Galloway, Lieut.-General Sir T. L. J., 231, 280.  
 Galton, Captain Sir D. S., 153, 157, 282.  
 Gambia, The Survey of the, 196.

- Gandy, Captain H. G., 238.  
 Garnault, Captain H. W., 316.  
 Gatacre, Major-General Sir W., 68, 88,  
 90, 104, 112, 113.  
 Gedaref, 73.  
 Geographical Section of the General  
 Staff, The, 178.  
 Gervers, Major F. R. S., 195.  
 Gibraltar, 20, 21, 31, 163.  
 Giles, Captain F. L. N., 199.  
 Gill, Sir David, 187, 190.  
 Gillam, Major R. A., 212.  
 Ginnis, The Battle of, 56, 385.  
 Girouard, Colonel Sir E. P. C., 63, 65,  
 70, 80, 105, 127, 129, 223, 225,  
 231, 238.  
 Giurgevo, 261, 339.  
 Glasgow, 160.  
 Glubb, Colonel F. M., 119, 128.  
 Godby, Colonel C., 238.  
 Godfrey-Faussett, Major E. G., 80,  
 108, 130.  
 Gold Coast, The Survey of the, 194.  
 Gordon, Major-General C. G., 53, 76,  
 262, 295, 311, 312, 326, 345,  
 348, 371, 383.  
 Gordon, Major-General E. C. A., 159.  
 Gordon, Major H. W., 191, 192, 194,  
 200, 221.  
 Gordon, Major-General Sir J. W., 2,  
 253, 320, 355.  
 Gordon, Lieut.-Colonel W. S., 62, 65,  
 70, 72, 238.  
 Gordon Boys' Home, The, 266.  
 Goringe, Major-General G. F., 65, 75,  
 127, 221, 225, 238.  
 Gowlland, Lieut. G. C., 238.  
 Graham, General Sir G., 57, 339, 384.  
 Grant, Colonel S. C. N., 178, 191, 204,  
 210, 221, 231.  
 Grant, Major P. G., 92, 225, 238.  
 Grant, Lieut.-General Sir R., 3, 5, 363.  
 Graspan, 89.  
 Great Britain, The Survey of, 174.  
 Greathed, Major-General W. W. H.,  
 331.  
 Greig, Lieut. J. P. S., 202.  
 Greig, Captain R. H., 128.  
 Grenfell, Field Marshal Lord, 54, 60.  
 Griqualand, East, 188.  
 Grover, Colonel G. E., 3, 229.  
 Grubb, Major A. H. W., 128.  
 Gubat, 373.  
 Guggisberg, Major F. G., 195, 198,  
 199, 206.  
 Gujerat, The Battle of, 286, 305.  
 Gwynn, Major C. W., 184, 225, 238.  
 Haggitt, Major E. D., 235.  
 Haig, Lieut.-Colonel A. B., 235.  
 Halifax, 20, 276.  
 Hall, Captain G. C. M., 72, 238.  
 Hall, Captain H. A. L., 186, 196.  
 Hamilton, General Sir B. M., 114.  
 Hamilton, General Sir Ian, 116.  
 Hamuda, The Emir, 63.  
 Harlin, Sapper, 204.  
 Harness, Major-General Sir H. D., 324.  
 Harper, Colonel G. M., 128, 221, 223.  
 Harrison, General Sir R., 5, 221, 223,  
 235.  
 Harrison, Major W. A., 181.  
 Hart, General Sir R. C., 223, 225.  
 Harvey, Major R. N., 80, 128, 231.  
 Hassard, Major-General F. C., 339.  
 Hawkins, General Sir J. S., 157.  
 Hawkins, Colonel W. F., 79, 108, 127.  
 Hazara Campaign, The, 388.  
 Hearson, Captain J. G., 199, 207, 208.  
 Heath, Colonel G. M., 79, 85, 118, 128,  
 129, 225.  
 Heath-Caldwell, Major-General F. C.,  
 13, 129, 226.  
 Hedley, Colonel W. C., 130, 179, 221.  
 Hellard, Colonel R. C., 163, 178.  
 Helsham-Jones, Colonel H. H., 262.  
 Hemming, Colonel E. H., 7, 12.  
 Henderson, Lieut.-Colonel Sir E. Y. W.,  
 336.  
 Hepper, Colonel A. J., 55, 221.  
 Herbert, Lord, of Lea, 153, 283.

