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Authors alone are responsible for the statements made and the opinions expressed in their papers.



DORE BRIDGE.

STUDIES ON THE USE OF FIELD TELEGRAPHS IN SOUTH AFRICA.

By MAJOR E. G. GODFREY-FAUSSETT, R.E.

III .-- LORD ROBERTS' MARCH ON BLOEMFONTEIN.

A TELEGRAPH DIVISION ACTING WITH A FORCE OF SEVERAL DIVISIONS.

THE great feature of the start for the march to Bloemfontein was the absolute secrecy which was maintained as to the Commander-in-Chief's intentions. Very few officers were in the secret, and no one was more bewildered than the telegraph officers when orders were issued at the end of January, 1899, for the concentration at Modder River.

By February 8th, Nos. 2 and 3 Sections were at Modder River, and 10 additional buck wagons and teams were drawn from the transport to carry spare air line, cable, and forage. On the 9th the sections trekked south to Enslin, marching with 3 officers, 69 N.C.O.'s and men, 63 natives, 290 mules, 30 ponies, and 32 vehicles. Mules had fortunately by this time been substituted for the oxen originally issued for G.S. wagons, and a number of boys had been incorporated in the air-line detachments to do the hammer and jumper work, thus freeing the sappers for more important duties.

The water at Enslin was scarce, so that the whole caravan had to go on six miles to Botha's Farm for the next day, and even then the mules had to go four miles to water.

On Sunday, 11th, the start was made, air line being run from Enslin to Ramdam—nine miles of terrible going in great heat. The ground was so dry that jumper holes filled in at once, and nearly every pole had to be dug in with pick and shovel. Moir ran cable in advance with the cavalry, a cart remaining to pick it up when replaced by air line.

Mackworth's section (No. 4) arrived at Enslin by train from Rensburg, and joined the remainder at Ramdam.

The Cavalry Division under General French assembled at Ramdam on the 11th, and left for the drifts of the Riet River at 2 a.m. on the 12th. They were accompanied by a cable section under Moir, who kept them in touch with the air line office at Ramdam. The VII. Division followed later, reaching De Kiel's Drift in the evening. Four air-line parties continued the line in the same direction as far as

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9-Mile Vlei, where they tapped in on Moir's cable, but owing to want of orders got no further on the 12th. A column which had been formed of all the spare telegraph wagons got astray and went to De Kiel's Drift, so that the air-line detachments were without food, save for a sheep purchased at a Kaffir kraal.

On the 13th Moir went off north with the cavalry who secured by the evening Rondeval and Klip Drifts on the Modder. The air line was run on to De Kiel's Drift, but just as it was being finished orders were received to change the point of crossing to Waterval Drift. Some five miles of air line were abandoned, a new line run, and an office opened at Waterval by 3 p.m. This change necessitated the abandonment of Moir's cable if it went wrong, which needless to say it did.

During the night of the 13th the VI. Division crossed at Waterval and marched to Wegdraai, accompanied by a cable laid by Mackworth. The Division pushed on again on the 14th to Rondeval, and in this manner touch was regained with the cavalry through Mackworth's cable.

Early on the 14th the sole use of the drift at Waterval was obtained for half an hour, and the wagons were got across by dint of using double teams. An office was left at Waterval, and the air line pushed on 10 miles to Wegdraai by 1 p.m. Advantage was taken of the early hour to run it on $2\frac{1}{2}$ miles further towards Rondeval in preparation for the next day.

During the 15th, headquarters was stationary at Wegdraai; Mackworth, with an escort, completed the air line to Rondeval (14 miles), and Moir accompanied General French to Kimberley with cable. All the morning the communication was good in both directions, but the air line to Enslin was cut at Waterval when the convoy was attacked there by De Wet. General French reported the relief of Kimberley by cable and by search light *via* Modder River. A small party accompanied the 15th Brigade to Jacobsdal, repairing the permanent line. The party came under fire and lost several mules.

On the 16th headquarters moved to Jacobsdal, and Henrici ran out air line towards Modder, meeting a detachment working out from thence under Capt. Fowler (14 miles). In this way the base was shifted from Enslin to Modder, and all lines laid in rear were abandoned.

Early in the morning Moir's cable from Rondeval to Kimberley was completely destroyed by the whole of Cronje's force trekking over it.

Next day (17th) Mackworth accompanied the VI. Division with cable to Paardeburg. The line from Wegdraai to Rondeval was repaired (it had been cut in two places, and two linemen sent out to repair it were captured), and the air line was continued to near Drieput's Drift, where the detachment bivouacked under escort of Nesbitt's Horse.

The 18th was the day of Lord Kitchener's attack on the Paardeburg laager. Good communication was maintained through Mackworth's cable, and the air line was pushed on to Sterkfontein. Three parties were sent back to run a direct line from Jacobsdal to Rondeval, and so cut out the loop by Wegdraai.

On the 19th Lord Roberts passed through to Paardeburg, and a fresh cable was run from Sterkfontein to his camp. On the 20th the air line replaced it, and on the 22nd the air line was pushed on to Koodoesrand, which remained the extreme point until the 7th March.

For a fortnight, during which the army remained at and about Paardeburg, the hardworked air-line detachments got good rest, though food was scanty and water bad. Unfortunately the question of forage was a difficulty—the telegraphs, as Army troops, were no man's child, and the O.C. had to arrange with his own transport for supply from the parks.

The operators had a very busy time, for the work at Paardeburg, and, later on, at Osfontein—where headquarters moved on 1st March was very heavy, and necessitated the presence of an officer in the office all day to sort out those messages which would best bear delay. After Cronje's capitulation nearly every public body in England thought it necessary to telegraph their congratulations to Lord Roberts. The Wheatstone would have been invaluable, but it was all in use elsewhere, and the line was worked duplex day and night without cessation.

Moir went back with an air-line detachment and repaired the permanent line from Jacobsdal to Kimberley, thus shifting the base to the latter place, where there was more accommodation than at Modder River. A convoy came in on the 3rd with more air-line stores. Moir remained in rear with his detachment, strengthening the air line, on which breakdowns were frequent. Most of these were due to the convoys, who found the line a useful guide at night, and repaid by knocking it down. On one occasion nothing was found of two miles of line but pieces of wire and small scraps of poles.

On 7th March the advance was resumed, an attack being made on the Boer position at Poplar Grove. A cable cart, under Mackworth, accompanied the cavalry on the right, running out 26 miles from Osfontein; another cart kept Lord Roberts at Le Gallais Kopje in touch with Osfontein, and a third cart based on Koodoesrand worked with the balloon and the extreme left under Henrici.

By 12 noon the enemy was in full flight, and Henrici's cable was pushed on to the bivouac at Poplar Grove. The air line was only able to reach Makauws Drift, but it was in to Poplar Grove by 10 a.m. on the 8th, and was pushed on four miles further in the afternoon.

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Headquarters remained at Poplar Grove on the 8th and 9th. The air line was continued eight miles further with an escort of mounted infantry, and Mackworth ran cable with the cavalry to Abraham's Kraal.

Next day's air line was delayed by the Battle of Driefontein, the air-line detachments coming under fire as they were working into the farm.

On the 11th the air line was at Aasvogel Kop (headquarters) by 4.30, and was pushed on to Doornboom afterwards; and on the 12th the air line reached Venters Vallei, while Mackworth ran cable with the cavalry to the railway at Ferriera siding.

At Venters Vallei Lord Roberts authorized the O.C. to express to the detachments his approval of the work that had been done. He at the same time stated that it would be unsafe to leave linemen and intermediate offices on the line, so Moir, who was still in rear, was told to come in through the line, bringing in all maintenance parties with him.

By 11.15 on the 13th the cable was in to Bloemfontein, the telegraph office seized, and all communication with the north cut off. Unfortunately the cable was cut just before, and by the time the air line reached rail it too had gone in rear. As it was impossible to send linemen back—the break might be anywhere in 125 miles things seemed hopeless, and it was with indescribable feelings that the O.C. watched Lord Roberts send off his despatch containing the news of the occupation of Bloemfontein by despatch rider. A copy, however, was given to the telegraphs, to be sent if it were possible.

By reading the messages left in Bloemfontein office, it was discovered that the Boers had been using the Bloemfontein-Boshoff line till the last moment, and on the 14th, Mackworth and Sergt. Cadwell volunteered to ride through and repair it. This they succeeded in doing after many adventures, stealing ponies to replace their own tired beasts from a Boer laager encountered *en route*.

Henrici went south by train with the advanced parties to meet General Clements' advanced guard, and a wire was working by the evening of the 14th.

But at 6 p.m. on the 14th the operator who was watching the useless instrument on the Kimberley air line suddenly obtained signals, and Lord Roberts' despatch was immediately sent off, beating the despatch rider, as we afterwards heard, by two or three hours. The break had been in front of Moir, and he had repaired it as he came through. After this the air line worked for 10 days without any maintenance.

On the whole it may be claimed that the telegraph communication was successful. Touch with the base was never lost for more than a few hours, and the work was nearly always cleared during the night The episode is, however, prolific in lessons, most of which have been learnt, and have affected the present organization.

(a). The operations of General French's Cavalry Division illustrate the hopelessness of trying to keep in touch with strategic cavalry by means of cable. Touch was lost between De Kiel's Drift and Klip, and only regained because the infantry reached Klip. It was lost again between Klip and Kimberley when Cronje crossed, and never regained; and no attempt could be made to follow the cavalry from Kimberley to Paardeburg. No cable is now allotted for this work, but two wireless companies are available.*

(b). Cable sections are required to keep the Commander-in-Chief in touch with his divisions. Little could be done in this way, owing to want of men and cable carts. Mackworth's line on the 13th and 14th is an example; also the work at the Battle of Driefontein, where Lord Roberts, in the centre, was in touch with both his flanks. This is now provided for by the cable companies forming part of the Army troops.

(c). Cable is still required with air line, to get communication when the air-line parties are overtaken by darkness before completing their line, e.g., Henrici's line on the afternoon of March 7th. Each air-line section now has a cable wagon for this purpose, and for working through woodland, where air line would be prohibitively slow.

(d). The Battle of Paardeburg is a good illustration of the necessity for telegraphic communication from Commander-in-Chief right down to battalion commanders. To quote from the official history :—" It would seem probable that Cronje's main laager might have been carried during the afternoon of the r8th had the attacks from east and west been better synchronized, and had they been delivered by a combined effort of all the troops available on each flank." War Establishments now provide a cable company of three detachments for the internal communication of each division, and a section of two mule detachments for each brigade.

(e). The four air-line detachments and three officers available (after deducting officers and men utilized for cable) were insufficient to keep three divisions in touch with their base without unduly hard work. The presence of the Commander-in-Chief of all the troops in South Africa made the traffic enormous; an officer should have been available at all times for duty in the headquarter office, and a second line for local work would have been a great help. The present organization allows for six air-line detachments, and six officers (one air-line company) for a similar force.

(f). Owing to the tendency of supply columns, marching at night, to follow and break down the line, care should be taken to run it

• For further elaboration of this see an article by the same author in the *Cavalry Journal* for July, 1908.

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over inaccessible places, so as to discourage the practice. This was done between Paardeburg and Bloemfontein with good results. In a country of roads and hedges the line should always be over the hedge. Great trouble was also occasioned by mules grazing near the bivouacs—every pole had to be surrounded with a trench and bank to keep them off.

(g). The supply question was a daily anxiety, as the telegraphs were the only Army troops, and no supply column was available. The supply of the scattered telegraph detachments must always be a difficulty, but fortunately each air-line section and each cable detachment is complete with its own transport. In addition, an Army Troop Supply and Transport Column now appears in War Establishments.

DESCRIPTION OF A FERRO-CONCRETE BRIDGE IN THE BRITISH INFANTRY LINES AT AHMEDNAGAR.

By MAJOR A. H. D. RIACH, R.E.

THE following description is that of a bridge constructed to carry the road to the new British Infantry Lines at Ahmednagar, over a shallow nullah of an average width of 30 feet, the water in which rises on occasion to a depth of 3 feet and more. The original estimate provided for stone masonry piers and a decking of steel trough plates on rolled steel girders, at an estimated cost of $\pounds 216$, and the present ferro-concrete structure was substituted to demonstrate its practicability and comparative cost.

The load to be borne is a 10-ton steam roller, or a distributed live load of 75 lbs. per square foot of road surface. The design adopted provides for six ribs of parabolic form, I foot in thickness, 6 inches deep at crown, with 15 feet clear span, a 3-foot rise from haunch to crown, spandrels filled in solid, and spaced at intervals of 3 feet in the clear. These ribs support the decking, also of ferro-concrete, 9 inches thick at centre of roadway and 6 inches at the edges.

Practical considerations decided the form and general dimensions of the ribs, and they are therefore larger than theory demands, as it would have been difficult to construct them had their proportions been determined by calculation alone. The upper surfaces of the ribs are all in one horizontal plane; the camber of the surface of the decking provides a greater strength under the roadway proper, and also allows for the water percolating through the road surface to drain away.

The foundations were on soft rock, and consisted of lime concrete, with a small addition of cement in the top layer. The pier and abutments, of coursed rubble stone in lime mortar, were first completed up to the level of the top of the ribs, leaving spaces into which the concrete of the ribs was to be rammed.

Two moulds—or centerings—of planking with open ends and lined inside with galvanized sheet iron were then supported between the piers and abutments, so as to form one complete trough over the two spans of the bridge, 38 feet long, 1 foot wide, and from 3 ft. 6 ins. to 6 inches deep. The ends of this trough were formed of the masonry filling referred to above. The sides of the moulds were kept in position by bolts passing through sleeves of piping, or bent pieces of iron sheeting, which formed distance pieces. These were placed 4 inches from the top edge of the mould, and in the positions where the shearing bars were to come.

The armouring for each rib consisted of :--

- (a). 2 rods, $\frac{3}{4}$ inch diameter, following curve of parabolic intrados.
- (b). I rod, ³/₄ inch diameter, so bent that its ends came in decking and its central portion followed the curve of the parabolic lying between the two rods (a).
- (c). 2 rods, $\frac{3}{4}$ inch diameter fixed horizontally over rods (a), and 4 inches above top of moulds (so as to come into the decking).
- (d). 26 shearing bars, $1\frac{1}{2} \times \frac{1}{4}$, hooked on to rods (a) and (c).

This armouring, previously bent to template, was fixed in position in the moulds, rods (b) and (c) being supported on wooden blocks laid across the top of the moulds, bars (d) tied to the sleeves above mentioned, serving to support rods (a).

No trouble was experienced in getting the armouring into the correct position, and it was kept from being displaced during ramming by men with small handspikes. The ends of all rods were fish-tailed, and the two rods were bound in the usual way at joints. The moulds and armouring being ready, they were brushed over with a cement wash, and the mixing and ramming of the concrete was then done. The proceedure was as follows :—

Four cubic feet cement and 2 cubic feet sand were mixed dry and added to a heap of 12 cubic feet of clean ballast, consisting of equal parts of $\frac{3}{4}$ -inch gauge trap metal and shingle up to $\frac{3}{4}$ inch, out of which the fine sand had been screened. This was well mixed dry, and a few basketfuls then wetted and turned over and at once carried to the moulds and rammed. The supply of wet concrete was maintained continuously, one lot as above taking about $\frac{1}{2}$ hour to mix, lay, and ram.

The haunches were first filled in and completed, and work gradually carried from both sides towards the crown, which was then filled in and rammed with special care, a mixture of 3 cubic feet ballast and $1\frac{1}{2}$ cubic feet cement being used.

Ramming was done with heavy poles and iron rammers, as found possible. The concrete was well tamped by two men with flattened handspikes, about the armouring, and particularly at connections of shearing bars.

The sides of the moulds were sometimes removed on the second day, and the surface of the concrete rendered where necessary. It was found that a rather wet quaking mixture gave the best surface, but caused cavities, due to the mortar running out in any places near leaks in the mould. Care is therefore necessary to minimize such leaks. The centerings were taken down on the 6th day and the moulds re-erected for the next rib. Progress was as under :--

25th April, 1	907	Filled No. 2 rib.
30th "	,, ···	Removed centering, watching through
•		level, no observable movement.
4th May	,,	Filled No. 3 rib.
9th ,.	31	Removed centering.
11th "	,,	Filled No. 4 rib.
17th "	,,	Filled No. 5 rib.
29th ,,	,,	Filled No. 6 (outer) rib.
4th June	, ···	Storm cleared away centerings.
9th ,,	,,	Filled No. 1 (the last) rib.

On the outer ribs spandrel panels were moulded by means of bevelled planking fixed on to one side of the moulds. The ribs were kept under grass, and watered until the decking was laid.

The centering of the decking consisted of corrugated iron sheets on wooden battens, supported on baulks of wood bolted to the ribs by means of bolts passing through the sleeves already mentioned. This device was very convenient in practice, and obviated the damage from floods to the centering which would have occurred had it not been borne by the ribs.

The armouring of the decking consisted of :--

- (e). Longitudinal bars, $\frac{5}{16}$ -inch diameter, 3 inches centre to centre, laid from end to end of the bridge, and wired at each point of contact to rods (f). These rods were omitted over the ribs.
- (f). Rods, §-inch diameter, 3 inches centre to centre, transversely to the ribs and of the full width of the completed decking. Every alternate rod was bent to template so as to come over the rods (c) of the armouring of the four inner ribs, and was attached thereto with wire binding. The remaining rods are at the lower side of the decking.

The grill, formed as above, was packed up so as to be $\frac{1}{2}$ inch clear above centering. The surfaces of the ribs were roughed and washed, and the joints between the corrugated galvanized iron centering and the ribs, etc., filled with mortar and wooden fillets. The concrete of the decking was then laid, mixed as before, and filled and rammed in diagonal strips of full depth required. The surface was at once rendered, and on the second day was flooded with water.

Decking was completed as above from centre to centre of outer ribs; one span on 22nd June, 1907, and the second on 11th July, 1907.

Care was needed to ensure decking being of requisite thickness; a number of small bits of rod, bound to the grid and set up vertically, with their tips at the required level, served as gauges for the ramming of the finished surface.

The dwarf parapets, including the outer I foot of the decking, the

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railings, and railing pillars were then completed. The pillars were rammed into moulds *in situ*; their steel joists, used as standards and railings, formed a very substantial and cheap railing.

The cost of the completed bridge—omitting the wing walls, etc., and the protective apron to prevent scour, but including the materials used for centerings, etc.—was $\pounds 197$, and the total cost, including hand rails on approaches, etc., $\pounds 250$.

The price of cement was 12s. a cask; about 80 casks were used. The steel bars cost nearly 10s. a cwt. in store; about 65 cwts. used. Labour was very unskilled, and a good deal was wasted.

The rendering of the surfaces was only needed in a few places, and should be done sparingly, as such application is subject to hair cracks and is a disfigurement to sound concrete.

The work should be done under thoroughly reliable supervision during the whole of the time the concrete is being mixed and rammed. The average quantity of materials used, per rib of cubic capacity of 72 c.f. was 72 c.f. ballast, 24 c.f. cement, and 12 c.f. sand.

The centering of the decking was removed on 1st August, 1907, leaving a very even, clean surface. The structure is as nearly monolithic as it is possible to make it. Beyond a few small hair lines, no cracks due to expansion and contraction have been found. The road was thrown open to light traffic and a 2-ton bullock roller sent over the bridge on 20th September, 1907.

On 21st October, 1907, two months after its final completion, arrangements were made to test the structure. The 10-ton steam roller was driven along a chalked line, so that one hind wheel should come centrally over one bay of the decking. Pencils attached to balanced lever arms, in contact with the under surface of the loaded bay and the adjoining rib, were set to give a record of the vibrations and resiliency of the material. The result, after sending the roller over slow and then at a medium pace, was *nil*. I then sent the roller up the hill, so as to gather momentum, and had it driven over the bridge at its highest speed, but was unable to perceive any vibration whatever, although I held my hands against the loaded bay and rib.

The conclusion arrived at is that a better bridge has been built for the money than that originally contemplated, and that a very considerable saving will result from the adoption of the same type of construction in larger spans.

In the present case the cost might safely have been reduced by the omission of the armouring in the ribs and by the use of a less rich concrete. The proportions of armour and cement were intentionally increased, as the behaviour of masses of concrete under the existing conditions of climate had not been tested practically.

The time taken could have been shortened very much if required, and as the materials used are all portable, a similar bridge could be made in any locality.

DORE BRIDGE.*

By COLONEL G. K. SCOTT-MONCRIEFF, C.B., C.I.E., R.E.

THE Dore River is a tributary of the Sarin River, which again is a tributary of the Indus, flowing into that river near the village of Torbela, where the Indus first begins to emerge from its mountain home.

The area drained by the Dore, at the point where the main road from the N.W.R. at Hassan Abdal to the military station of Abbottabad crosses it, amounts to 138 square miles. In the upper reaches this area is covered with forests, which in themselves would prevent the rainfall from passing off quickly; but the slopes of the hills which are thus timbered are exceedingly steep, so that rapid and violent floods are very frequent in the rainy season. The lower gorges of the stream and its tributaries are not so well wooded, but the hills are just as precipitous there as they are further up. The greatest height of the watershed is about 9,900 feet above sea level, the level of the bridge being at 2,770 feet above sea level.