- Herbert Hospital, The, 157, 284.  
 Hewett, Lieut.-General E. O., 235.  
 Higman, Sergeant-Major H., 215.  
 Hildebraud, Colonel G., 6, 7.  
 Hill, Colonel A., 6.  
 Hills, Major E. H., 177, 200, 221.  
 Hime, Lieut.-Colonel Sir A. H., 94, 231.  
 Hippisley, Colonel R. L., 80, 108, 127.  
 Hlangwhane Hill, 98.  
 Hobbs, Captain R. F. A., 128.  
 Holdich, Colonel Sir T. H., 216.  
 Holt Wilson, Colonel E. E. B., 117, 128.  
 Home, Colonel R., 179, 382, 388.  
 Home, 2nd Lieut. R. D. E., 238.  
 Hosking, Corporal, 198.  
 Hoskyns, Colonel Sir C., 163.  
 Hospital, The Herbert, 157.  
 Hospital, Netley, 156.  
 Huteatt, Colonel H., 238.  
 Hunter, General Sir A., 63, 66, 85, 113, 121.  
 Hunter, Major C. G. W., 194, 229.  
 Hunter-Weston, Colonel A. G., 80, 92, 93, 103, 116, 128, 129, 221, 223, 226.  
 Hutchinson, Major-General C. S., 233.  
 Hutchinson, Lieut. D. A., 181, 200.  
 Hutton, Major G. M., 128.  
 Hussey, Major W. C., 235.  
 Hyslop, Colonel R. M., 7.  
  
 Imperial Defence Act, The, 160.  
 Indian Sappers and Miners, The, 50.  
 Indian Submarine Miners, The, 36, 38.  
 Indus, The River, 375, 376.  
 Ingur, The Battle of the River, 262.  
 Innes, Lieut.-General J. J. McL., 327.  
 Innes, Captain W., 277.  
 Inspector-General of Fortifications, The, 2, 4, 5, 169.  
 Inspector-General of Royal Engineers, 2.  
 Intelligence Department, The, 179, 368, 381, 386, 389.  
 Intelligence Department, The Indian, 380.  
 International Commission for the River Danube, 294.  
     for the Panama Canal, 297.  
     for the Port of Alexandria, 297.  
     for the Suez Canal, 295, 387.  
 International Map of the World, The, 178.  
 Ireland, The Chief Engineer in, 21, 133.  
 Ireland, The Survey of, 174.  
 Irish Command, The, 24, 29.  
 Irish War of 1689, The, 134.  
 Iron Structures, Inspectors of, 3, 8, 12.  
 Irrigation Work in India, 245, 255, 256, 267.  
 Irvine, Colonel J. L., 13, 80, 96, 98, 119, 129.  
  
 Jack, Major E. M., 187, 213, 215.  
 Jackson, Colonel H. M., 129, 191, 200, 226.  
 Jackson, Colonel L. C., 12, 198, 208, 229.  
 Jackson, Captain L. C., 181, 193, 208.  
 Jalalabad, 248.  
 Jamaica, 20, 31.  
 Jamaica, The Survey of, 181.  
 James, Major-General E. R., 262, 311.  
 James, Major-General Sir H., 179.  
 Jekyll, Colonel Sir H., 229, 233, 235.  
 Jelf, Colonel R. H., 235.  
 Jelf, Lieut. R. J., 95, 108.  
 Jerome, Colonel H. J. W., 99, 127.  
 Jersey, 13, 29, 314.  
 Jerusalem, The Survey of, 367.  
 Jervis, Major T. B., 178.  
 Jervois, Major J., 231.  
 Jervois, Lieut.-General Sir W. F. D., 231, 271, 361.  
 Jessep, Colonel H. L., 162.  
 Johannesburg, 117.  
 Johnson, Captain C. R., 128.  
 Johnson, Lieut. & Qr.-Mr. T., 192.  
 Johnston, Colonel Sir D. A., 178.

- Johnston, Major W. J., 177, 206.  
 Johnstone, Captain J. H. L'E., 8, 238.  
 Joly de Lotbinière, Major H. G., 128,  
     130, 229, 238.  
 Jones, Lance-Corporal A. J., 187, 213.  
 Jones, Lieut.-Colonel H. B., 80, 130, 226.  
 Jones, General Sir H. D., 253, 356.  
 Jones, Major-General R. O., 235.  
 Jones, Lieut. R. J. T. D., 87, 127.  
 Joubert, General P., 81.  
 Jumna, The River, 376.  
  
 Kabul, 248.  
 Kaffir War, The, of 1845-47, 271, 292.  
 Kaffraria, 271, 292.  
 Kaibar, 64.  
 Kandahar, 248, 353, 377.  
 Kangra Valley, The, 376.  
 Kassala, 58, 67.  
 Kassassin, 344.  
 Kekewich, Major-General R. G., 83.  
 Kelly, Captain H. H., 185, 238.  
 Kelly-Kenny, General Sir T., 100.  
 Kelvin, Lord, 39.  
 Kenhart, 110.  
 Kennedy, Captain M. R., 238.  
 Kenney, Colonel A. H., 128, 196, 203,  
     204.  
 Kent, Colonel H. V., 8.  
 Kenyon, Colonel E. R., 228.  
 Khartum, 53, 348, 372.  
 Khasganj, The Battle of, 289.  
 Khelat-i-Ghilzai, 318, 377.  
 Kimberley, 82, 83, 100, 114, 117.  
 Kinburn, 313, 360.  
 Kincaid, Colonel W. F. H. S., 65, 67,  
     78, 101, 129, 223, 226, 239.  
 King, Captain L. N. F. I., 197.  
 King, Captain W. A. de C., 190.  
 Kingston Barracks, Jamaica, 171.  
 Kirkpatrick, Colonel G. M., 81, 129,  
     130, 221, 226.  
 Kitchener, Field Marshal Earl, 59, 61,  
     62, 65, 71, 72, 75, 76, 99, 124,  
     127, 128, 226, 229, 239.  
  
 Klip River, The, 85.  
 Knightsbridge Barracks, London, 160.  
 Knockner, Colonel H. P., 3.  
 Knox, Major G. S., 185, 200.  
 Koomati Poort, 123.  
 Kosheh, 55, 64, 385.  
 Kroonstadt, 115, 120.  
 Kruger, President, 122.  
 Kufit, The Battle of, 58.  
 Kuram Valley, The, 353.  
  
 Laberschagrin Nek, 91.  
 Ladysmith, 78, 82, 83, 87, 94, 95, 96,  
     98.  
 Laffan, Colonel H. D., 188, 210.  
 Lake, Colonel N. M., 6, 7, 163, 165.  
 Lambert, Colonel S. J., 221.  
 Laug-Hyde, Lieut.-Colonel J. I., 198,  
     207.  
 Laing's Nek, 119.  
 Lawrence, Mr. C., 203.  
 Lawson, Major-General H. M., 10, 74,  
     75, 129, 221, 223, 226, 239.  
 Leach, Lieut.-General Sir E. P., 55,  
     223.  
 Learoyd, Colonel C. D., 129.  
 Lee, Lieut.-Colonel R. P., 222.  
 Lees, Major W. E., 231.  
 Leggett, Major E. H. M., 106, 123,  
     128, 130.  
 Legh, Captain F. B., 181.  
 Lennox, General Sir W. O., 222, 226,  
     323, 342.  
 Leslie, Major G. A. J., 231.  
 Levenson, Colonel G. F., 80, 89.  
 Levenson, Colonel J. J., 210, 229.  
 Lewis, Colonel J. F., 228.  
 Ley, Captain C. H., 191, 202.  
 Lichfield, 160.  
 Liddell, Major J. S., 239.  
 Lindley, 116, 120.  
 Lindsay, Lieut.-Colonel H. E. M.,  
     130.  
 Livingstone, Lieut.-Colonel H. A. A.,  
     226.

- Lloyd, Sir C., 132.  
 Lloyd, Colonel E. M., 3.  
 Lloyd, Major F. L., 111, 222.  
 Locke, Lance-Corporal H., 209.  
 Locock, Colonel H., 2, 3, 4, 6, 162, 165.  
 Lombard's Kop, The Battle of, 84.  
 London, 17, 24, 29, 150, 152, 156, 160, 163.  
 Londonderry, 150.  
 Longfield, Captain W. E., 239.  
 Lord, Captain P. C., 239.  
 Lubbock, Major G., 222.  
 Lucknow, 289, 314, 316, 317, 324, 327, 328.  
 Lydenberg, 122.  
 Lyons, Captain H. G., 181, 239.
- McCallum, Colonel Sir H. E., 232.  
 Macauley, Major Sir G. B., 70, 72, 239.  
 McClintock, Major R. L., 83, 128.  
 Macdonald, Major-General Sir J. R. L., 226, 232.  
 McDiarmid, Corporal, 202.  
 Macdonogh, Colonel G. M. W., 222, 223.  
 Macfie, Major W. C., 186.  
 McGregor, Sergeant-Major C., 197, 203.  
 McHardy, Lieut.-Colonel Sir A. B., 235.  
 McInnes, Lieut.-Colonel D. S., 83, 128, 226, 232.  
 Mackenzie, Colonel W. J., 7, 12.  
 McKerlie, Colonel Sir J. G., 319.  
 Mackesy, Major J. P., 204.  
 Mackesy, Captain P. J., 196.  
 Mackintosh, Captain E. E. B., 239.  
 Mackworth, Captain H. L., 92, 109, 128, 239.  
 McNeill, Captain A. G., 181, 185, 194, 239.  
 McNeil's Zeriba, 58, 350.  
 McQueen, Lance-Corporal, 200.  
 Madras Sappers and Miners, The, 36, 49.  
 Mafeking, 82, 83, 118.  
 Magersfontein, The Battle of, 89.
- Mahdi, The, 54.  
 Mahmud, The Emir, 68.  
 Main, Colonel T. R., 111.  
 Maitland, Major-General Sir J. M. H., 3, 6.  
 Malay States, The, 276, 302.  
 Malay States, The Survey of, 181, 199.  
 Malta, 20, 21, 31, 163.  
 Mance, Captain H. O., 128.  
 Manchester Barracks, 150.  
 Mann, General G., 140.  
 Manser, Major W. E., 232.  
 Mantell, Colonel A. M., 239.  
 Map of the World, The International, 178.  
 Mapping Sections, The, 191.  
 Marchand, Captain, 72.  
 Marindin, Colonel Sir F. A., 234.  
 Mason, Lieut.-Colonel H. M., 140.  
 Massy, Major H. H., 80, 97.  
 Master-General of the Ordnance, The, 9, 132, 148, 169.  
 Matheson, Lieut.-Colonel J., 7.  
 Matheson, Major J. C., 230.  
 Maud, Major P., 183, 222, 239.  
 Maunsell, General Sir F. R., 331.  
 Mauritius, 20, 31.  
 Mauritius, The Survey of, 181.  
 Maxwell, Lieut.-Colonel C., 91, 112, 129.  
 Maxwell, Lieut. G. A. P., 185.  
 Maxwell, Major-General R. C., 6, 13, 99, 101, 127, 223.  
 Mayne, Colonel C. B., 7, 12.  
 Meares, Capt. A. D., 128.  
 Meridian, The African Arc of the, 182, 187.  
 Methuen, General Lord, 88, 90, 100.  
 Meyer, General L., 81.  
 Meyricke, Lieut. E. G., 239.  
 Meyricke, Captain R. E., 94, 95.  
 Micklem, Major H. A., 72, 107, 130, 239.  
 Micklem, Captain R., 239.  
 Middleburg, 122, 125.  
 Midwinter, Captain E. C., 72, 239.