At the point where the bridge is built, the river has worked for itself a trough-shaped bed through the alluvial plateau of the Hazara Valley. The bed of the stream is of gravel and small boulders extending to an unknown depth.

Just below the bridge site the Dore is joined by a tributary nullah called the Salhad, a stream which comes from near Abbottabad, draining an area of some 24 square miles, but with a bed slope so steep, that its floods are often more dangerous than those of the Dore.

It would appear at first sight as though the natural site for the bridge would have been below the junction of the two streams; but there were two reasons against this. One was that the existing road finds its way by a winding ascent to the top of the plateau on the right bank of the Salhad, and has close beside it a third nullah—the Banda—which would have had to have been bridged if the site for the.

* The description of the construction of this bridge, and of that over the Kharmana River, published in the August number of the R.E. Journal, is taken from notes made by the author at the time. Plans and illustrations of these works were given in the Professional Papers for 1905, "Recent Works in the N.W. Frontier Province, India," but, owing to limits of time in the lectures, delivered at the S.M.E., then published, it was only possible to describe very briefly the construction of these works. It is thought that some further details may be of use to officers who have similar work to carry out. main bridge had been lower down. The other reason was that below the junction of the Dore and the Salhad, the bed of the stream widens out to such an extent that either the bridge would have had to have been very long, or its training works would necessarily have been of a very colossal character.

The road from Hassan Abdal to Abbottabad was made in the early years of our occupation of the Punjab, and gradual improvements in gradient and metalling were made from time to time, so that it is now a first-class metalled road as far as the borders of Kashmir (79 miles), with a ruling gradient of I in 20. Although there are bridges over the greater number of the water courses traversed, yet on a few of the largest the crossing was effected on tracks made through the bed of the stream, which of course were liable to be blocked at any time by rain.

Of these the most troublesome was the Dore, the crossing there being about 400 yards long, and after every heavy rainfall the traffic was interrupted for from two to six hours, and sometimes as much as two days. Frequently fatal accidents occurred from carts becoming involved in the stream when the flood was rising, and despite the fact that every rainy season special gangs of men were kept to assist carts across, there was every year a number of such accidents.

The question of providing a bridge had been repeatedly pressed by both civil and military authorities for years, but it was not until about 1891 that the subject was taken up as a definite engineering project. The preliminary investigations and the design are the work of Mr. H. C. Granville, now Superintending Engineer, Punjab P.W.D.

Careful comparative estimates were made out in the initial stage of proceedings, as to the relative cost of various classes of work, *e.g.*, whether the bridge should have 20-foot, 30-foot, or 40-foot spans, and whether the decking should be trough plates or timber. It was ascertained that 30-foot spans with timber decking would be the most economical. In this preliminary investigation it was assumed that the foundations need not be carried more than 12 feet, that ordinary lime mortar might be used, and that it would be possible to carry out the work with very little pumping.

Probably if the officer who made out the first estimate could have foreseen the difficulties which arose from the quantity of water in the foundations, and the necessity for using cement, he would have allowed for much longer spans. The use of timber for the decking was on account of economy. Tarred deodar wood has been used with very satisfactory results in many bridges in North India.

The actual site of the bridge was fixed at a point slightly above the old road crossing. The stream here passes in a trough, some 300 yards wide, between high bluffs of clay and boulders some 30 feet to 40 feet high. In time of flood the water fills the trough from bank to bank, so that anything like diverting the river as a whole is impossible. All that one can do is to divert the stream from any given part, with the knowledge, however, that the next flood will almost certainly overtop or outflank one's efforts.

The nature of the bed is gravel mixed with boulders, but the latter are not large. The author has observed that where the bed of a stream is interspersed with large and heavy boulders, the scour is not nearly so great as where the boulders are few or small. In a stream where the bed is composed of fine gravel or sand, the scour will probably be greater than in a bed where there are large boulders and rocks, and also in the former case water may be found at a comparatively shallow depth and in considerable quantities. The author merely states these opinions as a general rule, founded on personal observation, and he gives the opinion for what it is worth, as he cannot assign any very satisfactory reason for it.

It seemed, therefore, that in the Dore the scour would be considerable.

The longitudinal slope of the bed is 71'99 feet per mile. Near the bridge the slope is 1 in 72. The calculated velocity of the stream when in full flood was 15 feet per second, and the discharge 73,000 cubic feet per second. This was equivalent to a rainfall of $\frac{3}{4}$ inch over the catchment area, and admitted of the bed being scoured between the piers for about 2 feet. The height of the piers was fixed at 6 feet from highest flood level to the underside of the girders.

The work had been begun in November, 1901—the steel work having being ordered from England—when the author took over from the Punjab Government the charge of the military and civil works in the N.W. Frontier. On his first visit to the work, which had barely been started, he came to the conclusion that the provision of some more hydraulic mortar than the ordinary fat lime of the country was necessary, and he also thought that where there was so great a velocity and so friable a bed, the scour would be greater than was supposed, and that if no floor or curtain wall was admitted, the foundations ought certainly to be more than 12 feet deep. He also realised that the inflow of water into the foundation excavations was such as to necessitate steam pumps.

He therefore stopped the little work which had been begun, pending reference to the Government of India, to whom he explained his views. He reported a possible discharge of 78,000 cubic feet per second, and a velocity of 16.6 feet per second. The Government of India agreed that the conditions of the case necessitated deeper and stronger foundations.

The design purposely reduced the waterway from 4,700 square feet to about 3,500 square feet, and as the calculated velocity of 16.6 per second was based on the assumption that the river occupied its total unrestricted bed, it was evident that, with the waterway reduced by about 25 per cent., the velocity would be enormous, and it was considered that a floor, apron, and curtain wall were necessary The curtain wall was to be 20 feet deep if possible, and 5 feet wide, and the floor 3 feet thick. The pier foundations were left at 12 feet.

The height of the piers was at the same time raised, so as to allow for the extra height of calculated afflux. A 6-foot clearance had been provided, which was increased to 10 feet.

Subsequently in construction after some experiments it was found that large boulders, with cement concrete rammed into their interstices, gave the best floor, and it stood the test of several severe floods without anything being displaced. And as, during construction, the floods had to be diverted from parts still under construction to those that had been finished, the test of having a concentrated rush of flood-water over fresh flooring was undoubtedly severe.

The fact that the depth of water allowed for would have to be increased owing to the construction of the floor, affected also the design of the training works. These were made II feet high up-stream.

It may here be noted that although often in such works the training works are simply earthen banks faced with stones, it was here considered advisable to make the work of stone throughout.

A revised estimate was therefore made out on the above lines, and the rainy season of 1902 was devoted to making the preliminary arrangements, viz., building workshops and a small inspection house for the engineer in charge, and also laying a small railway to the quarries four miles off, collecting other materials, and getting pumps and cranes.

The quarries provided excellent limestone in massive blocks, and as the line to them ran up the steep bed of the Salhad, it was possible to have the loaded trucks going down hill by gravity alone, the return empties being easily hauled up by animals.

In the Salhad too there were plenty of boulders weighing up to half a ton, suitable for the training works and floor.

Four swinging derricks and cranes mounted on trucks were made up. These took the boulders or the quarried stone off the travelling trucks and placed them *in situ* on the training works. In the deep excavation for the curtain wall, however, where the masonry was made of as massive and substantial a character as possible, it was not possible to use the cranes for depositing the blocks directly in position. To have done so would have necessitated the use of timber shoring, and after careful consideration it was resolved to give up the idea of this. Timber shoring would no doubt have enabled the work to have been done more easily and possibly more quickly, but it was not procurable anywhere near (the timber in the adjacent hills being under the Forest Department), and as the nearest railway station is 33 miles off, the cost of transporting it to the site from a distance would have been very great, especially when the chances of the work being swamped by floods (as it frequently was) and the possible damage to the timber arising therefrom had to be considered.

The railway line was therefore laid parallel to the line of the excavation but at a little distance from it, and the materials were run down an inclined plane of rails.

The pumps which were at first available were a 9-inch centrifugal and 12-H.P. engine, which had been lying disused in a store for years, and a 6-inch centrifugal and 10-H.P. engine, which were fairly serviceable though old. The 9-inch centrifugal would have been a useful pump if it had only been reliable, but it broke down so often at critical moments that at last it was considered better to remove it altogether.

Fortunately the Connaught Bridge at Chakdara had now reached a stage where it was possible to dispense with some of the pumps, and two 10-H.P. engines with 6-inch centrifugals were brought to the Dore, after it had been proved by some weeks of ineffectual struggling with the great inrush of water and untrustworthy pumps, that the work was being seriously retarded. These two fresh pumps were able to cope with the water easily, and once they were set in action the difficulties of excavation and building soon disappeared.

It was decided to take out the excavation for the curtain wall in lengths of 100 feet. This meant about 7 shifts of the pumps, which worked in sumps situated a little below the main excavation. Of course by excavating so great a length as 100 feet the quantity of water which had to be dealt with was relatively great, and if there had not been the ample pumping power above alluded to, it is probable that the lengths taken out at one time would have necessarily been reduced. But it was obviously desirable to have as few changes in the position of the pumps as possible, and it certainly tended to better work to have a considerable length of the wall done at one time.

Work was actually begun about the end of October, 1902, but in the end of the year and in the early part of 1903 there was a succession of floods which delayed the work most seriously, in nearly every case filling the excavation and leaving quantities of gravel and silt behind. Of course temporary diversion works were made and were very useful, but sudden and violent floods often outflanked these and caused much damage.

These floods also damaged the light railway from the quarries, and the supply of stone often ran short on this account.

The foundation of the curtain wall was laid (as in the case of the Chakdara Bridge) by means of large bags of coarse cement concrete to to 1. Above this the roughly-squared blocks of limestone were laid, with cement concrete rammed into the interstices. All masonry and concrete below R.L. 2690 was laid in cement mortar.

It was hoped that the bridge would be ready by August, 1903, but

the repeated floods from January to May so retarded the work as to render this impracticable. The bridge was actually open to traffic early in November.

The construction of the piers, the erection of the steel beams, and the laying of the flooring presented no difficulty.

The estimated cost as sanctioned was Rs.219,904, the actual cost being Rs.179,000.

The quantities were :- Dry boulder work, 399,000 cubic feet; rubble masonry, 181,394 cubic feet; excavation, 554,000 cubic feet; concrete, 11,000 cubic feet.

Lieut. D. Ogilvie, R.E., was in charge of the works from November, 1902, until April, 1903, when he was relieved by Capt. G. C. Kemp, R.E.

WATER SUPPLY COMPANIES.

By CAPT. P. H. FRENCH, R.E.

THE question of the organization of distinct companies to deal with the water supply of an army in the field, has not I believe hitherto been put forward. The subject however seems well worthy of discussion in the pages of our *Journal*, owing to its importance both as regards co-operation with the medical and sanitary branches in preventing the outbreak of disease; and also so as to secure as pure, liberal, and well distributed a supply of water as is possible, under any possible circumstances.

The actual approval of the source of water supply, is clearly defined in *Combined Training* as a duty of the medical branch, but all subsequent work in connection therewith should be an Engineer service. Under existing conditions field companies carry out the work of the supply and distribution of water in camps; but there are many who urge that they should be left free for military engineering pure and simple. Their work lies more with the fighting troops, and not in performing a duty which, however important, is apt to interfere with their fighting efficiency. There are specialist companies for telegraphs, balloons, search lights, railways, etc., and surely in these days, when the vital importance of a good water supply is so thoroughly recognized, a specialist water supply company would seem to be a very serviceable innovation.

It may be objected that there is not sufficient work in connection with this one subject alone, to justify the formation of separate units to deal with it, but a consideration of the following points may modify this view :—

(a). The location of underground water calls for geological training and careful study. The engineering involved in bringing it to the surface calls for special plant, detailed knowledge of its operation, and skilled labour.

(b). The water of wells, lakes, ponds, rivers, etc., is generally contaminated to a greater or less extent

(i.). Chemically (rarely dangerously).

(ii.). Bacteriologically.

(iii.). By solid matter in suspension.

The examination and detection of such impurities is the work of the medical branch, but under a properly organized system their removal can be undertaken by engineers, as is done in civil life. Before going further, however, the subject may be considered under two distinct headings, *i.e.* :—(a). Water supply of an army on the move. (b). Water supply of lines of communication.

As regards (a), the ever-present time factor renders it impossible to attempt a great deal, and if the available supply is made as drinkable as time permits, and its distribution accelerated as far as possible, nothing more is called for. As regards (b), however, a very great deal can be done, and, as in this case camps become semi-permanent, the matter becomes one of the greatest importance.

To cope with both (a) and (b) a "Divisional Water Supply Company" would seem to be necessary, one section being equipped for (a) and the remaining sections for (b). As mobility is essential, the section for (a) would have to be mounted and equipped with small but powerful pumps, operated by petrol engines, a considerable supply of fire hose, and canvas tanks and troughs for distribution purposes.

A very great amount of $2\frac{1}{2}$ -inch fire hose can be carried in a remarkably small space; it is light, extremely portable in every way, resists wear and tear well; is easily and rapidly connected up; and the conjuring that can be done with a combination of fire hose, tees, crosses, reducers, and taps, is remarkable.

The (a) section would also carry the sterilizing or filtering plant; and in connection with this point I would call attention to the Forbes Patent Portable Outfit for water sterilization, described and illustrated in *Engineering News* (New York) of 31st October, 1907. This sterilizer has a capacity of 400 gallons per hour of filtered and sterilized water, at an increased temperature of 16° Fahr. to resulting water. It has been specially designed for the United States Army, and appears to be eminently serviceable and portable.

The (b) sections would be dismounted and under the command of officers who have specialized in water supply. They would be equipped with powerful mobile pumps, filtering and sterilizing plant of greater capacity, apparatus for procuring underground water, and piping etc. Some may think that such specialization is unnecessary; but when large masses of humanity are together for some time in one place, water supply becomes a study in itself, and general knowledge of water supply is insufficient.

No details have been entered into in the above, nor have the *pros* and *cons* been fully discussed. The article has been written more with a view to calling attention to what would now seem to be a very necessary branch of specialization for the Corps, and also in the hope that it may elicit the opinions of senior and more experienced officers as to the necessity or otherwise of water supply companies.

DEMOLITION OF A CHIMNEY.

By LIEUT. D. OGILVY, R.E.

THE following is a short account of the demolition of an old chimney stack near Aberdeen. It had stood for over 60 years, and was considered unsafe though the brickwork appeared sound enough. The contract for the demolition was entrusted to Messrs. Walker & Duncan, of Aberdeen, to whom I am indebted for the facilities of examining the chimney before demolition.

The height of the chimney was 242 feet, and it was built of brick on a granite base, the diameter at the base being 20 feet. The thickness of the brickwork was approximately 2 ft. 3 ins.

The method used to fell the chimney was as follows :--Half the circumference of the base was underpinned with props which were shattered by explosives. No explosives were used in the underpinning process as it was thought that, owing to the age of the chimney, the concussion might cause a premature fall of at least a portion of the brickwork. The props were put in one after the other at given distances apart, the brickwork being pulled down as required. There were 13 props in all, and when they were fixed the intervening brickwork was cut out. So well was this operation carried out, that the chimney only settled $\frac{1}{16}$ of an inch on that side. The props were of larch, and were 9 inches in diameter. They rested upon two hardwood wedges (Fig. 2), the top wedge being placed with the butt end outwards, so that if the prop was not entirely shattered, it would be forced outwards and slide off the wedges. The hardwood wedges were placed on pitch pine sills which distributed the weight over as large an area as possible. Caps of the same dimensions (Fig. 2), were inserted between the brickwork and the top of the props, and, where necessary, pieces of pitch pine were used as packing pieces.



FIG. 1.-Elevation.-Scale 1/96.



The charge of explosive used for each prop was 3 oz. of gelignite tamped into an auger hole, bored a little less than half-way through, and about 9 inches from the base, on the inside of the prop. The charges were exploded by means of a No. 5 detonator attached to a time fuse. The fuse was regulated to allow of a few seconds elapsing between each explosion, and the centre shot was fired first. In addition to the charge in each prop, two wingholes were bored into the brickwork at each end of the breach (*Fig.* 3). These wingholes were



FIG. 3.-Plan.-Scale 1/96.

charged with 6 oz. of gelignite and the fuse regulated so that they were fired last. The idea of these wingholes was rather far-fetched, the official description stating that the bricks flying from the winghole charges were intended to knock out any prop whose charge should miss fire. The chance of many bricks being displaced by 6 oz. of gelignite in z ft. 3 ins. of brickwork was small, but the chance of one of these bricks flying with sufficient accuracy and velocity to knock out a larch prop 9 inches in diameter which was securely wedged under perhaps $\frac{1}{4}$ of the weight of the chimney was still smaller. However, such was the idea.

An eminent town official was requested to light the fuses. He lit the first one, but—owing possibly to unfamiliarity with this kind of job he then left. No mishap occurred as this contingency had been foreseen, and the remaining fuses were safely and correctly lighted. The result was eminently successful. When five props had been shattered the chimney swayed slightly. The next two to go caused a slight lean, and almost immediately the stack fell, other explosions being heard amidst the crash of the falling *débris*. The chimney fell as a whole through about 10 degrees, when it broke and seemed to telescope. The fall was almost in the line of the centre prop, and the outside brick was 139 feet from the base when the fall was completed, the whole operation being very successful. An enormous crowd of spectators watched the fall, but luckily there were no casualties.

AN IMPROVED METHOD OF SIGNALLING.

By MAJOR A. H. D. RIACH, R.E.

CAPT. HAMMOND's article in the R.E. fournal for March, in reviewing our present Service methods of signalling, calls attention to the wide cone of dispersion of lamps and the consequent ease with which messages can be intercepted; while even with the helio, the flash can be read by all and sundry within the limits of the, comparatively, acute angle it covers. The signalling appliance described below is probably little known in the Army, and enables a reflection to be sent from a distant point, back to a single light, the reflection remaining totally invisible outside of a radius of a few feet from the light.

The apparatus consists of a "prism," which can be described as three contiguous sides of a cube, silvered on their inner faces.

Such a prism has the property of reflecting any ray of light, falling on any one of the faces, back along its original path, with a cone of dispersion so small, that the eye has to be placed close up to the source of the ray to enable it to see the reflection.

The writer had the opportunity of testing this. By holding an electric torch close to his eye he could watch its reflection in the prism, which was being violently swung about at the end of a long passage. A spectator looking over his shoulder with his head within 18 inches of the torch could see no reflection whatever.

The size of the prism needed for use up to some miles, is under a cubic foot, and no special means of mounting and direction are required, so that the question of portability does not come in.

To use this for signalling, the prism is provided with a shutter similar to, but larger than, a lamp shutter. With this prism an outpost could signal back information which would reach the principal signalling station only. The only precautions needed, are to see that no lights—other than one steady light at the principal station—are shining into the prism; that this one light is powerful enough to shine brightly for more than double the distance from it to the prism; and that no unauthorized persons are allowed near the light.

For signalling as described above in both directions, the outlying station must have a lamp also, and the principal station a prism.

Such precautions, however, will not ordinarily be necessary, as they are really required for confidential information, which will normally be sent inwards, and not outwards. Outward orders, if confidential, can be in cypher or sent by hand.

The ability of an advanced party to communicate with the commander, without revealing either its position or its message, is an advantage which it is most desirable to obtain.

Experiments to test not only the practical advantages of the system, but also how to adapt it to the helio as well as to the lamp, are surely well worthy of the consideration of those interested in Army signalling.

THE MAPS OF GLAREANUS.

By MAJOR-GENERAL E. RENOUARD JAMES, LATE R.E.

FOLLOWING on the Paper by Major Close, R.E., in the June number of the *R.E. Journal*, 1905, the article which appeared in the *Geographical Journal* for the same month, by Mr. Edward Heawood, M.A., on "Glareanus: His Geography and Maps," attracted much attention, and has brought me into correspondence with both America and Germany on the subject of the MS. Latin treatise by Glareanus, and its accompanying series of maps, which are in my possession.

In August, 1905, I had the honour of receiving a visit from a very distinguished student of ancient geography, Professor E. L. Stevenson, of Rutger's College, New Brunswick, which resulted in the maps being reproduced by photography at the British Museum, and I understand it is the intention of the professor to publish the reproductions.

More recently I have been in correspondence with Professor Dr. Walter Ruge, of Leipzic, the learned editor of *Die Literatur zur Geschichte der Erdhunde von Mittelalter an* (1903-7), published in the *Geographischen Jahrbücher* (Gotha). In a recent article by him he gives a brief notice of my Glareanus Manuscript, and, in a letter to me, confirms the opinion expressed by Mr. Heawood, that the treatise is the original handiwork of Glareanus himself and much older than the printed copies which are to be found at Munich, Bonn, and other places. The maps with the MS. treatise were not included in the printed edition, but seem to have a close relation to—if they are not actual reductions from—previously known maps at Schloss-Wolfegg (in Würtemburg), Munich, Bonn, Rome, etc. The arrangement of them in the treatise proves clearly that the text was absolutely contemporaneous with them.

Mr. Heawood gave arguments to prove that the date of the MS. must lie between 1510 and 1520, although I was inclined to think it must be rather later, as some of the maps seem to indicate a knowledge of certain discoveries made in 1520. Mr. Heawood however in a letter to me dated April 1st, 1908, controverts my view, using arguments the soundness of which I am unable to dispute, and I must therefore accept his opinion on the subject.

Dr. Ruge having expressed a wish that greater publicity should be given to the MS. maps, I offer some notes which may help in some degree towards this end. In studying the maps analytically it would be of assistance if the unit of map measurement employed by Glareanus was known; but I conceive that it was one in common use at Glarus, his native town, in 1510-20, and most probably was the twelfth part of the Zürich foot, which differs only 0.00012 from the English inch. All the plan-units employed throughout Europe seem to have been based on the Roman foot of 0.966 English foot. For instance:

•••		=0.979	foot,
(thority))	=0.984	,,
	•••	=0.987	.,
•••		=0.002	,,
•••	•••	=0.947	,,
	 ithority) 	 ithority) 	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

and others of almost equal length. We may assume that the early map-makers treated the earth as a perfect sphere, and divided it into 360 degrees of 60 geographical miles, measured both on the equatorial and polar circumferences.

When we begin to examine the maps closely, we at once establish the probability of the use by Glareanus of the Zürich inch, which is practically the same as the English inch, as the unit of measurement.

The authorities consulted by me agree that the first map in the series closely resembles the great Waldseemüller map of 1507 at Schloss Wolfegg, in Würtemburg, though the scale of the latter is about nine times that of the MS. maps with the treatise. It is a map of the whole world, and I venture to describe its projection as a variety of the stereographic method, in which the centres, from which the several parallels are described, are removed in succession further and further along the prolongation of the central meridian. I suppose the map to have been commenced by drawing this meridian as a straight line, and plotting the latitude distances along The measurement from the equator to 70 degrees north is it. exactly 3 inches; and, in the same proportion, 50 degrees south of the equator has a length of 21 inches, while the 20 degrees at the pole, in nearly half the proportion, is 1 inch. The method, by which the radii of the parallels were determined, is not evident, but they vary from 8 to 9 inches, that of the arc of the equator being 8.75. The equator is only extended to one-fifth the circumference of a circle, the continents of the whole world being inaccurately compressed into this space. As was usual in early maps, the primary meridian passes through the Fortunate Islands (the Canaries), which are $17\frac{1}{2}$ degrees west of the meridian of Greenwich in modern use : the meridian of 90 degrees is in the middle of the map; and the 270-degree meridian limits the map on either side. The eastern and western curves are circular segments with radii of approximately 41 inches, and the intermediate meridians are equally interspaced curves. The initial meridian is carried round the pole in a circular segment to connect with that of 180 degrees. In the central zone of the map this method of projection results in the scale for longitudes being about two-thirds that for latitudes; or, approximately, 2,100 geographical miles to the inch in one direction, and 1,400 in the other.

The second and third maps of the series, which appear to resemble closely the maps by Glareanus at Munich and Bonn-which have been fully described by Professors Etter and Oberhümmer-show but little advance on the method of projection of No. 1, except in respect of the abandonment of the idea of mapping the whole world on one plane. They are separate representations of so much of the eastern and western hemispheres respectively as lie between 50 degrees south latitude and the North Pole, bounded as before by the initial meridian through the Fortunate Islands and that of 180 degrees longitude. As with No. 1, the map is commenced by setting off measurements for latitude on the central meridians-90 degrees and 270 degrees—as follows : -- For 50 degrees of south latitude, 2 inches exactly, and for 70 degrees of north latitude, 3.2 inches. It may be observed here that the intervals between parallels south of the equator are relatively 0.87 of those to the north, which at first sight seems an error in principle, but this I endeavour to give an explanation of further on. As in No. 1, the distance from 70 degrees north to the pole is 1 inch, no attempt being made on either map to represent the arctic region on a correct scale. The centres from which the arcs of parallels are described are, similarly to No. 1, distributed along the prolongation of the central meridian, their radii being approximately-

The equator	•••	•••		9.9 inches.
Parallel 70° N.				6.65 "
Parallel 50° S.	••••	•••	•••	8.75 "

The arcs of meridians o degrees and 180 degrees are true segments of circles, with radii a little over 4 inches, which distance was possibly taken as an approximation to the semi-diameter of the globe; and these meridians are carried round the pole in circular segments, while those of the intermediate meridians are equally-spaced and accurately-drawn curves. This method of projection results in an inaccurate degree-net except in the European zones, where the scale of the maps is approximately 1,100 geographical miles to the inch; in the equatorial zone the latitudinal seems to exceed the longitudinal scale in the proportion of 5 to 4; but in the southern latitudes the constant increases in the intervals between the meridians (before referred to) tend to restore the relation to equality in some degree.

The fourth and fifth maps of the series are similar to the fan-shaped map of Ruysch of 1508, produced in the edition of Ptolemy published

at Rome in that year, and of which there are copies in the library of the Royal Geographical Society. They jointly represent the whole world from the North Pole to 50 degrees south latitude, the projection of each hemisphere being on three-fifths of a semi-circle. The parallels are segments of concentric circles equally spaced, and the meridians radiate in straight lines from the pole. The measurements along the equator seem to be on a scale of about 1,000 geographical miles to the inch; and from the equator towards the north the longitudinal measurements are in correct proportion to the latitudinal, but south of the equator their apparent length is continuously and wrongly increased. But as the latitude measurements are uniform, the construction of a table of corrections applicable to the southern longitudes would not be difficult. As far as their projection goes, these two maps are not altogether bad.

The sixth and seventh maps in the series are equi-metrical circumpolar projections of the Northern and Southern Hemispheres, similar to those at Bonn of 1510. The meridians are straight lines radiating from the poles, and the parallels are concentric circles. As the semidiameter of the globe on these maps measures 36 inches, the scale along the meridians was probably intended to be 1,500 geographical miles to the inch; and making the best of this method of projection, the longitudinal scale of one part would be not quite 1,000 miles to the inch. But as the variations in proportion are constant, the projection may on the whole be regarded as the most correct of those employed by Glareanus.

Up to this point the geography of Glareanus has not been touched on. No doubt he intended to summarize the knowledge of geography in his day, but we can see at a glance that his maps can have no pretension to accuracy. But, with geographical knowledge and practical navigation in the low condition in which they were at the commencement of the 16th century, accurate systems of projection were relatively of small importance. Such maps were probably only intended to be general and descriptive, and each master-mariner would make, for his own use, sectional maps of the coasts of the countries explored, and would most likely keep his information exclusively secret as long as it was in his power to do so. These general maps did little more than denote the chief points of departure from which new destinations could be reached, by using sailing directions compiled from the experience of mariners. The first stage of the very long distant voyages to Africa and the eastern seas was as far as the Fortunate Islands, which took from 15 to 30 days from Lisbon or Cadiz, according to the force and direction of the wind. The details of this part of the voyage became thoroughly well known in very early times, and the Fortunate Islands were adopted as the principal point of departure from which further distances were measured in all long voyages. For a long period they were thought to be the most westerly land, and the primary meridian was made to run through them. Methods of navigation were very primitive. Latitudes were calculated from altitudes of sun and stars obtained with the astrolabe, a very inexact instrument, which was not materially improved upon until the introduction of Davis's guadrant about 1600. The magnetic needle was a very ancient device for showing the direction of the north, but the first practical mariner's compass we read of was not in use until the vovage of Columbus in 1492; while the first compass suspended on "gymbals"-the forerunner of our beautiful modern instruments-was not invented until 1608. We do not hear of the "Log" until 1577 (although we may be in error on this point), and the first published treatise on navigation was not issued until 1545. The essential principle by which longitudes could be determined lay evidently in differences of time, but methods of ascertaining such differences with even a small degree of accuracy depended on the most untrustworthy observations. The first portable clock is said to have been made in 1530, and it was not until the reward offered by the Board of Longitude was awarded to John Harrison in 1764, that any instrument approaching reliability as a chronometer was used by English sailors. The rates of the very rough timekeepers used by the early navigators varied with such terrible irregularity that they could not be depended on for the determination of differences of longitude. Lastly, nautical almanacs were not published until 1767, and mariners, until that date, had to depend on manuscript tables, compiled by themselves, giving the daily right ascension and declination of stars.

The ships of the beginning of the 16th century were bad sailers except before the wind, and their drift to leeward was so great when any attempt was made to progress against adverse gales, that a master-mariner scarcely dared to quit a port except the wind was favourable. Using such sailing direction as he could obtain, he steered by the sun and a few well-known stars until he had reason to consider he had made good a definite distance in the desired direction. If it be true that the log was not used until 1577, the position he had gained must have been little more than a guess calculated from the various courses run, making allowances for the strength of the wind and the estimated speed of the ship, after corrections had been made for leeway and the supposed effects of tides and currents. The positions thus approximately ascertained would be corrected from time to time by solar and sideral measurements made with the astrolabe, but this would be only for latitude; and the longitude would remain a bare estimation, as the daily rates of the timepieces varied so irregularly, that the results they afforded were less to be depended on than those determined by pure dead reckoning. It is true that a number of timepieces might be compared, but the constant possibility of a sudden change of rate occurring with the best reputed instrument—a contingency which the ship's motion in rough weather made always likely—introduced a source of error which frequently arose. It was quite impossible to carry time from port to port with any measure of truth, and it was necessary for ships to rest in ports, the positions of which had been previously determined more or less accurately, in order to rate the timepieces before making new departures. Taking all these difficulties into consideration, the comparative inaccuracy of the maps of 1510–20 cannot be wondered at, and it was only by slow degrees that comparisons between the reports of navigators permitted of fairly correct charts being drawn.

The Portuguese were the principal explorers in the eastern seas. Taking departure from the Fortunates, or from the Cape de Verde Islands, with a fair wind from north-west, they relied on striking the African coast somewhere, and the coast line would then be followed closely. Thus Cape Palmas was reached in 1446, and the Gold Coast in 1461. Keeping within sight of land by day, but standing off for safety at night, the voyage was continued southward without much skill in the navigator's art. In this slow way Sierra Leone was discovered in 1462, Angola in 1484, and the whole of the west coast of Africa, when the Cape of Good Hope was reached, in 1487. In 1498 Vasco da Gama doubled the Cape and discovered the Indian Sea, exploring the east coast of Africa as far as Mozambique. Navigation now began to improve, and mariners became bolder in crossing wide ocean spaces instead of hugging the land, and on attempts being made to reach the Cape of Good Hope in a direct course, the islands of Ascension and St. Helena were discovered in 1501. Adventurers also began to explore in the direction of the far east. The maps of Glareanus show that a curious error was made in fixing the position of Zanzibar, which had been visited by Vasca da Gama in 1498, and no doubt he left the notes of his voyage to enable it to be found again. But some strange mistake must have been made in the reckonings, for Zanzibar is marked to the south of Madagascar with an incredible error of 29 degrees of latitude and 48 degrees of longitude. Madagascar, Ceylon, and Malabar were visited in 1505 and 1506, Muscat in 1507, Java, Malacca, and the Moluccas about 1511.

The discovery of the New World had been made before these dates. After the existence of seas to the eastward of the Cape of Good Hope became evident in 1487, every doubt which remained that the earth was round was dispelled, and Christopher Columbus was inspired with the theory that the quickest way to reach far eastern lands would be by steering due west from Europe, without the smallest idea that he would discover an entirely new continent in doing so. He gained the Bahamas and Cuba in 1492, Jamaica in 1494, the main continent at Florida in 1498, and Honduras in 1502. Cabot, a Frenchman, discovered the Labrador coast, far to the north,

in 1497; and Amerigo Vespucci, an Italian, reached Brazil and Venezuela in 1499. The general name given to the newly-discovered continent was, at first, "Terra Sancta Crucis," but, after the appearance of Walseemüller's and Ruysch's maps, it came to be known as "America," though the priority of discovery must be credited to Columbus.

The Pacific Ocean was first entered from the east by crossing the isthmus of Darien in 1513, and seven years later it was reached by sea by Magellan, who, passing through the straits which bear his name in 1520, commenced the exploration of the west coast of South America. In making this passage he succeeded in avoiding the dangerous voyage round the south cape, which was made in 1615, when it was discovered by Schouten, a Dutchman, who named it Cape Horn, after his native town.

I supposed at first that the earliest date which could be assigned to the treatise of Glareanus would be subsequent to Magellan's discovery, but, as I have already stated, Mr. Heawood controverts this idea conclusively. It appears that the geographer took his information from maps known with certainty to be of previous date to Magellan's voyage, and that the outline of the South American continent was only a fairly accurate surmise of its form, based on theories formed from the discoveries which had been made.

The maps prove in several ways the geographer's complete ignorance of details, as they show, firstly, that he was still unaware that there was not an open sea passage through the centre of the new continent; and, secondly, because of his omission to mark the straits through which Magellan passed. We do not find on the maps the names of places discovered later than 1520, and even within this limit they are very inaccurate. This is noticeable from the very commencement of the records, for the Fortunate Islands, the chief point of departure, are marked with an error of 14 degrees of latitude. Cape Palmas, on the west coast of Africa, is given errors of 4 degrees of longitude and 14 degrees of latitude. At the mouth of the Niger, which mariners reached by coasting, and where they usually stayed long enough to correct the latitude and obtain the local time, the error was less; but after the whole west coast of Africa was explored, the maps, from which Glareanus copied, marked the position of the south point of the Cape of Good Hope with the almost incredible errors of $15\frac{1}{2}$ degrees of latitude and 6 degrees of longitude.

Ages before the exploration of the eastern seas by Vasco da Gama and other navigators, the vaguest outlines of the coasts of Africa and Asia had been derived from ancient coasting voyages down the Red Sea, which had penetrated to Mozambique in one direction and the Ganges in the other. The marches of Alexander the Great, and, later, the wanderings of Marco Polo and other travellers, had also afforded some knowledge of the continent of Asia. The records, such as they were, were absolutely unscientific, but the map-makers who, early in the 16th century, endeavoured to mark the new discoveries were unwilling to reject the old outlines, and in attempting to fit the new and the old together exercised extraordinary imagination. Some lands, apparently intended for Ceylon, Malabar, Malacca, the Moluccas, the Indian peninsula, the Bay of the Ganges, etc., are absolutely misplaced. And in attempting to show the position of islands previously unknown, the error is even greater; for instance, Java Major (which is apparently Borneo) and Java Minor (Java) are each marked 83 degrees of longitude in error.

In examining the earliest conception of the discoveries in the New World, in the making of which the map-makers were not hampered by having to piece old and new outlines together, we seem to see that the various renderings of the coast lines on the different maps from which Glareanus copied were principally based in each separate case on one only of the rival navigators' voyages. In the first map, for instance, it would appear that his authority—Waldseemüller—had obtained his information from the writings of Amerigo Vespucci, and knew nothing of the discoveries of Columbus; for, while an outline is given of the eastern coast of South America, and the name "America" is written, the Bahamas, Cuba, and Jamaica are not even marked. The longitude of the eastern point of South America is marked almost correctly, but the latitude is 7 degrees in error. On this map the position of the west coast of America is only guessed at by an indeterminate line.

In the construction of the third map geographical knowledge seems to have been a little more advanced. The coast of South America is shown as before, but the approximate positions of the islands discovered by Columbus also appear. As before, the position of the easternmost point of South America is fairly correct.

Passing to the fourth map, the information Glareanus had about the continent marked Terra Sancta Crucis sive Novus Mundus. seems to have been derived entirely from the work of Amerigo Vespucci, but the map is curiously inaccurate. The east cape of South America has errors of 3 degrees of longitude and 4 degrees of latitude ; and it is curious that the marking of the most eastern land of Asia overlaps that of the longitude of Venezuela by 50 degrees, and is actually 107 degrees in error. By this anomaly we recognize that the positions for Asia were determined by navigators coming from the Cape of Good Hope, while those for America were based on the observations of mariners who came westward from Europe. This strange error was corrected after the Pacific Ocean was entered, and the globe circumnavigated from the east ; but the first conception of America was that it lay almost wholly to the south of the equator, it being obstinately maintained for a long time that an open ocean separated Europe from Asia.

In the sixth and seventh maps we see the latest information which had reached Glareanus about the New World, but being confronted with an almost entire absence of names upon them, we can only test the accuracy of the points which seem intended to indicate the new discoveries by comparing the outlines with modern atlases. The islands meant apparently for the Bahamas are marked 6 degrees of latitude in error; Cuba is 3 degrees of latitude in error, and 51 degrees of longitude; Surinam is 7 degrees of longitude and 1 degree of latitude in error : Venezuela 121 degrees of longitude and 4 degrees of latitude in error. The position of the eastern cape of South America, however, which we may suppose to have been fixed by comparing the determinations of a great number of mariners, is more accurately given than any newly-discovered land in either hemisphere in the whole series of maps. Notwithstanding the inaccuracy of the positions fixed for the Bahamas, Cuba, etc., the determinations of newly-discovered lands in the New World compare favourably with those of places in the eastern seas, from which it may reasonably be concluded that the science of navigation made more rapid advances with the voyages of Columbus, Cabot, and Vespucci, who dared to remain out of sight of land for weeks at a time, than it ever would have done from the work of the landhuggers, who never ventured far from the coast.

In the construction of the sixth map, when information of the discoveries of Magellan had not yet come to Europe, the marking of the south and west of America was mere guess work, although it is evident that sound theories were formed by the geographers of the time. We need not, therefore, be surprised at the southern cape of America being shown 6 degrees too far to the north, and the longitude $14\frac{1}{2}$ degrees too far east, or that the supposititious west coast, at the latitude of the tropic of Capricorn, has an error of $2\frac{1}{2}$ degrees of longitude.

The printed copy of Glareanus' treatise in the library of the Royal Geographical Society, which is apparently not a first edition, is dated 1533, but contains a dedicatory epistle addressed to Don Joannes à Lasco, dated 1529. After carefully comparing it with the manuscript there is no reason to doubt the priority of the latter. The 40 chapters which each contains are identical in wording, with the exception that the numerous annotations on the margins of the manuscript are embodied in the printed text. The descriptions of countries in the Old World seem to be derived almost wholly from the books of Ptolemy, and to this part of the treatise I will refer briefly only. On the continent of Asia many names are marked by Glareanus to indicate the position of places known to the ancients by those they still bear. I allude to such as Armenia, Arabia, Mesopotamia, Persia, the Red Sea, the Persian Gulf, the Indus and Ganges rivers, etc. But as these do not enter into the history of the 16th century

discoveries, they need not be further noticed, and for the same reason no further mention is necessary of similar names in Europe and Central Africa. A little more may, however, be said of many names in the treatise and on the maps which have become obsolete, and the positions of which are now rather difficult to identify. Glareanus speaks of two Indies, and marks them India cis Gangem and India trans Gangem; these divisions are evidently Hindostan and Burmah, neither of which names are given by him. Nor is China named by him, although he gives the ancient Cathay, and he marks the positions of Tibet and India Superior at the extreme east of the Asiatic continent. Other obsolete names are the Parapanisades. in the position of Bokhara and Kashmir; the region of Sinarum, the name apparently given to the countries near the mouths of the Irawaddy; Scythia and Serica, for Western and Eastern Siberia; and Aria, Drangiana, Arachosia, and Gedrosia, in the position of the countries of Afghanistan, Beluchistan, and on the area lying between the Persian Gulf and the Indus river, both of which are marked on the maps. The outlines of the coasts of Asia, based on ancient knowledge, are marked with extreme inaccuracy, but on all the maps we find Sinus Gangeticus, the Bay of the Ganges, and Sinus Magnus, possibly intended for the Gulf of Moulmein. In the essay, islands referred to as the Taprobani Islands are described as "opposite the Indian coasts," and named on the maps, and these may have been intended for Ceylon, while in the distant eastern seas the Zibangri Islands seem to be the Japanese group. In these notes the obsolete names have been distinguished by italics.

The quaint descriptions of the countries of the world in the essay, are evidently based on the books of Ptolemy and the records of old travellers, but all mention of the new discoveries is omitted until the 40th chapter is reached. Only two pages are devoted to regions not known by Ptolemy. We are disappointed that we cannot learn anything about the new world to which Columbus and Vespucci led their crews, for the story of their discoveries is limited to one short paragraph. It is evident from this that Glareanus was not in possession of any precise information by means of which he could define the newly-found countries, with any degree of accuracy, on the maps.
THE S.M.E. WORKSHOPS.

By LIEUT.-COLONEL B. R. WARD, R.E.

THE S.M.E. Workshops were originally started about 1870 or 1871 by Colonel Leahy, when Instructor in Fortification. Their primary object was to supply profiling battens, mining cases, etc., for fieldwork purposes, but Colonel Leahy undertook a contract for supplying arm bands and shoes for rifle racks in barrack rooms. These he cut out of old ships' timbers broken up in Chatham Dockyard, and with the proceeds of the contract he constructed a building on the site of the present machine shop, in which he did a good deal of work for the C.R.E. Somewhere about this time Messrs. Aveling & Porter commenced the manufacture of their road engines, and these steam sappers-as they were then generally called-were utilized by Colonel Leahy as stationary engines. In addition to doing work for the C.R.E., the workshops were also of use in testing men at their trades. Previous to their being started, some recruits-known as "Miners"-were enlisted as labourers, receiving only the lowest rate of working pay ; others were enlisted as tradesmen, and, as such, had to be tested at their trades in civilian shops, or in the headquarters of the C.R.E.'s.