- Military Education, The Department of, 326, 374.  
 Military Forces Localization Act, The, 159, 343.  
 Military Operations, The Department of, 179.  
 Military Works Acts, The, 22, 164, 166, 167, 168, 170, 365.  
 Military Works in India, 290, 354.  
 Militia, The Royal Engineers, 35, 111.  
 Militia, The Submarine Mining, 36, 37.  
 Modder River, The, 89, 93, 99, 109.  
 Mograkeh, 55.  
 Moir, Major J. P., 68, 109, 128, 239.  
 Molyneux, Chief Engineer W., 134.  
 Moore, Captain H. T. G., 209.  
 Morony, Lieut.-Colonel B. E., 111.  
 Morris, Colonel Sir W., 78, 127, 187, 190, 199.  
 Mounted Detachment, The, 37.  
 Moysey, Major-General C. J., 2.  
 Mudki, The Battle of, 249.  
 Mullaly, Major-General H., 129, 227.  
 Multan, The Siege of, 305.  
 Murray, Lieut. J., 341.  
 Murray, Lieut.-Colonel J. H. S., 226.  
 Murray, Lieut.-Colonel V., 106, 130.  
 Muse, Lance-Corporal, 196.  
 Mutiny, The Indian, 269, 286, 306, 313, 316, 327, 331, 351, 360.  
 Naanwport, 82, 87.  
 Nanton, Colonel H. C., 106, 129, 130, 227.  
 Napier, Field Marshal Lord, 360.  
 Natal, 19, 114.  
 Natal, The Survey of, 188.  
 Nathan, Lieut.-Colonel Sir M., 232, 235.  
 Nathan, Major W. S., 130, 227.  
 National Defences, Royal Commission on the, 274.  
 Netley Hospital, 156.  
 Nevil, Chief Engineer A. J., 139.  
 Newcombe, Captain E. O. A., 239.  
 Newcombe, Captain S. F., 202, 239.  
 New Guinea, 361.  
 Newhaven, 380.  
 Newsome, Lieut.-Colonel W., 157.  
 New Zealand, 277, 278, 299.  
 Nicholson, Field Marshal Lord, 99, 129, 222.  
 Nicholson, General Sir L., 2, 3, 161, 232.  
 Nigeria, The Survey of Northern, 199.  
 Nigeria, The Survey of Southern, 197.  
 Nile Campaign of 1884-5, The, 53, 326, 363, 371, 384.  
 Nixon, Colonel F. W., 3.  
 Noel, Colonel W. F. N., 78, 94, 162.  
 Northern District, The, 17.  
 Northern Command, The, 24, 27.  
 North Eastern District, The, 21.  
 North Western District, The, 21.  
 Norval's Pont, 87, 93, 104, 109.  
 Nugent, Major C. H. H., 8.  
 Nur el Kanzi, The Emir, 56.  
 Oakes, Captain R., 12.  
 O'Brien, Lieut.-Colonel D., 235.  
 Omar Pasha, 260.  
 Omdurman, 70, 72.  
 O'Meara, Major W. A. J., 83, 127, 227, 235.  
 Ommannay, Captain Sir M. F., 232.  
 Ommannay, Captain R., 199.  
 Orange River, The, 107.  
 Orange River Colony, Survey of, 181, 193.  
 Ordahsu, The Battle of, 389.  
 Ordnance, The Board of, 132, 145, 147, 149, 150, 170.  
 The Board of, Abolition of, 34, 152.  
 The Irish Board of, 133.  
 The Irish Board of, Abolition of, 149.  
 Select Committee, The, 281.  
 Survey, The, 173, 174, 368, 374.  
 O'Shee, Major R. A. P., 199, 207, 210, 230, 232.