The development of the workshops was very gradual. About 1872 the first machine shop was constructed by Colonel Leahy. The foundry, the line of shops along the eastern and southern sides of the inner workshops square, and the police quarters were built between 1872 and 1884, and in 1883-84 the office, officers' workshop. and some extra stores in the outer square were put in chiefly by convict and recruit labour. Between 1884 and 1905 little was done to them, but since the latter date a thorough reconstruction has been sanctioned. An earlier expansion of the buildings and plant would doubtless have taken place, had it not been for the possibility of the removal of the S.M.E. from Chatham in 1903 and 1904. As soon as this proposal was definitely abandoued, funds were allotted for an extensive scheme of re-appropriation, reconstruction, and re-equipment, which is being carried out at the present time. The principal features of this scheme are described below.

The old sand model shed, used by the Fortification School, has been re-appropriated as a joiners' shop, a new shed being built in the main ditch for purposes of instruction in fieldworks. New classrooms, drawing and clerks' offices, lavatory, etc., are being constructed out of the old stores shed; a new steel-frame north-light machine shop has been erected on the site of the old turnery; the smithy and plumbers' shops have been re-modelled; heavy roads have been made for mechanical transport traffic. A modern equipment of plant has been purchased and erected in the saw mill, the forge, and smithy, and in the machine shop electric power is supplied from the new Electrical School for lighting and power purposes.

The primary *rôle* of the workshops is :- To instruct officers in the economics and management of workshops and prime movers; to train field engine-drivers, wood-working mechanists, and mechanical draughtsmen; to afford practical instruction in building trades to N.C.O.'s selected for India, to infantry pioneers, and to a class of Marines; and, lastly, to test recruits in their trades.

In order that the staff and plant may be kept at full load with a view to affording better instruction and of reducing the cost of instruction, Part II., *Engineer Services*—such as the provision of joinery for other stations—are undertaken with civilian labour. Further, the mechanical transport and drivers under instruction are utilized to a large extent to assist the transport department and reduce the cost of hired transport.

The first Officer in Charge of Workshops was Lieut. G. R. Walker, who was employed from 1873 to 1878. This title was held by all the officers in charge of the workshops until 1884. In 1888 the workshops were made independent of the Fortification School, and were placed under the Assistant Commandant.

In 1904 the officer in charge was given the title of "Superintendent of Workshops," and was graded as an instructor. Since 1901 an assistant to the officer in charge of workshops has been allowed, Lieut. I. J. Connor occupying the appointment till 1907, when he was succeeded by Lieut. F. D. Hammond.

For many years the training of Sappers in locomotive work, and instruction in locomotive driving for the young officers, formed part of the workshops course, and a short *résumé* therefore of the development of military railway engineering at the S.M.E. will not be out of place.

The first railway ever used for military purposes was one of 4-foot $\$_2^1$ -inch—or standard—gauge, and this was laid in 1855 from Balaklava to the plateau on which the siege works were constructed during the Crimean War. Although this line was laid by a civilian contractor, the introduction of trench tramways as part of the regular work of the Corps in siege operations, afterwards led to the study by the R.E. of steam and locomotive engineering generally.

In 1870 or 1871 a railway of 1-foot 6-inch gauge was constructed in Black Lion Field and down to the Dockyard wall—where the Admiral's quarters are now situated. This trench tramway was used for the conveyance of fieldwork stores from the R.E. Park—now known as the S.M.E. Workshops—to the various batteries, parallels, and other siege works which were constantly being constructed in Black Lion Field and the neighbourhood. A line was also laid at Upnor to take steam sapper locomotives running on flanged wheels. This was the origin of the training of Sappers in locomotive work. The Upnor Railway was used for the conveyance of building materials from Upnor to Chattenden, for the construction of the magazines then being built by the C.R.E. at that place.

About 1880 the Upnor-Chattenden Railway (standard gauge) was supplied with a locomotive engine known as "The Royal Engineer," built by Messrs. Manning & Wardle, of Leeds. The line about this time was extended to Hoo, for the completion of Hoo Fort. It thus formed a training ground for the engine-drivers of the 8th Company, which was the first railway company formed in the Corps, and which was sent to Egypt in 1882, under the command of Capt. D. A. Scott, R.E., being employed during the campaign on the railway from Ismailia to Cairo.

While the company was being trained for the Nile Campaign of 1884, Capt. G. F. Wilson and Lieut. W. S. Vidal laid out the alignment of the existing 2-foot 6-inch gauge railway from Upnor Hard to Chattenden and Lodge Hill. The platelaying was executed under the direction of Capt. H. W. Renny-Tailyour. The line was subsequently—in 1907—handed over to the Admiralty, since which date all practical work in connection with railways has been carried out at Longmoor Camp, the headquarters of the railway companies of the Corps.

The following officers have been in charge of the S.M.E. Workshops since Colonel Leahy originated the work in 1870 or 1871 :--

OFFICERS IN CHARGE OF WORKSHOPS.

Lieut.	G. R. Walker	•••	•••	 1873-1878
ب ر	R. M. Hyslop		•••	 1878-1880
27	H. W. Renny-	Tailyou	r	 1880-1881
**	D. A. Scott		• · •	 1881-1882
11	H. H. Barnet			 1882-1882
	H. Whistler Sn	nith		 1882
••	I. A. Ferrier			 1882-1884
	•			 1003 1004

ASSISTANT INSTRUCTORS FOR WORKSHOPS.

Capt. H. W. Renny-Tailyo	ur		1884-1888
Lieut. J. Winn	<i>a</i>	•••	1888-1893
" H. F. Gaynor	•••		1893-1899
Capt. H. G. de Lotbinière	•••		1899
Lieut. F. E. Harward	•••	•••	1899-1900
Capt. J. N. C. Kennedy	•••	•••	1900-1904

THE S.M.E. WORKSHOPS.

SUPERINTENDENTS OF WORKSHOPS,

Capt. J.	N. C.	Kenned	y	 •••	1904-1906
Capt. J.	W. S.	Sewell	•••	 	1906-

Assistant Instructors.

Lieut, I. J. Connor,		 1901-1907
Lieut. F. D. Hammond	•••	 1907-

ERRATA

In last month's article on The First Mounted Units of the Corps :----

Page 100, line 4, for "Chatham" read "Woolwich."

Page 100, line 9, for "Chatham" read "Woolwich and Chatham."

Page 100, line 35, for "when it was first organized" read "soon after its first organization."

TRANSCRIPTS.

ORGANIZATION OF THE MILITARY ENGINEERS IN FRANCE.•

Translated from the Boletin del Ministerio de Guerra y Marina, Lima, March, 1907.

A .- DUTIES OF THE ENGINEERS.

The mission of the engineers is to facilitate the fire and movements of the different arms, and to hinder the fire and movements of the enemy.

The power of the engineers resides, above all, in their tools and materials,

The engineers are charged with the following duties :---

- (1). Permanent and semi-permanent fortification.
- (2). Attack and defence of fortresses, as well as reconnaissances connected therewith.
- (3). Fieldworks, as well as reconnaissances connected with them with the execution of which they may be entrusted.
- (4). Bridging.
- (5). Communications, their construction, repair, and demolition.
- (6). Railways, their repair and demolition, and, when necessary, working.
- (7). Ballooning.
- (8). Pigeon post.
- (9). Telegraphy.

There is an important point which must be insisted on, namely, that the weak establishment of the engineer troops—about 800 per army corps—only permits of the sappers carrying out works of importance, such as the opening up of important communications, the making of large demolitions, and the placing in a state of defence of those points of support which have to offer a particularly long resistance. All works of minor importance must be executed by the troops that have to make use of them.

B.-ENGINEER TROOPS.

I. IN PEACE TIME.

In time of peace one battalion of engineers is in principle attached to each army corps, and bears the same number as that corps.

These battalions however are not stationed (except in the case of the covering troops) in the districts occupied by the army corps to which they are attached. In order to facilitate and simplify their instruction, which requires vast drill grounds and a varied *matériel*, the battalions have been

* A lecture delivered at the Peruvian Staff College by Lieut, Colonel D. Gastón Hébert,

grouped in threes and fours, so as to form six regiments of sappers and miners.

The covering troops however require that their units shall always be ready to take the field from the carliest moment of mobilization. In order to attain this result, three battalions and certain detached companies have been located in the frontier garrisons. A few fortresses also possess one company of fortress engineers each.

These six regiments with the three detached battalions form 20 battalions of sappers and miners. The sappers and miners are also pontoniers.

To these 20 battalions must be added :----

- (1). 3 battalions of railway engineers, forming 1 regiment.
- (2). 1 battalion of telegraphists, organized in 6 companies.
- (3). 1 aeronautical battalion, with 4 companies.
- (4). 1 battalion of sappers and miners of 7 companies, stationed in Tunis and Algeria.

In each regiment there also exists one company of engineer drivers, for the transport of important *maticicl.*⁹

(1). In the regiments and battalions of sappers and miners and in the detached companies, all the men are trained in fieldworks, sapping and mining, elementary bridging, demolitions by means of explosives, and in the erection of portable bridges. Afterwards one part (miners) are specially trained in mining, and another (pontoniers) in bridging on some river with a rapid current (the Rhone or Seine[†]).

(2). The regiment of railway engineers is occupied solely in the laying, maintenance, and working of railways, the erection of portable metal bridges, the repair of large viaducts that have been destroyed, and in various works connected with communications.

The companies are detached, each in their turn, for duty on the great lines of railway, in order to perfect themselves in railway work.

Besides this, the state has entrusted the working of a certain line and junction to a detachment of this regiment. One captain acts as manager, and the lieutenants carry out the duties of inspectors or station-masters at large stations; the sergeants are the station-masters at the smaller stations, the corporals act as guards, and the sappers perform the other duties connected with the working of the line.

On various occasions sappers have to perform work analogous to that which would be required of them in time of war; an example of this occurred at the time of the great review which was witnessed by the Czar of Russia.

^{*} Note by the Translator.—The detached battalions are quartered in Verdun, Besançon, and Toul. The six regiments are concentrated at the following places:—1st Regiment, Versailles; 2nd Regiment, Montpelier; 3rd Regiment, Arras; 4th Regiment, Grenoble; 5th Regiment (railways), Versailles; 6th Regiment, Angers; 7th Regiment, Avignon. 20 squadrons of train are attached to these regiments. There are also 21 battalions of the territorial army available in time of war.

[†] Note by the Translator.—The pontoniers are trained by the 6th and 7th Regiments at Angers on the Loire and at Avignon on the Rhone.

(3). The telegraph battalion is employed in visual signalling, ordinary telegraphy, and wireless telegraphy. The men are trained in the care of telegraphic material, in the construction of lines, and in their working. They are also in charge of the telegraphic communications in fortresses.

(4). The aeronautical battalion is engaged in ballooning, in the repair of material, and in the loading of the balloon wagons. The officers make free ascents.

(5). The pigeon service is a dependency of the aeronautical battalion. The sappers are chosen from those men who have kept carrier pigeons in civil life, and are employed in the care and training of the pigeons. They are stationed in fortresses.

2. IN TIME OF WAR.

On mobilization the company becomes the engineer unit, as regiments and battalions exist only for the purpose of facilitating instruction.

In each battalion the companies are attached in the following manner :--

	Nos. 1 and 2 Companies become divisional companies, attached to the divisions of the
Battalion attached to an army corps, bearing the same number.	army corps. No. 3 Company becomes the corps troops company. No. 4 Company becomes either a fortress company or, in the case of an army corps with three divisions, a divisional company.

In the field the engineer units are distributed as under.

A. Division of Infantry.

t divisional eng	incer	compa	ny with	i its pai	rk.			
Officers (1 capt	ain, 3	lieuten	ants or	sub-lie	utenan	ts)		4
Sappers			· • ·				•••	240
Sapper drivers	• • •		•••					11
Horses								28
Vehicles					- • •		•••	5

B. Army Corps.

(1).	2 or	3	divisional	companies.	
•		-			-0

- (2). 1 corps troops company with 5 officers and park.
- (3). I corps engineer park with-

Captains		 	••	 • • •	I
Sappers		 	•••	 	46
Sapper driv	vers	 		 	185
Horses		 		 	303
Vehicles		 		 	47

These units are under the orders of the commanding engineer, who is a general of brigade or colonel.

TRANSCRIPTS.

C. Army,

- (1). The units attached to the army corps.
- (2). I aeronautical company with its park.
- (3). I army engineer park with-

Field officer	·					 I
Sappers	•••	·-•			• • •	 25
Sapper drive	ers		•••			 271
Horses	• • •	•••				 449
Vehicles				•••	••••	 71

- (4). I telegraph company with 50 vehicles.
- (5). I lines-of-communication company.

D. Group of Armies, or Army Operating Separately.

- (1). The units attached to the armies.
- (2). Railway companies with their park.

E. Isolated Division.

- (1). I engineer company with park.
- (2). I divisional engineer park.
- (3). Half a bridging train.

F. Fortresses.

In certain fortresses there are engineer, fortress, and balloon companies.

G. Cavalry Division.

An engineer captain is attached to the staff of each cavalry division, and he may have placed under his orders all the sappers of the cavalry regiments of the division.

H. Detachments of Sappers, Cyclists.

These, under the orders of a lieutenant, are attached to certain cavalry divisions. They carry on their bicycles the tools and explosives necessary for making demolitions or effecting repairs in front of the army.

Source of Supply of Engineer Officers.

Engineer officers are obtained in the following ways :----

(1). From students who have qualified at the École Polytechnique. These are graded as sub-lieutenants on passing out, and have then to serve for one year in that rank in a regiment of engineers, before going through a course of instruction for one year in the École d'Application at Fontainebleau.

(2). From those non-commissioned officers of engineers who have passed the examination at the conclusion of a year's course at military school at Versailles. A certain number of officers of this class attend the courses at the school at Fontainebleau. (3). In order to fill vacancies on the establishment caused by the sending of engineer officers to the colonies for fortification, public works, and railway duties, a certain number of non-commissioned officers of artillery, cavalry, and infantry are allowed to take part in the examination for admission to the military school at Versailles.

RESERVE OF OFFICERS.

The greater part of the reserve officers belong to the *Ponts et Chaussies*. Others are either retired officers of the corps, or non-commissioned officers of engineers who have passed the required examination.

Engineer officers are attached either to units of the corps, or to the staff for engineer services.

STAFF FOR ENGINEER SERVICES.

The staff for engineer services is charged with the construction and maintenance of fortifications and barracks, of certain communications in fortified places, and finally with all questions relating to war department property.

France is divided into a certain number of engineer districts, whose headquarters are at the principal city of the district, or at the headquarters of army corps, or in important fortresses. At the head of each district is a colonel or lieutenant-colonel, called the director of engineers.

The districts are divided into divisions, commanded, according to their importance, by lieutenant-colonels, majors, or captains, called chefs de génie, who carry out their works by means of engineer captains, or—under exceptional circumstances—of administrative officers (officiers d'administration), who are placed under their orders.

Proposals for works are approved, according to circumstances, either by the director of engineers, the general commanding the engineers, or the minister of war.

The director of engineers performs the duties of secondary auditor, in the verification of the accounts of the sums expended on works.

Officers of engineers are assisted in their duties by administrative officers (officers of the administration of engineer services), by barrack wardens, and by *portiers-consigne*.

The administrative officers are recruited solely from the N.C.O. students of the École d'Administration Militaire at Versailles (engineer section), who have passed the final examination.

The engineer administrative officers number 570, and have a separate organization; their relative rank is as under :---

Officier d'a	idministratio	n, 3rd class	5		Sub-lieutenant.
••	,,	2nd "			Lieutenant.
**	**	ıst "	•••		Captain.
,,	,,	Principa	al	•••	Major.

They are charged with the superintendence of the works and with financial duties connected therewith.

The *portiers-consigne* have the relative rank of adjutant (N.C.O.), and are charged with the care of fortifications and barracks. They are recruited from amongst non-commissioned officers of various arms of the service after having passed an examination. They are commissioned.

The barrack wardens are charged specially with the maintenance of barracks. They are recruited from among non-commissioned officers of various arms of the service who have passed an examination, and receive a proportionate rate of retired pay. The office of barrack warden is considered as a civil one.

The administrative officers of the reserve and of the territorial army, are recruited from amongst retired officers of the same class, and also to a still greater extent from sub-engineers and conductors of the *Ponts et Chaussies*.

ENGINEER ESTABLISHMENTS.

Besides the districts and divisions, there exist a number of engineer establishments intended to carry out particular services, viz. :--

(1). The technical engineer section, which studies questions submitted to the technical committee of the corps.

(2). The directorate of military telegraphy and engineer war *materiel*, which has under its orders :--

(a). The general military telegraph depôt, which constructs, buys, experiments with, and takes charge of all *matériel*.

(b). The commission of studies and central establishment for engineer war *matériel*, charged with experiments relative to the improvement, construction, and provision of war *matériel*.

(3). The aeronautical laboratory.

(4). The central aeronautical establishment, charged with the construction of aeronautical *matériel*.

(5). The military pigeon lofts.

(6). The engineer schools established in the localities in which engineer regiments and detached battalions are quartered.

These establishments have as their objects :--

(a). To afford to these units of the corps the means of securing the special instruction of the non-commissioned officers and sappers.

(b). To take care of the *mathriel* of the engineer parks, the *personnel* of which mobilizes in the garrison in which the school is situated.

(r). To prepare non-commissioned officer candidates for the grade of administrative officer, etc.

The school connected with the 5th Regiment is called the Railway School. It is charged with the maintenance of the railway park and portable bridge *matéricl*.

The importance of these establishments, which have as their object, in almost every case, the construction and maintenance of *materiel*, cannot be denied, when the very large quantity of vchicles, tools, machinery, and *materiel* required for the different units of the armies are considered.

For example :—

(a). The bridge train of a French army corps is composed of 47 vehicles.

(δ). The heavy Rhine bridge train (German) is composed of 119 vehicles.

(c). A Roumanian pontonier company has 53 vehicles.

(d). A field balloon company in France has 17 vehicles.

(e). A German engineer siege train has 59 vehicles.

HIGHER COMMAND OF THE ENGINEERS.

In Peace Time.

In those districts in which engineer troops are stationed the command is held by a general officer. In other districts the command of the engineers is entrusted to the colonel, director of engineers.

In time of war the engineers of an army corps are commanded by a general officer or colonel; the engineers of an army are commanded by a general.

At the principal points on the lines of communications, lines of communications engineer divisions are established, commanded by reserve officers, under the orders of the commanding engineer of the lines of communications.

Rôle of the Engineers in the Colonies.

Engineer colonial troops have not been raised. When a colonial expedition takes place engineer units are formed either from volunteers or from men selected by lot.

The part which these troops play in colonial expeditions is considerable. Very varied and difficult tasks are entrusted to them, such as the construction of piers for the disembarkation of the force, hutting, the making of roads, railways, bridges, etc.

Outside the active operations of a colonial campaign, engineer officers are charged with the making of roads, railways, and harbours in unhealthy climates and amongst hostile inhabitants.

In this way important works have been carried out by engineer officers in Madagascar, Senegal, French Guinea, the Ivory Coast, Dahomey, the Congo, Tonkin, and Cochin China.

The maximum number of engineer officers who may be seconded for the execution of colonial works is fixed by ministerial decision of the 23rd February, 1901, at—

Colonel an	d lieute	nant-c	olonel	 	••	2
Majors			•••	 		5
Captains				 		23
Lieutenants and sub-lieutenants				 		10
Administrative officers			 		20	

4 M.1

THE USE OF SANDBAGS AS COVER IN THE ATTACK.

Translation of an article appearing in the Mitteilungen über Gegenstände des Artillerie-und Geniewesens No. 4 of 1908, and kindly forwarded by the General Staff, War Office.

SINCE the conclusion of the Russo-Japanese War, various experiments have been made, not only in Russia, but also in other countries, in the use of sandbags for purposes of cover during the attack. In the course of the war the Japanese frequently made use of sandbags, not only when acting on the defensive but also when attacking, and this fact has attracted the attention of all armies to the point in question.

While these experiments have been carried out on a varying scale in other armies and the matter has then been allowed to drop, greater importance seems to be attached to the question in Russia, where experiments are still being continued.

The first to point out the desirability of such experiments was General Skugarevski, President of the Committee on the training of the Russian Army. In consequence of his representations, exhaustive experiments have been (and are still being) carried out by various Russian regiments, and reports have been furnished to the committee referred to. The result is that the use of sandbags in action would seem to have been adopted as the normal rule in the *Drill Regulations and Tactical Instructions for Infantry*—now being prepared by this committee—as well as in the new *Manual of Field Fortification*.

The *Militär Wochenblatt* No. 158 of December, 1907, published an interesting notice of an article by the commander of a Russian battalion, which originally appeared in the *Russki Invalid* No. 235, dealing with the results of the experiments as far as they have gone.

It may be gathered from the original Russian article, that the troops did not take to the experiments in the use of sandbags with any more enthusiasm than they did to other forms of earthwork. The reason for this is said to be the disasters of the recent war, in which, notwithstanding the most extensive use of the spade, elaborate cover and fortifications did not save the army from defeat, and the faith of the men in the efficacy of work—which was always disliked—was badly shaken.

The experiments mentioned by the Russian battalion commander in his article were intended to clear up the following points :---'

- 1. What is the thickness of cover required, and the amount and description of earth necessary for filling the sandbags?
- 2. What is the best colour for sandbags, with a view to their being as little conspicuous as possible?
- 3. How should sandbags be used in action-especially in the attack?
- 4. Should the sandbag be introduced as an article of the men's equipment, and if so in what form ?

With regard to 1 and 2, experiments were carried out during the course of musketry training. At 400 paces* two head-targets were used, of which one was covered by a sandbag; another practice was carried out at the same range with one head-target covered by a sandbag; and finally at 600 paces and 400 paces with two head-targets covered by sandbags, and two similar targets without such cover.

The sandbags used were made of canvas of a grey-green colour, about 19½ inches long (the breadth of a man's shoulders), and 12—14 inches in breadth and depth. The weight of the sandbag when filled varied from about 30 lbs.to 44 lbs., according to what it was filled with (sand, gravel, or rubble). When filled with sand and gravel the sandbag was not penetrated by bullets, whereas when filled with earth even two sandbags placed one behind the other did not afford any adequate protection. In the practice carried out at 600 paces, the sandbags could hardly be detected with the naked eye, and the target behind a sandbag was extremely difficult to see. Even at 400 paces, with one head-target behind a sandbag, the difficulty of aiming was greatly increased.

With regard to point 3-the use of sandbags in action-the question of their use in the defence was not touched upon, as their enormous importance in defensive action had been sufficiently proved in the course of the recent war, especially during the winter fighting in the positions on the There is also no question that the use of sandbags in the Sha Ho. attack will be avoided in ordinary average ground. On the other hand, in very open ground their use is of incalculable value. The men dislike making fire-trenches when lying down, as digging or scraping the ground in that position is most inconvenient. They feel that it is much more to the purpose to fire than to laboriously dig a hole for themselves, especially as they are expecting every moment to have to dash forward. The idea that the reserves coming up behind will use and improve such trenches usually remains (as the experience of the last war proves) a pious hope and nothing more. It is preferable for the reserves to make a longer advance, and to utilize even an unimportant fold in the ground, rather than undertake spadework under the enemy's fire. Moreover, though such fire-trenches may afford cover from view to a man lying down, the earth thrown up does not stop a bullet. When the ground is hard, work with the small entrenching implement while lying down, is at best unsatisfactory and fatiguing, and is often quite impossible.

In the experiments carried out, empty sandbags were carried by the men and were not filled until the last moment, *i.e.*, immediately before deployment into attack formation. They were then filled with whatever soil was available on the spot. At ranges between 2,200 and 1,100 yards, the advance was carried out by individual men making short rushes of 30-40 yards, as the sandbag, when filled, is a considerable weight for a running man to carry. Before the rush the rifle was "slung," and the neck of the sandbag was grasped by one hand, while the other hand seized a special loop made for the purpose; the man then ran forward as

^{*} A Russian pace = 2.329 feet.

fast as he could some 30-40 yards, threw himself down, and took cover behind his sandbag.

Under effective fire from the enemy, between 1,100—600 yards, creeping forward under cover of the sandbags was practised, and it was found in some of the practices, that the men preferred creeping forward considerable distances with filled sandbags, to entrenching themselves while lying down.

From the defender's position it was impossible to detect, with the naked eye, a man lying down behind a grey-green sandbag, at ranges between 2,200 and 1,100 yards. The battalion commander mentions in his article that both officers and men were at first very averse to the experiments, but after two or three practices they entirely changed their opinions. Any misgivings as to increasing the field equipment carried by the soldier was more than compensated for by the undoubted advantages of the sandbag.

With reference to 4, the question whether the sandbag should be adopted as an article of the soldier's equipment and if so in what shape, it was proposed to take the opportunity of the issue of new field equipment regulations, to reduce the weight at present carried by a few ounces, in order to make the addition of a sandbag possible. It was not considered desirable that the sandbags should be carried with the first line transport.

As to the material to be used for filling the sandbags, the writer of the article points out that there can be no dearth of suitable material available in European countries, amply provided as they are with good roads.

The *Mililär Wochenblatt* adds that the introduction of the sandbag as part of the soldier's equipment, is entirely out of the question in Germany, since its use in offensive tactics must be confined to exceptional occasions; it would diminish the men's activity in attack and cripple the offensive spirit.

The provision of a larger number of sandbags in the wagons of the engineers, for use in the preparation of defensive positions, and also in the engineer siege trains, for use in siege operations, where sandbags are of especial importance to the attacker, has been arranged for by regulations quite apart from the questions discussed in the article referred to above.

REVIEW,

FIELD ENGINEERING IN VON LÖBELL'S ANNUAL FOR 1907.

THE thirty-fourth volume of von Löbell's *Jahresberichte über das Heer und Kriegswesen* has been issued in the usual form :—It contains reports on the armies of the various countries; on the tactics of infantry, cavalry, field artillery, and the combined arms; on fortification, field engineering, transport, balloons, telegraphy, small arms, artillery *matériel*, military history, etc., etc. Like the previous numbers, it has within its covers a mass of military information and statistics not to be found in any other single work.

The following is a summary of the article on field engineering :---

The first section—Field Fortification—gives a summary of the opinions which have appeared in print during the year. It is claimed that the German *Manual of Field Fortification*, 1893, was the first in which complicated works were abandoned, which taught that cover should be as low as possible, bombproofs as numerous as possible, and parapets as invisible as possible, and insisted that it was the duty of every arm to learn, and be master of, the use of fieldworks.* The Russo-Japanese War has proved that the German theories were right, but there are still some commanders who are "spade-shy," and who say "rather double in heavy marching order; it takes less breath than grubbing along the ground." This is no doubt the right spirit, but infantry should know how to use the spade, for necessity may force them to employ it, even as it drove the Japanese.

The new Manual of Field Fortification, 1906 (reviewed in the R.E. *Journal* of January, 1907), has still further simplified the art, and has still further laid stress on important principles. There is now little difference between the manuals of the various armies, but the French one admits *positions de repli* behind the main line, while the German lays down "one line only" as a general principle.

The proper tactical use of fieldworks is all-important, and much instruction may be gained in this subject from the great engineer exercises carried out in conjunction with other arms. The sentence from *Infantry Training* which is placed at the commencement of the *Manual of Field Fortification*, "Defence that will not only repulse an attack, but will include a decisive victory, must be carried out on offensive lines," is in accord with Clausewitz's idea, "The art of entrenching should not be used by

* Here, as so often happens in German works, complete ignorance of British military text books and writings is exhibited.

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the defender in order to fight with greater safety as behind a wall, but to attack the enemy with better chance of success." A strong position can be held by a comparatively weak garrison, and so will free reserves for use elsewhere.

The Japanese never delayed entrenching as soon as they had occupied a position; the Russians were often slow, and commenced to dig so late that their working parties frequently betrayed the situation of the trenches and rendered measures of concealment of little use.

Although," advanced positions" are rarely desirable, "advanced posts" must be regarded as an essential feature of every position; such posts compel the enemy to an early deployment, and are often able to provide useful flank fire; they should be strongly fortified, but weakly garrisoned, and able to hold out during the attack on the main position.

There is considerable difference of opinion in military literature as to the value of obstacles, due to some extent perhaps to the remark in the *Manual of Field Fortification*, "Strong natural obstacles, and continuous lines of artificial obstacles on a front, hinder an advance, and may induce the enemy to turn it." Some writers hold that it is vain to expect to be able to make a frontal counterstroke; it offers too many disadvantages----First, it is to be presumed that a numerically superior enemy has to be attacked; secondly, all fire effect must be renounced during movement; and thirdly, neighbouring sections will not be able to fire while their comrades are in front of the position.

Generally a clear field of fire is held preferable to obstacles, but a cleared field of fire may very possibly betray the position, and this must be considered in the arrangements ordered.

One writer on field fortification—Stavenhagen—has drawn a curious deduction from the instruction in the German Manual, viz., "that fire effect is all-important; therefore the first work to be undertaken is clearing the foreground and measuring ranges. Cover is the second consideration." He thinks the clearing and measuring are to be completed, and "then only is cover to be constructed in the shortest time possible." This is not what is meant; it is intended that the commander should regard clearing a field of fire as of the first importance, but he is not to delay undertaking other necessary work at once.

Another writer, Woelki, contends that the official principle, "fire effect before cover," is wrong, and points out that a clear field of fire, unless the defender is well covered, may give great advantage to the attacker.

Fritsch, in his work, The Attack of Fortified Positions, deals specially with the role to be played by the engineers in combination with other troops. In 1866 and 1870-1 such co-operation was generally lacking; in peace the engineers have too often been regarded as isolated units not really forming part of a division or corps, and very superfluous at manœuvres; so that they have not had opportunity of learning how to appear at the right time and place, and the commanders have not been accustomed to reckon on their assistance. A considerable advance has, however, been made, and it is now recognized that engineers are indispensable in the destruction of obstacles, the reconnaissance of a position, the preparation of stores for an assault, the construction of the assault

REVIEW.

position, and in the assault itself. There should be at least two companies of engineers per division; the Japanese had three, and found that number insufficient, for they had to call for volunteers for engineer duties from the infantry.

Special attention is drawn to an article in the *Revue du Genie Militaire* of July, 1907, which gives an account of the sapping and mining done by a Russian sapper company against a Japanese field position on the Sha Ho.

The second section of the article deals with bridging. It is stated that the Russian pontoniers, though expert at pontooning, were found during the Manchurian War to be insufficiently experienced in building temporary bridges. In future the heavy artillery of the field army will make special demands on bridge builders. Attention is particularly drawn to the Manual of Temporary Bridges.

Austria has adapted the Hébert *matériel* for the cavalry bridge train; each regiment carries with it in eight four-horse wagons *matériel* for a bridge 35 mètres (114'S feet) long.

In France the experiments with a light cavalry *matériel* are not yet concluded.

The third section deals with organization. The compiler, recalling the controversies of past years with regard to the increase of the engineers, is glad to be able to record a fact—one engineer battalion has been added to the German Army, but it will not be the only one.

A short résumé of the growth of the Prussian engineers is given. In the war of 1864 all the nine engineer companies were employed; in 1866 all the companies were again used, but only five pontoon trains and six light bridge trains; the 1st and 2nd Armies had to build or repair 110 bridges mostly with extemporized materiel. Owing to lack of mutual understanding between the staff and the engineers, the latter were hardly used in the battles, and were prominent only on the lines of communication. After the war the 4th-or miner companies-of the engineer battalions were converted into fortress companies; the 2nd and 3rd Companies (sappers) were given increased instruction in bridging; and with the 1st Companies (bridgers) were given some instruction in mining. In 1870-1, although all the field companies and 30 out of the 33 fortress companies were employed in the war, there was an insufficiency of field engineers; yet after the war all three field companies of a battalion were trained as pontoniers. In 1885, the 4th Companies dropped mining and were trained as field companies. It was arranged that certain engineer companies should be raised as siege companies, but when the 16th Battalionwhich was to be the nucleus of these companies-was formed, it was trained as a field battalion.

In Austria, where the Engineer Corps (as separate from the field battalions) was reduced in 1893, and in France, when the pontoon train was disbanded and its duties handed over to the engineer troops in 1894, Germany's lead in introducing the "one pattern" engineer units (*Einheitspioniere*) was followed. Although many officers protested in these countries, the authorities appeared to consider that future wars must be wars of manœuvre, and that technical troops would only be

required on the communications. It took the Russo-Japanese War to open their eyes to the possibilities of the attack of fortifications and positions. In Germany the number of battalions had been gradually increased, so that in 1901 there were in all three battalions more than the total number of army corps. In 1905 it was decided to raise one battalion in each of the years 1907, 1908, and 1909, and in six army corps to have a regiment of two battalions instead of a single battalion; the second battalion in each regiment is to devote special attention to siege warfare. All battalions will be fully instructed in field warfare and temporary bridging, but those which do not specialize in fieldworks will be trained as pontoniers. The objections to the separate training have at last been overcome. In this connection it may be remembered that many generals opposed the formation of separate telegraph companies, yet these now must be subdivided to provide wireless companies, and increased from three battalions of three companies each to three battalions of four companies each.

Several new technical inventions have appeared which may develop into matters of extreme importance, such as liquid air as an explosive, the respirator Vanginot with compressed air, with the breathing apparatus "Aerolith of Suess und Schumann."

The organization of the Military Technical Academy is now completed; the two junior courses are no more and no less than the two divisions of the old Artillery and Engineer School under a new name. All officers without exception attend the "Pioneer Course" and the so-called "First Engineer Course"; then they go back to regimental duty, and, later on, a few of them are selected for the Second and Third Engineer Courses. This is simply a return to the former system of sending a few officers to the Technical High School for special technical instruction, except that the new course is more adapted to military requirement.

The article concludes with list of books and articles of military interest which have appeared during 1907.

' E.'

NOTICE OF MAGAZINE,

REVUE DU GÉNIE MILITAIRE.

May, 1908.

MILITARY TELEGRAPHS.—The French first used the electric telegraph for military purposes in the Crimea in 1854, and in 1862 some further experiments were made with it at Chalons. The first telegraph company was raised in 1868, and on the outbreak of war in 1870 this was still the only telegraph company that France possessed. Various other telegraph units were raised during the war.

After the close of the war in 1872, the reorganization of the military telegraphs was taken in hand, and in 1875 the whole of the military telegraphs were handed over to the civil telegraph department at the request of the latter. Very soon however the civil department began to complain of the burden of their military duties, and the war department were called upon to furnish not only the telegraph stores, but also a considerable *personnel* for the military telegraphs. This system was 'expensive and inefficient.

In 1900 another reorganization took place, and a telegraph battalion was raised to take over the first line military telegraphs. The line-ofcommunication telegraphs were left in the hands of the civil telegraph department.

The telegraph companies are army troops. They are entrusted with visual signalling as well as telegraphs. Each company is organized in six sections, and commanded by a captain, with another captain as second in command. The sections are commanded by subalterns, of whom five-sixths belong to the reserve. The *personnel* for the second line telegraphs is taken from the civil telegraph department. One telegraph company is allotted to each army. Each cavalry division has also a telegraph section, commanded by a reserve lieutenant. In every cavalry regiment there are four telegraphists, and these on mobilization form the divisional telegraph section. Each cavalry regiment also furnishes one telephone and two kilomètres of wire, carried on the saddles of the telegraphists. Each cavalry brigade has telegraph instruments and a few kilomètres of wire, carried in a light cart.

of six, and to double the number of companies. The telegraph troops of each army should then be placed under the command of a senior engineer officer. Each telegraph section should be organized and equipped as a self-contained unit.

THE FOREIGN MILITARY ESTABLISHMENTS IN CHINA.—A continuation of the previous article. A description is given of the German barracks at Tientsin. The German troops were originally quartered in hired European houses, in the Chinese University building, and in some portable barracks of the Decker type. The buildings now in occupation are the Chinese University, and some portable wooden barracks erected behind it.

The writer also gives a description of the English barracks in the Pekin Legations. The troops were originally quartered in some old Chinese yamens, but the heavy roofs of these buildings showed signs of collapsing, and they had to be pulled down. Barracks for 250 men are now being built to replace them. The design of the hospital—which was nearly finished at the time of writing—is commended. The Legation defences consist of a brick wall 3 feet thick, with small bastions for flanking it. The writer considers that the wall is not a sufficient defence, as the Chinese have plenty of modern guns which they could bring to bear on it.—*To be continued*.

J. E. E. CRASTER,

JULY, 1908.

(Published Quarterly).

THE following extracts from the list compiled by the General Staff, War Office, are published in the R.E. *Journal* by permission of the Army Council.

HISTORICAL.

THE TRUTH ABOUT PORT ARTHUR. By E. K. Nojine, Translated and edited by Capt. A. B. Lindsay and Major E. D. Swinton, 395 pp. 8vo. London, 1908. Murray. 15s.

This work gives a vivid picture of the situation inside the fortress, from the opening of the war until the capitulation, including the fighting at Nanshan and in the mountains between Dalny and Port Arthur. The author is a civilian, and during the siege was correspondent of the *Nowy Kry*, the Port Arthur newspaper, but although he has been at great pains to collect information, he is such a hot partisan of General Smirnoff, and so violently antagonistic to General Stessel, that his statements must be accepted with caution. He left Port Arthur in a destroyer on November 15th, so that the facts were not altogether gathered by personal observation. Nevertheless, documents are quoted to an extent which makes it impossible to doubt the correctness of most of the accusations levelled at General Stessel, and at the trial of that officer the indictment was almost a repetition of the charges contained in this book.

From a military point of view the work will perhaps be found a little disappointing, but as a graphic narrative by eye-witnesses of the principal events which led to the capitulation it will be found of absorbing interest.

An excellent map of the defences is given, and there are several good illustrations reproduced from photographs of the defence works.

THE RUSSO-JAPANESE WAR (La Guerre Russo-Japonaise). By Colonel E. Bujac. 487 pp., 21 maps and sketches in text. Svo. Paris, 1908. Lavauzelle. 6s. 3d.

This work is the sixth of a scries written by the author and entitled "Précis de quelques guerres contemporaines,"

It is divided into five parts.

Part I. opens with a retrospect of the political situation, from the treaty of Shimonoseki to the outbreak of the Russo-Japanese War, and contains a description of the theatre of war and of the contending armies.

Part II. comprises a history of the struggle up to the establishment of army headquarters in Manchuria under Marshal Oyama. It treats of the naval operations off Korea, round Port Arthur and in the sea of Japan. The narrative of the campaign on land embraces the Battles of the Yalu and Nanshan.

In Part III, the author describes Oku's and Kuroki's advance towards Liao-yang, the Battles of Liao-yang, the Sha-ho and Hei-ku-tai, the slege operations up to the capture of the 203-mètre height inclusive. Mishchenko's raid on Ying-kou and the "dashes" southward attempted by the same general in February and May, 1905, as well as the Japanese cavalry raids against the Russian communications.

Part IV. contains an account of the fall of Port Arthur, the Battles of Mukden and Tsushima, and the expedition to Saghalien,

Part V. gives a history of the peace negotiations and the events immediately succeeding the cessation of hostilities. The renewal of the Anglo-Japanese Alliance is also noticed and discussed.

The details given in Part I. concerning the Trans-Siberian Railway are of interest, and a useful table of distances between different points on the Russian and Chinese railway systems is given. Data are furnished concerning the traffic which passed over these systems at different periods, and the *personnel* and *matériel* carried.

Next follows a concise strategical summary of the war—an arrangement whereby the student is enabled to grasp the general course of the campaign before proceeding to study its details.

The measures taken to ensure China's neutrality are next discussed, as are also international law questions relating to contraband of war, right of search, anchoring in neutral waters, floating mines, dispo-al of wounded in naval warfare, and wireless telegraphy.

A list of Chinese prefixes and suffixes, descriptive of administrative divisions and topographical features is given. The *pricis* of the successive steps whereby demobilization was accomplished shows the difficulties attending the process. The criticisms of the three arms on the Russian side on pages 55-58 are too superficial to be of value; in discussing the infantry, the author quotes largely from a lecture by Capt. Soloviev published in Vol. L., J. U.S.J. The gist of the above is the important part played by the bayonet attack, and the need for more officers.

This part of the book contains several errors. The nine brigades of East Siberian Rifles, alluded to on page 33, contain *four regiments of two battalions*, and not *two battalions* as stated. The raising of third battalions for these rifle regiments, referred to on page 35, was *not* part of the mobilization. The figure 95,000 on page 36 is considerably underestimated. On page 59 it is stated that Manchuria and the adjoining regions were the *only* base of provisions, whereas in reality nearly all flour, vegetables, condiments, and oats were at first brought from Europe.

On the other hand, the details given about the Japanese forces, which even include the names of and changes amongst chief staff officers and regimental commanders, are wonderfully accurate.

The statement on page St that the 1st Reserve Brigade was sent from the Hnd to the HIrd Army at the end of August, 1904, is, however, an error. This brigade served with the HIrd Army from the beginning of July, 1904. From data supplied, the author reckons the total loss of the Russians during the war at 280,000. Admissions to Russian hospitals

were 18.8 per cent., and the proportion of killed to wounded was $\frac{1}{3.5}$.

In discussing Japanese infantry factics the author remarks on the following :--

- (a). The large number of rifles employed at the outset in order to obtain superiority of fire, resulting in an undue extension of front and premature using up of reserves.
- (b). The practice of entrenching during the attack.
- (c). The use of rushes, which according to the author tended to be long in the Ist Army and short in the IInd and IVth Armies.
- (d) All commanders—especially generals—keep their places, and great attention is paid to intercommunication, with happy results.