- Osman Digna, 58, 349.  
 O'Sullivan, Colonel G. H. W., 227.  
 Ottley, Colonel Sir J. W., 235.
- Paardeberg, 101, 102.  
 Page, Lance-Corporal C. H., 187, 196, 213.  
 Palestine Exploration Fund, 202, 367.  
 Palestine, The Survey of, 202, 368.  
 Palmer, Major-General H. S., 230.  
 Panama Canal, The International Commission on the, 1879, 297.  
 Park, The 1st Field, 16, 35, 80, 114.  
 Park, The 2nd Field, 37.  
 Park, The 3rd Field, 41.  
 Park, The 4th Field, 41.  
 Parsons, Major-General Sir C., 68, 73.  
 Parliament, The Dublin House of, 138.  
 Parys Drift, 116.  
 Pasley, General Sir C., 301.  
 Patagonia, 216.  
 Peace Conference, The Hague, 386.  
 Peacock, Lance-Corporal N. S., 211.  
 Pearce, Captain Sir E., 138.  
 Pearson, Major H. D., 181, 185, 197, 204, 240.  
 Pemba, The Survey of, 200.  
 Penrose, Colonel C., 8, 232.  
 Pennington, Lieut. H. L. D., 186.  
 Perak, 276.  
 Perkins, General Sir E., 351.  
 Philips, Colonel G., 323.  
 Phillips, Major G. E., 96, 230.  
 Photo-Reconnaissance Section, The, 114.  
 Pienaarpoort, 120.  
 Pietermaritzburg, 82.  
 Pigott, Major-General T., 140.  
 Pitkington, Major Sir H., 228.  
 Pinnar, Captain N., 133.  
 Piper, General R. S., 271.  
 Pitt, Colonel W., 162.  
 Pitt, Mr. William, 142.  
 Place, Captain C. O., 128.  
 Plunkett, Lieut.-Colonel G. T., 235.
- Plymouth, 163.  
 Poland, 311.  
 Pole-Carew, Lieut.-General Sir R., 104, 123.  
 Pollard, Major-General C., 375.  
 Polwhele, Lieut. R., 64, 240.  
 Pontoon Troop, A, 16, 35, 40, 95, 96, 114, 119.  
 Pontoon Troop, B, 37, 45.  
 Pontoon Troop, C, 41, 114, 116.  
 Pontoon Troop, D, 41, 44.  
 Poplar's Grove, 103.  
 Portsmouth, 148, 150, 163, 337, 381.  
 Potgieter's Drift, 96.  
 Powell, Major S. H., 240.  
 Powell, Lance-Corporal S., 215.  
 Prendergast, Colonel T. J. W., 232.  
 Pretoria, 117, 121.  
 Prince Imperial, The, 264.  
 Pringle, Major J. W., 234.  
 Prinsloo, General, 121.  
 Pritchard, Major H. L., 72, 232, 240.  
 Prittie, Captain the Hon. F. R. D., 215.  
 Probert, Sergeant, 210.  
 Public Works Department, The Indian, 255, 268, 290, 303, 329, 332.  
 Punjab, The, 249, 267, 268.
- Queenstown, South Africa, 87.  
 Quetta, 378.
- Raban, Colonel Sir E., 228.  
 Railway, The, Department of the Board of Trade, 259, 282.  
 The, Pioneer Regiment, 43, 106, 114, 116, 120.  
 The Suakin-Berber, 349.  
 The Sudan, 53, 63, 67.  
 in India, 268.  
 in the South African War, 104, 105, 106, 107, 116.  
 Rainsford-Hannay, Captain A. G., 240.