The general characteristics of Japanese factics are said to be :--

Approach to hostile positions by night when possible,

Close co-operation of infantry and artillery. Energetic attack of selected points-often at night or dawn.

The details given on page 88 concerning infantry ammunition supply do not take account of the increased number of rounds carried during the later stages of the war.

Losses in horseflesh during the South African and Manchurian campaigns are compared, and also losses through disease in the Japan-China and Russo-Japanese Wars respectively. Japan's total losses during the latter war are given as 450,000. Some statistics are given to show what heavy financial burdens the war imposed upon Japan.

In Part II, the difficulties of modern blockade, the employment of torpedoes and mines, and the action of war vessels against land defences are briefly discussed.

In cruicizing the Battle of the Yalu, the author, after quoting from various military writers, gives the opinion that Sassulitch would have been well advised to retire without giving battle, but that having at the last moment decided to accept it, he adopted the worst methods of defence under the circumstances, viz., the cordon system. Reconnoitring detachments should have been pushed well forward and different points along the tiver guarded by advanced posts—carefully interconnected—thus giving the main body time to manœuvre; the main body to attack the enemy whilst the latter was in the act of crossing.

The following points in the Russian disposition are criticized : -

1. Two complete regiments held back far behind the right.

- 2. The absence of reserves and cavalry on the left.
- 3. The absence of a general reserve and second position.
- 4. The orders for the occupation of the position,

Some interesting observations follow regarding the treatment of correspondents in this war and their position nowadays; the latest German regulations on this subject are quoted.

The description of Oku's movements between his disembarkation and the Battle of Nanshan is mengre,

Regarding Nanshan, the Russians are criticized for failing to keep large reserves at hand and omitting to make a counter-attack on the 4th Japanese Division. The absence of a Japanese naval force in Hand Bay is commented on, but is rightly attributed to the dread of mines.

Stakelberg is criticized for fighting at Telissu according to a preconceived plan, and for his tardy and piccemcal use of reserves. Contrary to some authorities, the author considers that the Russian commander was well served by his cavalry.

In a discussion on the conduct of the campaign by the Japanese up to the eve of Liaoyang, their strategy is warmly defended against various critics whom the author quotes (see also comments on strategy, page 244).

Oyama's preliminary dispositions at Lino-yang are praised, but they "finally end in a commonplace frontal attack." The force for the frontal attack "Japanese left and centre" is pronounced as too strong, and the right (Kuroki) as too weak, for its tactical task, the indispensable preliminary of its strategical $r\delta te$.

Kuropatkin's best plan, according to the author, would have been a vigorous offensive with the right wing, with a reserve behind his left to prepare for eventualities.

Pages 273-277 contain an excellent description of the Japanese infantry attack.

In the chapters dealing with Port Arthur full particulars are given as to the strength of the garrison, food and ammunition supplies, etc. Several opinions are quoted as to the surrender. The differences between General Stessel and some of the higher commanders are referred to, but evidently the author was ignorant of much that has lately come to light, since Fock is referred to in a footnote as a "heroic figure." The statement that the Russians successfully countermined under Fort No. II. (page 312) is incorrect, and in the last paragraph, on page 311, 10th Regiment should read 12th Regiment. On page 380, General Samejima is erroneously stated to have been transferred from the command of the 7th to that of the 11th Division; he never commanded the former.

Of Port Arthur the author says that it only had a deceptive likeness to a fortress, that neither attack nor defence were up to modern standards, and that the instructiveness of the siege was consequently affected.

The defence is held to have used its reserves up prematurely in defending too extended a perimeter. The premature assaults of the Japanese are blamed, and attention is drawn to the inability of the Japanese artillery to perform the three-fold task of keeping down the adversary's artillery fire, sweeping the ground and opening up "storming avenues" for its infantry.

General v. Caemmerer's criticisms on Mukden are quoted, and extracts are given from other writers descriptive of Japanese attack formations (both by day and night) at this battle.

The book is not well edited; Chinese, Japanese, and Russian renderings of names are used indiscriminately both in the text and on the maps, and different transliterations given of the same word where only one language is used.

On page 24, the 10th Division is described as the nucleus of the HIrd instead of the

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IVth Army. The words "Army" and "Corps" are used indiscriminately in describing Japanese forces consisting of several divisions.

On page 80, "Jobihei," which includes the standing Army and its 1st Reserve, is erroneously translated as "armée active." On page 144, Sasaki's Brigade is stated to include the 17th instead of the 47th Regiment.

In spite of these imperfections the book is a most valuable aid to the study of the latest great campaign, especially as a preliminary to the perusal of larger works.

HISTORY OF THE WAR IN SOUTH AFRICA, 1899-1902. Compiled by the direction of His Majesty's Government. Vol. III. 560 pp., with maps in separate case. 4to. London, 1908. Hurst & Blackett. 17s. 6d. to subscribers and 21s. to non-subscribers.

Vol. II. of this history was noticed on page 3, No. 3.

The present volume opens with an account of the rebellion in N.W. Cape Colony, and of the measures taken for its suppression between October, 1899, and July, 1900.

The remainder of the book deals with the whole of the operations from the reorganization at Bloemfontein in March and April, 1900, till the departure of Lord Roberts from South Africa in November, 1900. It thus includes the advance of Lord Roberts to Pretoria, the operations in the Orange River Colony in May and June, 1900, the siege and defence of Mafeking, Plumer's operations in the north, the Battle of Diamond Hill, Sir R. Buller's operations in Natal up to his junction with Lord Roberts, the surrender of Prinsloo, the advance to Middelburg, the pursuit and escape of De Wet, the advance to Komati Poort and to Pilgrim's Rest, and the operations in Western and Eastern Transvaal and in the Orange River Colony at the end of 1900.

This volume, though not dealing with such important engagements and operations as its predecessors, certainly lacks nothing in the way of interest, and though, like its predecessors, it refrains from comment, adverse or otherwise, it is often possible to read between the lines and to see clearly who was in fault or the reverse, and for what reasons.

A vivid picture is given of the difficulties which beset Lord Roberts at Bloemfontein in March and April, 1900, and of the extraordinary difficulty of supplying, at a later stage, columns widely separated and operating in country, the topographical features of which differed so widely as they did in the Transvaal and the Orange River Colony.

All the operations are described with great clearness, and that this alone is no small achievement will be realized by all who took part in the scattered operations of the latter half of 1900.

By the aid of the excellent maps provided it is possible to follow the operations through every detail, and to realize, to a certain extent, the difficulties which surrounded the commanders, who in many cases were pursuing a mobile and clusive enemy through a little-known country, while they themselves were to a great extent tied to roads and based on railways. The difficulties were those which regular troops operating against a guerilla enemy have always to surmount, and many historical instances could be adduced to show how other nations have had in other countries to contend with similar problems. If the reader turns to Professor Oman's Vol. III. of *The Peninsular War*, he will find many of the conditions repeated, though in many cases the task of the French generals was an easier one than that of our own in 1900.

On the whole, this volume i_5 thoroughly worthy of its theme, and should be read and digested by all officers.

THE DEFENCE OF PARMAIN (La Défense de Parmain). By A.-D. Denise, former Mayor of Parmain. 220 pp. Svo. Méru, 1906. J. Douce. 15. Sd.

An interesting story of a little-known episode of the war of 1870-71. Though the author may be suspected of erring on the side of partiality to his own countrymen, the account demonstrates that raw levies, when composed of patriotic and determined men, may check even the best regular troops for a short time; at the same time, however, it affords yet another proof of the inability of these untrained men to act on the offensive or to carry out any concerted action, and shows that their efforts, however brave and heroic, are certain to end in defeat and disaster. KÖNIGGRÄTZ, By Lieut,-Colonel H. M. E. Brunker. 112 pp. Svo. Portsmouth, 1908, Holbrook, 35. 6d.

This small book is an epitome of the campaign, summarized from Bonnal's Sadowa and other authorities.

It is apparently compiled with a view to assisting officers in their examinations for promotion, and, as the author points out, should be taken rather as a guide to further reading on the subject than as a complete history.

The maps provided are not clear, and the difficulty of reading them is enhanced by many variations of spelling of names of places in the text.

The addition of a map of the country about Trautenau and Nachod would have been an improvement.

MILITARY HISTORY FOR EXAMINATIONS IN 1908: QUESTIONS ON THE KÖNIGGRÄTZ CAMPAIGN IN 1866. By Lieut.-Colonel H. M. E. Brunker. 17 pp. Svo. London, 1908. Forster, Groom. 18.

This pamphlet contains 50 questions on the campaign of 1866 in Bohemia, the first eight of which are the same as those set at the Staff College Entrance Examinations of August, 1897. The questions are searching and to the point, and would doubtless be of value to students of the campaign.

A HISTORY OF THE CIVIL WAR IN THE UNITED STATES, 1861-5. By W. Birkbeck Wood, M.A., and Lieut.-Colonel J. E. Edmonds, R.E. 549 pp., 13 maps, and 14 plans. 8vo. London, 1908. Methuen. 128. 6d.

This is a second edition of a book originally published in September, 1905, and is an endeavour to provide "within a reasonable compass an impartial account of the events of the four years of hostilities." Chapter XX., "Grant and Lee in Virginia. From the Wilderness to Cold Harbour," and portions of Chapter XXI., which contains an account of Major-General Butler's operations in May and June, 1864, and of Chapter XXIV., "The Shenandoah Valley in 1864," will be found useful by officers preparing for the November promotion examination; but the volume will be specially of service to those who wish to obtain a general survey of the military operations before proceeding to the detailed study of a particular period.

GRANT'S CAMPAIGN IN VIRGINIA (THE WILDERNESS CAMPAIGN). By Capt. Vaughan Sawyer. 197 pp. 8vo. London, 1908. Swan Sonnenschein. 5s.

This is the eighth volume of the "Special Campaign Series." Opening with a short outline of the war up to the beginning of the special period under consideration, it contains a clear, concise, and impartial account of the operations in Virginia, from the date of Grant's appointment to command of all the armies of the Union (March 9th, 1864) till shortly after the battle at Petersburg in June of the same year.

This book is accompanied by eight maps, which would have been more valuable had the names of all places mentioned in the text been included.

THE CAMPAIGN IN VIRGINIA, MAY AND JUNE, 1864. By T. M. Maguire. 88 pp., 6 maps in black and white. Svo. London. 1908. Clowes. 4s.

This hook consists chiefly of extracts from various works on the campaign in question. Officers are recommended to study the originals rather than the reproduction.

MEMOIRS OF FIELD MARSHAL SIR HENRY W. NORMAN, G.C.B., etc. By Sir W. Lee-Warner, K.C.S.I. 319 pp., with portraits and maps. 8vo. London, 1908. Smith, Elder. 145.

In the first chapter of this history Sir W. Lee-Warner traces the early career of the late Field Marshal, relating how he entered the Indian Army and joined the 1st Native Infantry, being shortly afterwards finally posted to the 31st Native Infantry (now the 2nd

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Queen's Own Rajput Light Infantry). Sir Henry Norman having become Adjutant of his regiment took part in the Sikh War, and was present at the Battles of Chilianwala and Gujrat; of the former a detailed account is given, the want of a decisive result being ascribed in a large measure to the flight and panic of the cavalry on the right. After the Sikh War, Norman acted as Brigade Major of a punitive expedition sent in 1850 against the Afridis, and his conduct on this occasion earned for him the appointment as Brigade Major at Peshawar.

After taking part in numerous frontier and other expeditions, Norman was finally appointed to the Bengal headquarter staff in May, 1856.

On the outbreak of the Mutiny, Norman was at Simla, but joined General Barnard's staff and acted as A.A.G. at Delhi. His account of the Siege of Delhi is mostly taken from extracts from letters to his wife, and gives a vivid picture of the whole scene and operations. He seems to have been always cheery and sanguine, although the difficulties to be contended against were at times very great. Being on the staff all the time he saw the inside of things, and, therefore, his account is well worth reading, even though the reader may be familiar with the events.

After the taking of Delhi, Norman went with the Lucknow relieving column still as the representative of the Adjutant-General's staff.

The description of the relief of Lucknow is brief, chiefly owing to the fact that Norman could not send many letters to his wife owing to difficulties of communication. After Cawnpore, Norman, having had a few days' leave, joined Sir Colin Campbell for the Oudh Campaign, where he fulfilled the same duties as before.

He then acted as Adjutant-General throughout the operations which ended in the capture of Lucknow. He took part in the operations of 1858, and finally went home at the end of 1859. In September, 1860, he was appointed A.M.S. to the Duke of Cambridge, but in 1861 was recalled to India to assist in the reorganization of the Indian Army, finally becoming Secretary to the Government of India in the military department. He had become Lieut.-Colonel and C.B. for his services in the Mutiny.

From this point Norman became a quasi-civilian, and the remainder of his career, though he filled the important posts of Member of the Council of India, Governor of Jamaica, Governor of Queensland, and finally Governor of Chelsea Hospital, ceases to be of purely military interest, though his views on the subject of our relations with Afghanistan, given in Chapter IX., should be of considerable interest to all soldiers.

The book as a whole presents a striking picture of a man who always did his duty to his utmost ability, and whose career, though latterly passed more as an administrator than as a soldier, may well serve as an example and incentive to all ranks of His Majesty's Service.

A map of India at the time of the Mutiny would have added greatly to the value of the book.

HISTORY OF THE PENINSULAR WAR. By C. Oman. Vol. III. September, 1809—December, 1810.—Ocaňa, Cadiz, Bussaco, Torres Vedras. 560 pp., with maps and illustrations. Svo. Oxford, 1908. Clarendon Press. 14s.

This, the third volume of Professor Oman's history, opens with an outline of the political conditions obtaining in Spain in the latter part of 1809. The next two chapters deal with the operations in Aragon and Catalonia, but chiefly with the Siege of Gerona by Verdier, St. Cyr, and Augereau. The account given is vivid and interesting, and a great deal of information seems to be new. None of the French generals appeared in a favourable light in these operations, the usual jealousies and quartels which appeared in the absence of Napoleon being evident. On the Spanish side the incapacity and indecision of Blake was balanced by the ability and resolution of Alvarez, whose treatment by the French after the surrender does not redound to their credit.

The autumn campaign of 1809 forms the subject of the next chapter, and the actions of Tamames, Ocaña, and Alba de Tormes are described. The first of these three was a victory for the Spaniards, largely owing to the indifferent generalship of Marchand, who made three weak attempts and was strong nowhere; but Ocaña, where Areizaga was opposed to Soult, resulted in a very severe defeat for the Spaniards, whose cavalry were inefficient and whose general showed a combination of vacillation, hesitation, and rashness which was fatal. He followed no definite plan, and when he had gained a temporary strategical advantage made no attempt to complete it by a tactical success. At Alba de Tormes the French victory was due to a tactical mistake on the part of Del Parque, to the indifferent quality of the Spanish troops, and to the dash of Kellermann, the French cavalry leader. The whole campaign is instructive, and although such an operation as Kellermann's at Alba de Tormes can hardly be recommended as an example of cavalry action, yet in general the operations show that victory goes to those leaders who follow the well-established principles of war.

We next come to Section XVIII. ("The Conquest of Andalusia"). The first chapter deals with the general situation, showing how the Spanish Army had fallen into the common error of attempting to guard every passage through an obstacle, with the result of being weak at all points and strong at none. The result of this policy was soon seen in the complete defeat and practical annihilation of the Spanish Army, while Soult and Joseph occupied Cordova and Seville. The French, however, were checked in their attempt on Cadiz, and Joseph returned to Madrid, leaving behind him a garrison of 70,000 troops.

The author now turns his attention to Portugal, and after a comprehensive survey of the geographical features of that country and of the possible routes for an invasion from Spain, he proceeds to consider Wellington's preparations for defence, in connection with which he also treats the subject of the Portuguese Army and administration. The next chapters deal with the French preparations, with the operations of Bonnet in the Asturias, with the siege and capture of Astorga by Junot, with the capture of Ciudad Rodrigo by Ney, and finally with the combat of the Coa and the capture of Almeida by Masséna. In his description of the Coa, Professor Oman pays fitting tribute to the conduct of the Light Division, but blames Craufurd for his action in getting involved in the fight.

The events in Eastern Spain are then related, and the operations of Suchet in Aragon, and of Augereau and Macdonald in Catalonia, are described. The disasters of the Spaniards were frequently due to their lack of cavalry, and though their leaders at times displayed energy and determination, their lack of combination proved generally fatal. The same factors affected the situation in Andalusia, where the only favourable element was the successful defence of Cadiz; but otherwise the Spaniards were everywhere defeated, though they certainly kept Soult and his lieutenants busy.

The next two chapters deal with Masséna's advance to Bussaco, and with the Battle of Bussaco. The descriptions are admirably clear, and with the aid of the excellent maps which illustrate the advance and the battle it is possible to grasp the situation and to understand all the important features of the fight. Mr. Oman challenges Napier's accuracy in several instances, and supports his charges by authentic extracts from various sources. He brings out the fact that there was little or no connection between the attacks of Ney and of Reynier, and also that Reynier's attack consisted of two entirely separate phases. A description of the topography of Bussaco is added, in which the salient , features which affected the tactics of the battle are well brought out.

The remaining chapters of this section are devoted to an account of Wellington's retreat to the lines of Torres Vedras, and to a very complete and clear description of the lines themscives. The section concludes with the story of Massena's retreat to Santarem. The author does not fail to criticize Wellington's dispositions in November, t810, nor those of Massena, and considers that both leaders did not act up to their reputations. Here the account of the operations in Portugal in this volume ends.

The last two chapters in the book deal with the operations in the north and east of Spain at the end of 1810, and with the political conditions in Spain generally. Appendices contain details regarding the various forces, orders, etc.

It is hardly necessary to say, considering Professor Oman's reputation, that this work will be of great interest to soldiers. Although a great part of it deals with operations in which the British forces did not take part, yet the interest of British officers should not be diminished, for the lessons of the various operations are well drawn, and the mistakes or successes of the various commanders are clearly pointed out, thus providing that instruction which should be the end and aim of all military history. In addition, there is not a dull page in the book, and it will doubtless be of interest to civilians as well as to soldiers. The maps are good, but the book stands in great need of a general map of the Iberian Peninsula. Some of the maps, too, are inserted in inconvenient places.

It is to be noted that Professor Oman maintains that the generally-used spelling of "Busaco" is wrong, and that it should be spell Bussaco, as given above.

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THE WAR OF 1809 (Krieg, 1809). Vol. 1.—Ratisbon. By Major E. M. von Vedropolje and Capt. O. Criste. 710 pp., with 23 maps. 8vo. Vienna, 1907. Seidel. 30s. Vol. II.—Italy. By Major M. Ritter von Hoen and Capt. A. Veltzé. 507 pp., with 12 maps. 8vo. Vienna, 1908. Seidel. 16s.

This excellent work has been prepared in the military-historical section of the Austro-Hungarian War Archives. It is based upon the original reports, supplemented by information from other authentic sources, and contains an exceptionally detailed account of the campaigns dealt with.

The first volume deals with the operations in Bavaria from the 10th to the 23rd April, 1809. It is divided into four sections. The first (pages 1 to 66) contains a history of the political events which led to the war; the second (pages 67 to 212) deals with the numbers, organization, and general characteristics of the opposing forces, and with their strategic concentrations; the third (pages 213 to 300) with the operations from the 10th to 15th April; and the last (pages 301 to 604) with the operations from the 16th to 23rd April, 1809.

The second volume is devoted to the operations in Italy during April and May, t809. This volume is similarly divided into four sections. The first (pages 3 to 45) deals with the concentration of the opposing armies; the second (pages 46 to 207) with the Austrian offensive in Italy; the third (pages 208 to 345) with the Archdake John's retreat to the Austrian frontier; and the last (pages 346 to 432) with the fighting in the Carnic and the Julian Alps.

The Appendices (pages 605 to 710, Vol. I., and pages 433 to 507, Vol. II.) contain the text of many important orders and reports, in addition to other valuable information. The maps are excellent.

The book should be of great value to officers studying the campaigns in question.

THE SIEGE OF GENOA, 1800 (Le siège de Gênes). By Eduard Gachot. 448 pp., engravings, plans, and maps. 8vo. Paris, 1908. Plon-Nourit. 6s.

M. Gachot is a well-known authority on this period, and the author of several volumes dealing with it—"The First Campaign in Italy" (1795—1798), "Second Campaign in Italy" (1800), "Suvarov in Italy" (1799), "The Campaign of Helvetia" (1799).

The present work reads more like a prose epic than sober history, and is a record of what may be accomplished by a determined commander with beaten and disheartened troops, despite want of money, food, and supplies, a hostile population, and daily diminishing numbers. It is founded on the documents in the French archives, the papers of Masséna, now in the possession of his descendants, and contemporary letters and diaries, particularly the diary kept during the siege by an Italian nobleman.

When Napoleon became First Consul by the coup d'état of the 18 Brumaire, the Army of Italy had ceased to deserve its name. Defeated and driven back, it only occupied Cori, in Piedmont, where the garrison was besieged, and Genoa, with the strip of coast leading to France; its commander, Championnet, had resigned, suggesting that Bonaparte should be sent to succeed him. Masséna was selected by the Consuls to restore the situation, and summoned to Paris from the scene of his successes in Switzerland.

In response to his demands for men, money, and supplies, he could obtain little from Berthier, the Minister of War, except promises; at Lyons and Marseilles, where he expected to find magazines, he discovered but little, and was practically left to make his own atrangements with local contractors.

Arrived at Nice, on the 17th January, 1800, he found the troops were deserting literally by hundreds; that the army had neither money, clothing, guns, ammunition, wagons, horses, nor mules; that the men still with the colours were living by robbery or begging; that fever and influenza raged, and that the so-called hospitals were without beds, coverings, wine, medicines, linen, or even warm water (through lack of fuel). The blockade of the coast by the British and Neopolitan fleets, under Lord Keith, made it extremely difficult for supplies, even if available, to be forwarded to the troops.

On toth February Masséna reached Genoa, where he found mutiny, anarchy, and conspiracy. He at once set about restoring discipline, organizing, requisitioning, and manufacturing. By the t_5 th March he had formed three corps, under Soult, Suchet, and Turreau, and in spite of his difficulties, was planning the offensive. On the 4th April, however, Mélas, the Austrian commander, commenced a movement against him with threefold more numerous troops, in four columns, by different routes, with the view of cutting him off and surrounding him. Taking advantage of the dispersion of his opponent Masséna was able to hold him off for some little time, and even to take numerous prisoners, but was eventually separated from Suchet and Turreau and isolated at Genoa, on 6th April, with 16,000 men of his force, where he was blockaded on land by 40,000 Austrians, and on sea by Lord Keith's fleet. He had to renounce the offensive and assume the modest $r\delta le$ of defending a fortress.

Hampered by an enormous civil population and without reserves of supplies, the situation soon became a terrible one. By the 15th May the starving population was reduced to devouring "bats, large spiders, lizards . . . grass and seaweed were eaten raw . . . snails and lemon bark commanded high prices. Wood fibre, worms, grass-hoppers, cockchafers, and caterpillars were sold when the butchers had no more dogs, cats, or rats to offer. Leather for stewing was sold at 2 frances a pound. The ration of the garrison was reduced to 5 ounces of bread made of beans and hay, 4 ounces of horse, and $\frac{1}{2}$ pint of wine . . . but often the soldier was on half or even quarter rations." The deaths per diem gradually rose in number—315 on the 25th May, 419 on the 28th May, 523 on the 2nd June.

A heavy sortie was made on the 1 th May in the hope of capturing a large supply depôt; but it failed, and Soult was wounded and captured. After this there was no active defence.

Napoleon had required Masséna to hold Genoa until the z3rd April. He promised to hold it until the 20th May, but receiving no message by that date, continued the defence.

By the 3rd June eating leather was 14s. a pound. Masséna dined on grass sonp and a piece of horse without bread; the Austrian prisoners ate human remains; the garrison was reduced to 4,000 men. Yet in spite of the agonies endured Masséna was not only obeyed, but an officer was able to write of him, "When Masséna marches out the dying raise themselves and try to follow him. To these atheists he has become a god." Famished and sick, his men never ceased to admire a chief who knew how to appeal to their courage and cared for them as if they were his children; but they said, "Masséna will make us eat our boots before he surrenders."

On the night of the 1st-2nd June the Austrians attempted to surprise the fortress, but after the repulse of one detachment the others retired.

On the 2nd June a British naval *parlementaire* proposed a "capitulation," but Masséna would not hear of the word. On the 3rd the Austrian commander, Ott, proposed a *readition*; on the 4th Masséna met Keith and Ott and obtained his own terms :--The French were allowed to march out with arms and baggage, free to recommence hostilities after a truce; the sick and wounded were to be transported by sea to Antibes. The arrival of Napoleon in Northern Italy and the necessity for the instant presence of the Austrian troops elsewhere made hours of value and forced the Allies to grant easy conditions. They would have done better to have raised the siege rather than to negotiate, for without horses, without supplies, and his men invalids, Masséna could not have left Genon.

On the 24th June the French, in accordance with the terms of the treaty at Alessandria, made after Marengo, were again in possession of Genoa.

An account of the operations of the French left wing and centre, which was separated from Masséna, and of the Siege of Savona is included in the volume.

Although the maps supplied with the work possess a special interest as being photographic reproductions of those used by Masséna, they are somewhat difficult to decipher, and do not appear to contain the names of all the places referred to in the narrative. LIFE AND SERVICES OF VISCOUNT LAKE. By Colonel Hugh Pearse. 429 pp. 8vo. London, 1908. Blackwood. 155.

Lake began his military career at the age of 13, in 1758, in the 1st Regiment of Foot Guards.

Though he took no part in the great victories of 1759-Minden, Quebec, Madras, and Quiberon Bay-he gained early experience of active service in the Seven Years' War, which ended with the fall of Cassel in 1762.

He then had a long period of home service, brought to a close by the outbreak of the War of Independence in America in 1775, when every available fighting man was required. The attitude of the "Opposition," who referred in the House of Commons to any British success as "terrible news," undoubtedly led to the intervention of France and our ultimate loss of America. The result was that England, without an ally, was at war with her Colonies, France, Spain, Holland, and in India, and was further embarrassed by riots in London and in Ireland.

The sutrender of Cornwallis at Yorktown in 1781 brought these wars to a close; a surrender directly attributable to the faulty distribution of our fleet, due to an attempt to guard all our possessions simultaneously. This gave de Grasse command of the sea sufficiently long to complete the isolation of the British troops in the Yorktown Peninsula, and to allow the French and American land forces a free hand in the investment of the town.

Lake spent the ensuing period of home service between the dissipations of the Court and the representation of Aylesbury in the House of Commons In 1793, heing now a major-general, he accompanied the small British Army which was thrown into Holland to oppose the invasion by the Republican troops. By August the Allies (England, Austria, Prussia, and Holland) were so successful that, but for the dissensions almost inseparable from such coalitions, they might have marched on Paris and restored the Monarchy; but the opportunity was lost. Lake was recalled in 1794 to take up the appointment of colonel of the 53rd Regiment, and in 1796 became major-general on the Staff in Ireland. He was immediately threatened with invasion by 16,000 French troops, but fortunately the weather was rough and the expedition could not land. In 1798 he had a considerable hand in the suppression of the Irish Rebellion, and immediately afterwards marched to Mayo, where Humbert with 1,100 French troops had landed. It is interesting to note that at this period of small sailing ships it was estimated that the French would have had no difficulty in landing 40,000 men on the coast of Ireland. Though he managed to keep the field for 17 days, and was successful at the "Castlebar Races," Humbert eventually surrendered with his whole force. In 1800 Lake was appointed Commander-in-Chief in India, under Wellesley as Governor-General. The Maratha War broke out in 1803, and Lake's part in Wellesley's scheme was the command of the Northern Army ; his task was the defeat of the Army of Sindhia, which was based on Agra, Delhi, and Aligarh, and had been organized and trained by Frenchmen, most of whom were dismissed by Sindhia, or quitted his service on the outbreak of war. His own army consisted of 10,000 men, accompanied by no less than 100,000 camp followers. He defeated the French general near Aligarh, stormed that fortress, defeated Bourquin at Delhi, captured Agra, after a short siege, and finally won the important Battle of Laswari, after a march of 65 miles in 48 hours. This, fought just after Assaye, proved the turning point of the campaign, and peace with Sindhia was signed at the end of the year. Holkar, jealous of Sindhia, had remained inactive while his rival suffered the above successive defeats, but early in 1804 he took the field against the British and gained one or two successes against the detachments into which Wellesley had divided his army. Lake's great energy, however, backed up by some wonderful marching by his troops, restored British prestige, and victories near Farakhabad and Dig, and the persevering, though unsuccessful, Siege of Bhartpur, opened the way to an honourable ending of the war. The Court of Directors of the India Office, however, considered this a suitable opportunity to recall Wellesley, who on many occasions had shown more regard for the public weal than for the wishes of "his very worthy masters,"

Wellesley sailed for England in August, 1805, and his successor, placing economy before all else, gave Lake orders which amounted to a complete surrender of all gained.

Lake, however, took upon himself to continue Wellesley's policy, and having temporarily satisfied Sindhia, he finally forced Holkar to accept terms early in 1806.

So disgusted was he with what he termed the "huckstering policy" of the Directors that he would only remain in India long enough to demobilize; early in 1807 he returned to England, and in the following year died after a short illness at the age of 63.

Colonel Pearse is fortunate in his selection of his subject, and his treatment of it has given us a book which is full of interest both from a military and a historical point of view.

The maps to illustrate the campaigns are clear, and contain the names of practically all places mentioned in the text.

THE CAMBRIDGE MODERN HISTORY. Vol. V.—The Age of Louis XIV Edited by A. W. Ward, A. W. Prothero, and S. Leathes. 927 pp. 8vo. Cambridge, 1908. University Press. 16s.

The last volume (IX.) issued of this history was noticed in No. 3, page 7, The volume under review is of considerable military importance, for it deals with all the wars of the latter part of the 17th century, and with those of the first 15 years of the 18th century. It thus comprises the fighting against the Turks in Hungary, the wars of Sweden with Denmark, Charles XII. of Sweden's campaigns, and the wars of the Spanish Succession, including all Marlborough's campaigns. A good many of the more noted battles of European history come within this period-Blenheim, Ramillies, Oudenarde, and Malplaquet ; Narva, Dunamünde, Pultusk, and Poltawa ; Febrbellin, Lund, etc., etc. Besides engagements on the Continent of Europe, we have also William III.'s operations against James II. in Ireland, including the Battle of the Boyne, and the sea fights of the Anglo-Dutch wars in 1666, 1672, and 1673. The battles are not generally described in any detail, nor would it be possible to understand them without the aid of battle plans, but the main outlines of the campaigns are generally clearly and carefully shown, though, in this case also, it would have been far easier to understand them had maps of the Europe of that time been provided with this volume.

The writer of the chapter on Marlborough's campaigns ascribes his success chiefly to his knowledge of how to use the three arms, and of how "the combination of all three would increase the efficiency of the whole." In another chapter the success of the Austrians and Germans against the Turks is ascribed to the teaching of Montecuculi, and to the attention which the Germans had given to organization and tactical training, whilst the Turks had stood still. It is interesting to note how Charles XII.'s invasion of Russia failed, principally owing to the Fabian tactics of the Russians, and to the great difficulty which Charles experienced in supplying his army, much the same causes as were responsible for Napoleon's failure. A great part of the volume is naturally given up to the political history of the time, and much of the information therein given must be interesting to the military as well as the civilian student of history. The history of Russia is traced from 1462, and that of Prussia from 500.

The chapter on the early history of the Colonies of European Powers and of Europeans in India will be of particular interest to Englishmen.

Chapters on the literary, religious, and scientific history of the time complete a volume of this history, which will certainly not be found the least interesting of the series.

The very complete bibliography, the chronological table, and the excellent index deserve mention.

A REVIEW OF THE HISTORY OF INFANTRY. By Colonel E. M. Lloyd. 302 pp. 8vo. London, 1908. Longmans, Green. 6s.

This volume carefully traces the development of infantry tactics, formations, and arms, and briefly describes their effect in the more important battles of the world—from Platea to Mukden.

POLITICAL.

THE ANGLO-RUSSIAN RIVALRY IN ASIA DURING THE 19TH CENTURY (La rivalité anglo-russe au 19^{ieme} siècle en Asie). By Dr. Rouire. 300 pp., with a map. 8vo. Paris, 1908. Colin. 5s. 6d.

The Anglo-Russian Agreement gave rise to so much adverse criticism in this country that it is of great interest to hear a comparatively impartial foreign opinion. The views held on the Continent vary in accordance with the desire of the different nations to see friendly or hostile relations prevail between Great Britain and Russia. The French people welcomed the agreement between their friend and their ally, and were ready and anxious to look upon it in the most favourable light. It is, therefore, only reasonable to expect Dr. Rouire to enter upon his task in an appreciative frame of mind. Although, however, it is fair to admit that his mind may have been prejudiced in favour of the agreement, he has in this volume advanced very cogent arguments in support of his views.

As regards Persia, Dr. Rouire points out that Russia's influence has become paramount in the northern portion of the country, and that Great Britain abandoned no rights or advantages, but merely gave her official assent to a position which she had allowed to arise by her own negligence, a position which she had become powerless to alter in her own favour. Though the Russian sphere of influence undoubtedly includes the richest and most fertile provinces of Persia, Great Britain receives valuable concessions in that she secures an equal share with Russia in the supervision of Persian political affairs and finances, in that Russia has acknowledged her special interests in the Persian Gulf, and has allowed Seistan to pass definitely under British control. Moreover, Russia has renounced all political action in Teheran, has recognized the principle of commercial equality, and has apparently abandoned the idea of gaining access to the sea and acquiring a warm water port.

With regard to Afghanistan, the author is of opinion that Great Britain has gained what she wanted, and that the position of Afghanistan as a buffer State is stronger than ever. In the case of Tibet, he seems to think that Great Britain has been only too glad of a chance of withdrawing from that inhospitable country, now that she has demonstrated her strength to the Tibetans, and has made it certain that no foreign power will be able to establish itself in the land of the Lamas.

On the whole, then, Dr. Rouire is disposed to offer his heartiest congratulations to both parties on settling disputes which had existed for so long, and had so often threatened to bring about war between the two nations, a war the costs and results of which would have been entirely out of proportion to the magnitude of the questions involved. He shows that Great Britain is now free to devote her attention to the Persian Gulf, to Oman, and to Koweit. Whilst mentioning the somewhat anomalous position occupied by France on the Arabian coast, he emphasizes the great importance of Koweit, and advises Great Britain to concentrate her energies on the acquisition and maintenance of this place, the future terminus of the Baghdad railway and the key of the new route to India.

The whole tendency of the book is to rejoice that the two principal friends of France have become reconciled, so that their strength and that of France herself are thereby increased and have become free for use against their real enemies, who are rapidly growing more dangerous and more intent on mischief. The author believes that Russia and Great Britain have no serious reason to quarrel in Asia, and is glad to see that they have at last recognized this fact, and have realized that it is high time for them to concentrate their strength in order to deal with their true enemies.

The book is interesting and well written; there are a few inaccuracies, c.g., Sikhs are described as being "either Hindus or Mohammedans," but these do not appreciably detract from the merit of the work. The author has not ventured on any prophecy regarding the attitude of the Ameer of Afghanistan with respect to the agreement.

ENGLAND'S WORLD-POWER (England's Weltmacht). By W. Langenbeck. 17 pp., with 19 illustrations in the text. Svo. Leipzig, 1907. B. T. Teubner. 15. 3d.

A brief sketch of the world-power of Great Britain from the 17th century to the present day. in which the author rapidly reviews the commencement of British colonial policy at the time of Queen Elizabeth; the development of the Anglo-Saxon character during the 17th and 18th centuries; the raising of Great Britain to a world-power after her struggles against Spain, the Netherlands, and France; her commercial, matitime, and colonial development during the 19th century; her present-day political position; and the future of the British Empire.

The author concludes by discussing the possibilities of the collapse of the British nation owing to desire for money and luxury, the antipathy to manual labour, and the craving for sport, gambling, and betting.

THE REAL INDIA. By J. D. Rees, C.I.E., M.P. 345 pp. 8vo. London, 1908. Methuen. 105. 6d.

An answer to the advocates of the National Congress movement in India. It has been well described as "a wholesome corrective to the propaganda of the school who are most active in instructing people at home upon Indian affairs,"

The book deals chiefly with our administration of India, the causes of unrest, and proposals for reform, but the chapter on "Later History" deals with military policy on the North-West Frontier, with recent changes in military administration, and gives an account of the Indian Army, omitting, however, to mention the formation a year ago of the Northern and Southern Armies in place of the three "Commands."

The chapter on "Native States" deals with their military strength, the Imperial Service Troops, and very briefly reviews our relations with Arabia, Persia, Afghanistan, and Tibet.

The chapter on "Russia in the East" gives a short account of Russia's military position in Central Asia, and of the Anglo-Russian Agreement and its effect in securing the North-West Frontier.

The chapters on "Unrest and Reform," with remarks upon the attempts made to tamper with the loyalty of the Native Army, are interesting reading.

ENGLAND AND GERMANY. By Austin Harrison. 181 pp. 8vo. London, 1907. Macmillan. 25. 6d.

The volume contains a series of letters, reprinted from *The Observer*, depicting the political relations between Great Britain and Germany. The writer endeavours to show with what suspicion we are regarded in Germany, and it is possible that he does not take an extravegant view of the situation. The letters are instructive and worthy of study.

WAR OR PEACE? OUR PROSPECTS IN A FUTURE WAR (Krieg oder Frieden? Unsere Aussichten in einem künftigen Kriege). By Colonel Gädke (Retired). 53 pp. 8vo. Berlin, 1907. Herm. Ehbock. 6d.

The well-known author of this little pamphlet has recently been forced to abandon his military title by the decision of a Court of Honour, and he now signs himself in the *Berliner Tageblatt*, to which paper he contributes articles on military subjects, as Gädke, late Colonel.

In the pamphlet under review he discusses briefly, and in a very comprehensive manner, the inferior political position in which Germany finds herself placed at the present day with respect to other Powers, and the errors of foreign policy which have been committed by German statesmen during the last 17 years. He attributes the situation entirely to the impetuosity of the Emperor and to the astute diplomacy of King Edward.

Great Britain is regarded as Germany's natural enemy, and although some space is devoted to reviewing the military position of Germany as compared with that of France and Russia, by far the greater part of this portion of the pamphlet deals with the naval

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situation as regards Great Britain and Germany. The question of war or peace between these two Powers is freely discussed, and the fear of Great Britain taking the initiative isthe main argument which the author brings forward for the rapid strengthening of the German Navy, to which point the discussion throughout the pamphlet leads, and in which it culminates. With a Liberal Government in power in England, the author has no fear of aggression on the part of this country, but he fears the worst should the Conservative party once more assume the reins of direction of foreign affairs.

The pamphlet is well worth reading.

GERMAN ARMAMENT POLICY OF THE FUTURE (Deutsche Wehr-Politik der Zukunft). By a German abroad. 450 pp. 8vo. Zurich, 1908. Zurcher and Furrer. 3s.

In the introduction of this work the author, although hinting at the possibility of Great. Britain attacking Germany, maintains that the last idea of the latter country is to go to war with Great Britain. Next to the German people he regards the British as the greatest nation in the world, far-seeing in their foreign policy, always knowing what they want and how to gain their ends. France, on the other hand, is regarded as the natural and hereditary foe, and the subject-matter of the book deals with the necessity for Germany of always maintaining an army on a peace footing which shall be vastly superior in numbers to that of France. Many of the earlier pages are devoted to the investigation of the existing establishments of all arms in the German Army as compared to that of France, and the author points out in what respects the army should be augmented. He is an advocate for fourth battalions being created on the French half-battalion system. According to him, no increase of expenditure appears to be necessary. The requisite increase of numbers may be obtained without spending a single mark by depriving officers. of their "soldier maid-servants" and forming the new battalions with the 37,000 men thus obtained. He does not suggest how the question of officers' servants is to be dealt with, nor how the cadres for the extra battalions are to be created. The extra men for units of other branches of the service are to be got by reducing the periods of service, and so increasing the reserve. Other portions of the book are devoted to questions of leading and its improvement, hygiene, supply, and equipment, naval policy and the forming of alliances. Some 40 pages are devoted to discussing the financial position of the German Empire.

GERMAN EXPANSION OUTSIDE EUROPE (L'expansion allemande horsd'Europe). By E. Tonnelat. 290 pp. 8vo. Paris, 1908. Armand Colin. 3s.

An interesting work, dealing with German emigration to the United States, Brazil, Shantung, and South Africa, her colonies or possessions in those countries, and their political importance. The author reviews the whole history of the movement, from the time when Germany was a heterogeneous collection of states, large and small, up to the present day, when Germany is a world power, with boundless ambitions and a vigorous pan-Germanic policy.

The author is evidently of opinion that the Germans have not been an unqualified success as colonists; he pays a tribute to their energy, and asserts that Germany shrinks. from no expense in furthering the development of her colonies; he adds, however, that she shrinks from no cruelty or barbarity in pursuing her object.

THE TRADE AND ADMINISTRATION OF THE CHINESE EMPIRE. By H. B. Morse. 393 pp., with 6 appendices, 2 maps, and several plates and photographs. 8vo. New York, Bombay, and Calcutta, 1908. Longmans, Green. 7s. 6d.

The author is an American and graduate of Harvard, who went to China 33 years ago, and holds a high position in the Inspectorate-General of Chinese Customs.

The scope of the book is greater than its title implies. The first portion contains a.

clear and succinct history of China from the earliest times. The following subjects are also dealt with :--Principles and method of government; the court, nobility, defensive forces, and public departments; revenue, taxation, currency, weights and measures; conditions under which foreigners reside in China; treaty ports, development of foreign trade, the opium question, Inspectorate-General of Customs, Post Office.

The appendices comprise a translation of an edict of 1906 re-constituting the Government and foreshadowing reforms in the provinces, also extracts from proceedings of law courts showing the nature of cases which come before foreign courts in China, reports concerning religious disturbances, and regulations for opium smoking.