- Rainsford-Hannay, Brig.-General F., 7, 8, 12, 232.
- Randolph, Lieut.-Colonel A. H., 8.
- Ras Alula, 58.
- Rawson, Colonel H. E., 94, 127, 129.
- Redan, The Assault on the, 341, 356.
- Redman, Captain A. S., 181, 193.
- Regimental Units, The, 33, 35, 38, 39, 45, 47, 50.
- Reid, Major-General Sir W., 335.
- Renny-Tailyour, Colonel H. W., 232.
- Rensburg, 92.
- Rhenoster River, The, 116, 120.
- Rhodes, Captain E. F., 232.
- Rice, Colonel S. R., 78, 84, 123, 125, 129.
- Rich, Colonel F. H., 234.
- Richardson, Corporal, 207.
- Ridout, Lieut.-Colonel D. H., 122.
- Riet, The River, 110.
- Rimmer, Corporal, 202, 207.
- Roberts, Field Marshal Earl, 93, 99, 113, 122, 124.
- Roberts, Major G. B., 240.
- Robertson, Captain C. L., 216.
- Robinson, Sir W., 133.
- Rochfort-Boyd, Colonel C. A., 80, 127.
- Rogers, Major H. S., 235.
- Roper, Colonel A. W., 99, 129.
- Rosmead, 89.
- Ross, Captain A. J., 240.
- Ross, Colonel J. C., 240.
- Rotheram, Sir T., 133.
- Roupell, Captain E. P. S., 208.
- Royal Commission on Barracks and Hospitals, 283.
- on Defence of British Possessions Abroad, 264, 278, 303.
- on Defences of Canada, 337.
- on Embankment of the Thames, 283.
- on National Defences, 251, 274, 336.
- on Organization of the Army, 264.
- on Sanitary Condition of the Army, 153.
- on Tonnage Measurement, 297.
- Royal Engineer Auxiliary Forces, 35, 42, 47, 51.
- Staff in the Districts, 13, 16, 25, 26.
- Staff at the War Office, 1, 10, 12, 169.
- Royal Engineers, Strength of the, in South Africa, 42, 43, 81, 111.
- Ruck, Major-General R. M., 2, 6, 7, 11, 223.
- Rudolf, Lake, 183.
- Russell, Captain R. E. M., 240.
- Russell-Brown, Major C., 210.
- Ruwenzori Mount, 214.
- St. Helena, The Survey of, 181.
- Salc, General Sir R., 248.
- Salisbury Plain, 22, 166.
- Salmond, Major-General Sir W., 2, 4, 6.
- Sandbach, Colonel A. E., 71, 72, 128, 227, 240.
- Sanitary Committee, The Army, 154.
- Sanitary Condition of the Army, 153.
- Sankey, Lieut.-General Sir R. H., 235, 316.
- Sannah's Post, 112.
- Sappers and Miners, The Indian, 36.
- Sappers and Miners, The Royal, 33, 34.
- Sarras, 57.
- Schaw, Colonel H., 2.
- Scholfield, Major G. P., 81, 130, 227.
- Schreiber, Captain A. L., 91, 128.
- Science and Art Department, The, 357.
- Sclater, Captain B. L., 230, 232.
- Scott, Major A. C., 240.
- Scott, Major-General D. A., 6, 55, 224.
- Scott, Lance-Corporal J. G., 211.
- Scottish Command, The, 24, 29.
- Scott-Moncrieff, Colonel Sir C. C., 236, 240.
- Scott-Moncrieff, Major-General G. K., 12.
- Scratchley, Major-General Sir P. H., 360.
- Scudamore, Lieut.-Colonel W. V., 106, 227.

- Sealy, Lieut. E. M. W., 213.  
 Seaman, Lieut.-Colonel E. C., 12.  
 Searchlight Section, The 1st, 42, 44, 111.  
 Searchlight Section, The 2nd, 42, 44, 111, 114.  
 Searchlights, Electric, 39.  
 Sebastopol, The Siege of, 253, 261, 310, 320, 340, 355, 360.  
 Seddon, Colonel H. C., 159, 228.  
 Settle, Lieut.-General Sir H. H., 7, 60, 61, 80, 110, 127, 129, 224, 227, 240.  
 Seymour, Major L. I., 107, 121.  
 Sharpe, Colonel J. B., 80, 88, 163.  
 Sheerness, 152.  
 Sheffield, 152.  
 Shendy, 69.  
 Sheridan, Sapper, 196.  
 Shone, Lieut.-General Sir W. T., 5, 11.  
 Shorncliffe Camp, 154.  
 Sierra Leone, 20, 31.  
 Sierra Leone, The Survey of, 181, 196.  
 Signal Service, The, 49.  
 Sikh War of 1845, The, 255, 286.  
 Silistria, The Siege of, 260.  
 Sim, Colonel G. H., 88, 97, 127.  
 Simmons, Field Marshal Sir J. L. A., 232, 259, 311, 382.  
 Sinai, The Survey of, 368.  
 Sinauer, Lieut. E. M., 240.  
 Sinclair, Colonel H. M., 224.  
 Skinner, Colonel M. W., 162.  
 Sloan, Corporal W. S., 206.  
 Smith, Major G. E., 185, 216, 230.  
 Smith, Colonel P. G. L., 228.  
 Smith, Colonel R. Baird, 287.  
 Smith, Major-General Sir R. M., 230, 236.  
 Smith-Dorrien, General Sir H. L., 101.  
 Smith-Rewse, Colonel H. W., 7.  
 Sobraon, The Battle, 249, 255.  
 South African War, The, 77.  
 South Africa, The Survey of, 176, 181, 187, 188, 191, 192.  
 Southern Command, The, 24, 28.  
 Sowerby, Captain M. E., 240.  
 Spion Kop, 97.  
 Staff, The General, 23, 24.  
 Staff, The Royal Engineer District, 1, 13.  
 Staff, The Royal Engineer War Office, 1.  
 Stafford, Colonel W. F. H., 80, 92, 127.  
 Stanton, General Sir E., 309.  
 Stephenson, General Sir F., 54.  
 Stevenson, Major A. C., 12, 63, 72, 186, 230, 240.  
 Stewart, Colonel W. R., 12, 78, 83, 106, 129, 227.  
 Stokes, Captain A. W., 240.  
 Stokes, Lieut.-General Sir J., 7, 292.  
 Stopford, Major G. M., 335.  
 Stormberg, 82, 87, 90, 92.  
 Stotherd, Major-General R. H., 178.  
 Stuart, Colonel A. M., 12.  
 Strachey, Lieut.-General Sir R., 255.  
 Straits Settlements, The, 19, 21, 31, 276.  
 Strensall, 159.  
 Strickland, Corporal E. J., 196.  
 Suakin, 57, 60, 346, 349.  
 Suakin-Berber Road, The, 347.  
 Sub-District Commanding Royal Engineer, 14.  
 Submarine Mining, 35, 36, 40, 44, 45, 275, 281, 303.  
 Mining Defences, Inspectors of, 2, 8.  
 Mining Defences in the Colonies, 36, 40, 42, 46.  
 Miners, The Indian, 36.  
 Miners, Militia, 36, 37, 47.  
 Miners, Volunteer, 36, 37, 47.  
 Sudan, The, 53, 63, 75, 345, 371, 384.  
 Sudan, The, The Survey of, 182.  
 Suez Canal, The, 295, 296, 312.  
 Suk Abu Sin, 74.  
 Surprise Hill at Ladysmith, 85.  
 Survey, The Ordnance, 174.  
 Survey Section, The Colonial, 180.  
 The 1st Field, 40, 111, 176, 192.

- Survey Section, The 2nd Field, 40, 111, 114, 176, 192.  
 The 3rd Field, 176, 192.  
 The 4th Field, 176, 192.  
 The 5th Field, 176.  
 The 6th Field, 176.  
 Sutherland, Doctor J., 153, 283.  
 Suttlej, The River, 250, 267, 286.  
 Swinton, Major E. D., 128, 236.  
 Sydenham, Colonel Lord, 233, 236.  
 Symons Captain C. B. O., 195.
- Talana Hill, The Battle of, 84.  
 Talbot, Colonel the Hon. M. G., 71, 72, 75, 182, 184, 240.  
 Tamai, The Battle of, 347, 384.  
 Tasmania, 299.  
 Taylor, General Sir A., 236, 286.  
 Taylor, Colonel E. F., 78.  
 Taylor, Major, 130.  
 Telegraph Battalion, The, 19, 35, 39, 44, 46, 79.  
   Company, K, 46, 47, 50.  
   Companies, The Divisional, 27, 28, 29, 30, 47, 49, 50.  
   Division, The 1st, 35, 39, 40, 79, 80, 82, 92, 95, 100, 103, 108, 114.  
   Division, The 2nd, 35, 39, 114.  
   Division, The 3rd, 41, 44.  
   in South African War, The, 83, 103, 108, 109.  
 Tel-el-Kebir, The Battle of, 344, 370, 383.  
 Templer, Colonel J. B., 41, 81.  
 Territorial Force, The, 47.  
 Thomas, Corporal A., 213, 215.  
 Thompson, Colonel R., 7.  
 Thompson, Major W. M., 216.  
 Thomson, Colonel A. G., 80, 91, 129, 236.  
 Thomson, Major C. B., 130.  
 Thwaites, Captain H. F. O., 240.  
 Taku Forts, The, 342.  
 Tofrik, The Battle of, 58, 350.  
 Tokar, 60, 346.
- Topographical Department of the War Office, The, 179, 368.  
 Topographical and Statistical Department, The, 178.  
 Toski, The Battle of, 62.  
 Trade, The Board of, 233, 259.  
 Trains, Armoured, in South Africa, 83.  
 Transvaal, The, 113, 122.  
 Travers, Major G. A., 130.  
 Triangulation of the United Kingdom, The, 176.  
 Trichard's Drift, 96.  
 Trinity College, Dublin, The Library of, 138.  
 Troop, A Pontoon, 35, 39, 40, 45, 80, 95, 96, 97, 114, 118, 119, 125.  
   B Pontoon, 37, 39, 45.  
   C Pontoon, 41, 46, 93, 100, 114, 116.  
   D Pontoon, 41, 44.  
   The 1st Field, 37, 40, 43, 80, 92, 100, 102, 103, 114, 117, 121, 123.  
   The 2nd Field, 43, 44, 114.  
   The 3rd Field, 43, 114, 118.  
   The 4th Field, 43, 44, 46.  
   The 5th Field, 46.  
 Trotter, Colonel Sir H., 230, 369.  
 Trotter, Major-General Sir J. K., 204.  
 Tucker, Quartermaster and Hon. Major, 130.  
 Tugela River, The, 94, 95.  
 Tulloch, Major H. C. B., 236.  
 Turner, Lance-Corporal A. R., 199.  
 Turner, Colonel H. F., 6.  
 Turner, Major E. V., 82, 84, 85, 240.  
 Turner, Captain J. F., 206.  
 Turton, Lieut.-Colonel W. H., 128.  
 Twiss, Lieut.-Colonel J. H., 106, 130, 227.  
 Tykden, Colonel R., 341.  
 Tyler, Major A. H., 196, 204, 233.
- Uganda, The Survey of, 185.
- Vaal River, The, 113, 115, 116.  
 Vaalkrantz, 98.

- Vallancey, General C., 140.  
 Vereeniging, 117.  
 Vet River, The, 115.  
 Vetch, Colonel R. H., 2, 242.  
 Vicars, Major-General E., 252.  
 Victoria, 299.  
 Victoria Lake, The, 186.  
 Volksrust, 119.  
 Volunteer Battalions, The Royal Engineer, 36, 38, 111.  
 Volunteer Staff Corps, The Engineer and Railway, 36.  
 Volunteer Submarine Miners, The, 37, 38.  
 Von Donop, Lieut.-Colonel P. G., 234.  
 Wad el Nejumi, The Emir, 55, 60.  
 Wady Halfa, 53.  
 Waggon Hill, Ladysmith, 85, 86.  
 Waghorn, Lieut.-Colonel W. D., 130.  
 Walker, Lieut.-General Sir F. F., 82.  
 Walker, General J. T., 305.  
 Walker, Captain R., 212.  
 Waller, Captain R. L., 184.  
 Waller, Colonel S., 236.  
 Walpole, Major-General J., 292.  
 War Office (Reconstitution) Committee, The, 8.  
 War Office, Royal Engineer Staff at the, 1.  
 Warren, Lieut.-General Sir C., 58, 96, 224, 227, 236.  
 Washington, Colonel F. P., 236.  
 Waterhouse, Lieut. G. G., 198.  
 Watherston, Major A. E. G., 195, 205, 206, 210, 233.  
 Watson, Colonel Sir C. M., 4, 6, 7, 58, 162, 165, 230, 240.  
 Waugh, Major-General Sir A. S., 307.  
 Wei-hai-Wei, 22, 166.  
 Wellington, The Duke of, 148, 170.  
 Wepener, The Defence of, 112.  
 Western, Colonel J. H., 240.  
 Western Australia, 336.  
 Western Command, The, 24, 28.  
 Wheatley, Colonel M. J., 236.  
 White, General Sir G., 79, 82.  
 Whitlock, Major G. F. A., 208, 209, 233.  
 Whitters, Lance-Corporal, 200.  
 Wilbraham, Captain B. H., 240.  
 Wilkinson, Colonel C., 163.  
 Williams, Colonel H. B., 128, 130, 222, 224, 227.  
 Williams, Captain G. C., 185.  
 Willock, Captain H. B., 3.  
 Wilson, Lieut. B. T., 240.  
 Wilson, Major-General Sir C. W., 71, 178, 179, 222, 366.  
 Wilson, Lieut.-Colonel C. S., 81, 110.  
 Winburg, 115.  
 Wingate, General Sir F. R., 75.  
 Winterbotham, Captain H. St. J. L., 177, 181, 194.  
 Wodehouse, General Sir J. H., 57, 60.  
 Woking, 163.  
 Wollen, Lieut. W. R. C., 240.  
 Wood, Field Marshal Sir Evelyn, 54, 236.  
 Wood, Major-General Sir E., 3, 80, 110, 127, 129.  
 Wood, Colonel C. K., 80, 95, 129.  
 Woodroffe, Major A. J., 197, 199, 208, 218.  
 Woolley, Mr. J., 203.  
 Woolwich, 17, 148, 163.  
 Woram, Sergeant, 207.  
 Wray, Lieut.-General H., 236, 336.  
 Wright, Colonel H. B. H., 109.  
 Wrottesley, Major-General the Hon. G., 252.  
 Wrottesley, Major A. F., 108.  
 Wynne, Lieut. O. E., 212.  
 Yorke, Lieut.-Colonel Sir H. A., 234.  
 Yonge, Sir G., 143.  
 Young, Captain E. G., 117, 118.  
 Yule, Colonel Sir H., 255, 267.  
 Zand River, The, 115, 120.  
 Zoutspan Drift, 110.