The author expressly states that he is describing China as she is and was, and does not deal with her future in any way. Consequently he ignores the new Chinese Army, whilst describing the organization of the old "Banner" troops and giving the distribution of Mancha garrisons in China.

Most lucid are the explanations of the intricate official and social hierarchy, the bewildering currency systems, the *likin* arrangements, and the administration of the various foreign settlements. In each case the historical development is briefly sketched.

In dealing with the provinces the author describes the resources, natural products, and river systems of each, and gives statistics concerning trade and population.

THE FAR EASTERN QUESTION (La Question d'Extrême Orient). By Edouard Driault, 391 pp. 8vo. Paris, 1908. Félix Alcan. 5s. 10d.

In spite of a few inaccuracies, this work gives an excellent and unbiased summary of the Far Eastern Question, which the author defines as the question of the relation of the white to the yellow races.

Two chapters are devoted to the history of China and Japan in ancient times, and the remainder of the book deals with the period from the middle of the 16th century, when the Portuguese first found their way to the Far East, down to the present day. The part played by each European nation in opening up new channels for trade and missionary enterprise is clearly described, and an interesting account is given of the rise of French influence in Indo-China.

The Russo-Japanese War is considered from a political and not from a military point of view. The author says that it is not Russia alone that has received a check in this war. England has no other ambition than to act in agreement with Japan, before whom she effaces herself. The United States are afraid that they will not easily be able to establish their supremacy in the Pacific. France has suffered some disquietude regarding Indo-China, while Germany feels herself menaced in Kiao-chon, which can no longer be looked upon as the point of departure for a great German expansion in the Far East.

M. Driault is of opinion that China is about to follow the example of Japan in assimilating Western ideas, and that soon she will be able to defend herself against all attacks. When that time comes Japan will cease to be the leading Power in the Far East, and it is probable that Korea will again become a Chinese protectorate.

NAVAL.

THE ADMIRALTY OF THE ATLANTIC: AN INQUIRY INTO THE DEVELOPMENT OF GERMAN SEA POWER, PAST, PRESENT, AND PROSPECTIVE. By Percival A. Hislam. 209 pp., with maps and illustrations. Svo. London, 1908. Longmans, Green. 6s. 6d.

In his preface the author of this book says that he has endeavoured to steer between the two prominent schools of thought, *i.e.*, between the naval reductionists and those who exaggerate the strength of the German fleet and belittle the strength of their own. He declares himself "actuated throughout by the conviction that the rise of German sea power is a factor in international politics which England can neither with safety ignore nor with dignity overrate, and firm in the belief that it would be better to sacrifice our dignity rather than our safety."

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He, then, in his first two chapters relates the history of the inception and development of the German fleet, and gives extracts from the speeches of such authorities as the Emperor himself, Admiral von der Goltz, and Admiral von Tirpitz, to show what is the object of the extraordinary efforts of the German nation and Government during the past ro years to create as soon as possible a powerful fleet. Admiral von der Goltz pointed out how Great Britain was compelled to scatter her forces all over the world, while "the German fleet, though much smaller, can remain concentrated in European waters."

The next two chapters are devoted to a consideration of the German Navy of to-day, and to a comparison of that navy with the British. This comparison, with the exception of fast protected cruisers for fleet work an l of torpedo craft, shows the superiority of the British fleet at present, but it also shows the rapid progress made by the Germans in recent years, and in the next chapter the author demonstrates how the Germans can build as fast as we can.

Mr. Hislam then considers the question from the point of view of the relative strengths of the two nations in the North Sea, and finds that the Nore Division of our Home Fleet is inferior to the German Active Battle Fleet, while he questions the policy of having a base at Berehaven.

The author then proceeds to a review of our naval bases, and lays great stress on the importance of the Nore, for " defensively it is situated at the most important point of commercial concentration in the United Kingdom, and . . . the status of the Nore from an offensive standpoint is no less important." He deplores the waste of money at Dover and has but cold encouragement for Rosyth. From this point the auther turns his attention to German naval bases, and shows how the geographical position of Germany acts to her detriment and to our advantage, and he considers that our forces should be so disposed as to enable us to close the passages (of the Straits of Dover or of the Shetlands) at an hour's notice. After some remarks on floating docks, of whose advantages Mr. Hislam is well persuaded, he passes to a chapter entitled "The Invasion of England." In this chapter he points out that an invasion of England from Germany is quite within the bounds of possibility unless there should be always a British fleet in the North Sea capable of demolishing the naval force which Germany maintains in those waters, and unless our fleet should be maintained in a state of perpetual readiness, From a consideration of British shipbuilding policy, the author demonstrates again our inferiority in torpedo craft, and he estimates that we ought to build at least 17 yearly to keep pace with Germany.

The book concludes with a brief survey of the navies of a few other powers, viz., France, United States, Japan, Russia, Italy, Austria-Hungary, Spain, and Brazil.

Taken as a whole, the book is decidedly worth reading, for it avoids extremist views in any direction and puts the facts before its readers in a clear and concise fashion. It will be of greater interest to the officers of the Navy than to those of the Army, but any book which deals with questions affecting the defence of these islands and with our power of offence should be studied by all who are interested in the military profession.

STRATEGICAL AND TACTICAL.

THE EMPLOYMENT OF DETACHMENTS AND THE SERVICE OF RECONNAISSANCE IN THE CAMPAIGN IN THE EAST OF FRANCE (1870-71) (La couverture au cours de la campagne de l'Est (1870-71)). By Capt. S. Bourguet, French Artillery. 60 pp., with 13 sketches and diagrams. Svo. Paris, 1906. Berger-Levrault. 18. Sd.

This little brochure deals with one of the later campaigns in the Franco-German War (between Bourbaki and Garibaldi on the French side, operating against Werder and Manteuffel), a campaign which hardly receives sufficient attention in this country, though it presents features of particular interest for Englishmen.

The author has brought out certain points very clearly, e.g., the necessity of adequate reconnaissance, and the impossibility of carrying this out with any but the very best cavalry; the unreliability of imperfectly trained artillery; the inability of partially-trained troops to contend with a highly-disciplined enemy; the uselessness of holding attacks
unless they are executed with vigour and resolution; the importance of mutual cooperation; the value of initiative, energy, and determination, as shown by the way in which the German general, Kettler, handled his weak detachment in the operations near Dijon against the greatly superior forces under Garibaldi.

This campaign resulted in the neutralization in Swiss territory of about 80 000 French troops, a disaster almost as great as that of Sedan. This calamity occurred, moreover, at a most unfortunate time, as its effect was to discourage the French and to blight their hopes, now beginning to rise in consequence of the wave of patriotism which had spread over the country, and as a result of the energetic and partially-successful operations of Chanzy and Faidherbe.

ADVANCED GUARDS (Essai sur les Avant-Gardes). By Capt. N. Coucke, of the French General Staff. 105 pp., with diagrams. Svo. Paris, 1907. Berger-Levrault. 1s. 8d.

This is a useful little volume, showing very clearly the French conception of the $r\delta l e$ of an advanced guard. It examines the duties of the commander of an advanced guard in various situations, the strength and composition of his force, the parts played by the different arms, and their co-operation in action. The author treats the question of the protection of an army on the march, both at a distance from and in close proximity to the enemy. He also discusses the use of a general advanced guard to an army, as opposed to the system of employing advanced guards for each column.

The book abounds in comparisons between French and German methods, and as such is of considerable interest; it deals with the regulations of various countries on the subject, and gives details regarding the system of forming advanced guards. It is written in easy French, is of a handy size, and is well worth reading.

SIEGE WARFARE AND THE MANGUVRES ROUND THE FORTRESS OF LANGRES IN 1906 (Étude sur la guerre de siège, et la manœuvre de forteresse de Langres en 1906). By Lieut.-Colonel Klein. 86 pp., one map. Svo. Paris, 1907. Berger-Levrault. 25. 6d.

In 1906 the French introduced a new departure from their ordinary manœuvres by practising an attack on the large fortified camp of Langres, an innovation the advisability of which was probably suggested by the Siege of Port Arthur. The experiment proved a decided success, and the various mistakes showed the importance of gaining experience in this difficult branch of the art of war.

Lieut.-Colonel Klein has given us an interesting description of the operations, with useful notes on the duties of the different arms of the Service, both in attack and defence. He draws attent on to the trying nature of the work involved, and points out the necessity of employing highly trained troops in the siege of fortresses, showing how, in spite of all improvements in modern fircarms, the human element is still ownipotent.

TRAINING AND EDUCATION.

STAFF RIDES AND REGIMENTAL TOURS. By Colonel R. C. B. Haking. 495 pp. 8vo. London, 1908. Rees. 8s. 6d.

Colonel Haking has had a large and varied experience of Staff Rides, and we have here the result of that experience, which will doubtless be of great use to the many officers who have felt the want of a book which would serve as a guide to them both in the preparation of a scheme and in the subsequent conduct of a Staff Ride. After perusing this volume it will be conceded that the author has succeeded in producing a book which will serve the purpose indicated above. This book is intended to deal with Staff Rides held by Divisional and Brigade Commanders, and with Regimental Tours, and is not concerned, the author says, with very large Staff Rides, and he draws a distinct line between Staff Rides for the instruction of Staff officers and Regimental Tours for Regimental

officers. Colonel Haking goes deeply into the question of the preparation of schemes and gives many instances from military history which may be used. These instances may be useful to Directing Staffs, and may give them an indication as to campaigns and situations which they should study when working out a scheme.

From the preparation of schemes, Colonel Haking passes to a chapter on the method of directing a Staff Ride, wherein is contained a number of hints which will doubtless be of great value to officers who have not had much experience in the matter,

Single Staff Rides are then dealt with, and Staff Rides for practising operations against semi-civilized or savage races, and examples of problems suitable for Staff Rides, with instructions for reconnoitring officers.

The next chapter deals with the method of preparing narratives, and in this connection Colonel Haking remarks, "It is most important that officers should not be allowed to do things on a Staff Ride which they would not even suggest in real war . . . during a Staff Ride it is best to assume the most difficult situation in each case"; and in the next chapter on criticisms he says, "The object of criticizing the work is . . . simply to inculcate sound principles of strategy, tactics, and administration."

We then have chapters on the work done by officers during a Staff Ride (Appreciations, Orders and Instructions, Reports, Sketches, etc.), on Regimental Tours, on the conduct of Tactical Exercises on the ground and on one-day exercises, and finally a short chapter on War Courses.

The value of this book will be great to all who are conducting Staff Rides, and also to those taking part in them, and Chapters XVII., XVIII., XIX., and XX. will be of special interest to commanding officers who are responsible for the training and education of their officers. It will supply a want, and it inculcates the principles of the training manuals, which, as the author says, should be the "sheet anchor" of officers.

TACTICAL EXERCISES AND WAR GAMES (Thèmes tactiques et Jeu de la Guerre). Translated by Capt. Corteys, of the 140th Infantry Regiment. 212 pp., with 3 maps. 8vo. Paris. Lavauzelle. 4s.

This useful volume, which is translated from the German, is divided into two parts. The first part deals with the framing and solving of tactical exercises, and is valuable on account of the clear insight it affords into German tactical and strategical ideas, and into their school of thought. General Litzmann, the author, was formerly Commandant of the Berlin Staff College, so that his views and teachings are of considerable value. We see throughout the value attached by the Germans to the spirit of the offensive, the initiative, mutual co-operation, rapid decisions, and the determination to conquer at all costs. It is brought out very clearly that the Germans prefer rapid decisions and energetic action, even if not absolutely the best possible means of dealing with a situation, to hesitation, indecision, and inaction. The problems propounded are of value as a set of well-thought-out exercises, whilst the solutions are carefully argued and contain useful lessons.

The second part deals with war games, and gives various rules for their conduct. It also describes a series of exercises drawn up for young officers, and shows the methods to be adopted in the case of novices at this work, as well as those for more senior officers. A feature of the German system is the way in which these games may be directed by officers junior to numbers of the participants; though General Litzmann arges the points in favour of this system, its success would appear to demand very great tact on the part of the director.

LETTERS ON APPLIED TACTICS. By Colonel Griepenkerl. Translated by R. Maxwell. Brought up to date by K. von Donat. 498 pp. 8vo. London, 1907. Rees. Ss. 6d.

This is the fifth edition of the excellent translation of the well-known studies of tactical exercises, worked out by Colonel Griepenkerl.

The twenty-four problems selected deal with small detached forces of all arms, and are worked out with great detail and thoroughness.

The book is accompanied by five very good maps of the country round Metz, which is the district in which the imaginary operations take place.

For the benefit of British officers studying for the Staff College, or for promotion examinations, the translator deals with British Army units corresponding as nearly as possible to those of the German Army in the original; and calculations of time and space have been amended in accordance with Combined Training, 1905.

TRAINING AND TACTICS. By Capt. H. M. Johnstone, R.E. (Retired), with a preface by Lieut.-General Sir E. P. Leach, v.c. 158 pp. 12mo. London, 1908. Oliver & Boyd. 1s. 6d.

This is a useful little book for the purpose for which it is intended, *i.e.*, to be useful to members of the Officers' Training Corps. A few points have been noticed in which the information given is not quite correct, notably in Chapter X. and the Appendix. Chapter IV. does not seem to be quite in accord with Chapter VII., *Cavalry Training*, 1907. In the main, however, the book will serve to explain and amplify some parts of Combined Training and Infantry Training.

INDIVIDUAL AND COMBINED MILITARY SKETCHING. By Capt. E. T. Cole, 6th United States Infantry, and Capt. R. Stuart, Corps of Engineers, 2nd edition, revised. 8vo. New York, 1907. U.S. Cavalry Association. 5s.

The authors of this book deal with the subject in a plain and practical manner. Due weight is accorded to the governing factors of rapidity and military judgment in sketching. The practical hints for acquiring the art of showing form of ground are excellent.

Part II. deals with combined sketching, the organization of parties to carry out the work within time limits, and the tracing and blue printing of the map so produced. A special celluloid paper is strongly recommended for field use. This book is specially suited to cavalry sketching instruction.

FORTIFICATION AND MILITARY ENGINEERING.

TYPES OF FIELD WORKS EMPLOYED IN THE RUSSO-JAPANESE WAR.— By S. A. Tsabel. 119 pp. 8vo. St. Petersburg, 1907. V. Berezovski. 5s. 6d.

The title should read "Types of Russian Field Works, etc.," as Japanese works are not dealt with.

The author commences by tracing the change in Russian methods, which took place during the war, from hasty fortification on its early stages to the more deliberate and solid work which the lengthy pauses in the active operations permitted during its later stages. Shallow trenches, to give cover kneeling, proved to be inadequate. The wide Japanese turning movements forced the Russians to occupy extended fronts which could be only thinly held, and consequently had to be strongly fortified.

The disadvantages of the narrow and deep shelter-trench without a parapet are dilated upon. It is not easy to find a good site for it; in low ground it is unsuitable, because the smallest irregularity of surface in front obstructs its field of fire. When sited upon slopes fronting the enemy it is conspicuous when the sun shines, for the cast shadow of the trench makes it noticeable from afar, and it is difficult; to dispose of the excavated earth so that it may not be seen. The best site for it is the crest-line of a ridge, where the inside is not visible, and the excavated earth can be easily got rid of. It is also too narrow to admit of men passing along it behind the riflemen holding it. The author declares in favour of a trench to give cover standing, and with a command of from 14 to 25 inches, as the most generally useful type.

Blindages were of two types—a splinter proof, consisting of poles covered with *kowliang*, and with from 6 to 8 inches of earth, and a more solid type, intended to keep out the Japanese high-explosive shell, consisting of a layer of timbers with $3\frac{1}{2}$ feet of earth over them.

Nearly 40 pages are devoted to discussing the various types of field redoubts. Or

two general types, that with a shallow ditch and that with a deep ditch, the former ispreferred when combined with an efficient obstacle. The second type is advisable only in second line, where concealment is of less importance, and when the ground is sufficiently firm to permit of steep slopes.

Manchurian villages are very defensible, and were often used as tactical pivots. They have thick and high mud walls, and are not inflammable. The method of fortification varied with the size of the village and the tactical purpose. The whole perimeter of small villages was usually prepared; in the case of large villages, which were to be obstinately held, only the front edge was fortified, and a keep was prepared inside.

The necessity of always entrenching guns, whether in open or concealed positions, is insisted upon.

The use of obstacles on the Russian side degenerated into abuse as the war went on, and Russian depression and passiveness increased. The smallest gap in the hedge of obstacles was at once closed by the troops themselves. In the Shih-ping-kai position the 2nd Army alone used 340 tons of barbed wire. The height of wire entanglements was repeatedly changed in the hope of keeping out the Japanese. It is significant to read that the Commander-in-Chief, when inspecting the Shih-ping-kai position, found fault with the wire entanglements as being too low, and issued a general order on the subject. These were the obstacles most generally used. Military pits were found to be of little use unless combined with wire entanglement, and often afforded cover to the enemy. Abatis were little in vogue, being very liable to destruction by artillery fire, and the necessity of care-little wire caused great nervous exhaustion, fougasses produced a great moral effect. It was generally agreed that all obstacles should be placed from 50 to 60 paces in front of the firing line which defends them.

The pumphlet is written almost entirely from an engineering point of view, and the tactical and psychological side of field fortification is hardly touched upon. The writer shows a complete failure to realize the true causes of the Russian defeats, in that he attributes them to numerical superiority on the side of the Japanese, which enabled them to execute wide turning movements. In concluding, he expresses regret that the conclusion of peace prevented the administration of a final "repulse" to the Japanese, and notes with pride that military engineering has never flourished in the Russian Army as it did in the recent war.

The pamphlet is accompanied by an atlas of 34 plates of field works.

REINFORCED CONCRETE IN THE CONSTRUCTION OF FORTIFICATIONS (Le béton armé dans la construction des ouvrages de fortification). By Lieut,-Colonel A. Algrain. 20 pp., with numerous diagrams. Svo. Brussels, 1907. Goemaere. 15. 8d.

The author deals with the properties of this new and important preparation, and describes the various uses to which it is capable of being put. The pamplilet is interesting, and may be useful to Engineer Officers.

AERIAL NAVIGATION.

DIRIGIBLE BALLOONS (Les ballons dirigeables. Théorie. Applications). By MM. E. Girard and A. de Rouville. 310 pp., 143 diagrams. Svo. Paris, 1907. Berger-Levrault. 4s.

This volume is made up of a collection of articles which appeared in the *Recue de Génie militaire français* during 1906 and 1907, enjoying considerable popularity at that time.

The work has undoubted merit, though there are various defects, of which it may be advisable to mention the following :—There is a certain amount of unnecessarily precise and detailed calculations with regard to points of comparatively minor importance; the discussion on the motors now used for the propulsion of airships is somewhat too short; the authors hardly appear to have treated the German airships with impartiality, and seem to have allowed their sense of strict and scrupulous fairness to be overcome by their feelings of patriotism and preference for everything that is French.

In spite of these drawbacks, the book contains much useful research and valuable information, and is well worth reading by those interested in aerial navigation.

THE CONQUEST OF THE AIR (Die Eroberung der Luft). By Graf Zeppelin. 31 pp. Svo. Stuttgart and Leipzig, 1908. Deutsche Verlags Anstalt. 9d.

The pamphlet contains the subject-matter of a lecture delivered by the famous aeronaut in Berlin on the 25th January last.

The possibilities of the capabilities of dirigible balloons of the future are entered into, and the lecturer very naturally lays considerable stress on the advantages of the rigid system of construction which he has adopted in his own airships.

ORGANIZATION AND ADMINISTRATION.

MARCHES AND SOLDIERING IN TIME OF PEACE (Routes à l'intérieur. Droits et devoirs des autorités militaires vis-à-vis des autorités civiles). By Capt. G.R., French Artillery. 130 pp. Svo. Paris, 1908. Chapelot. 18. 8d.

A useful little book, dealing with the movements of troops in time of peace in France. It shows the French system of billeting and of obtaining forage and supplies, and gives numerous examples of the way in which the civil authorities should co-operate with the military officers, and *vice versi*.

CONCERNING THE QUESTION OF DEFENCE, ORGANIZATION, EQUIPMENT, AND TRAINING OF MOUNTAIN TROOPS IN SWITZERLAND (Zur Wehrfrage. Organisation, Ausrüstung und Ausbildung von Gebirgstruppen in der Schweiz). By Major Froelich. 88 pp. 8vo. Aurau, 1907. Sauerländer. 18. 6d.

This pamphlet contains the text of an essay which won the first prize in a competition set by the Officers' Association of Switzerland. The judges, though commending the work highly on the whole, made the following unfavourable criticisms:—The author has not sufficiently regarded the question from the point of view of the whole army, but has bestowed such ample resources and so large an amount of care on the mountain troops that other parts of the army would undoubtedly suffer. His scheme, furthermore, involves too great a break with existing institutions. He has evolved a completely new and ideal organization, instead of attempting to improve and build upon that which already exists.

The Swiss could undoubtedly draw from their population an abundant and very suitable material for a special corps of mountain troops, and it would appear eminently desirable, from the point of view of the defence of the Republic, that an organization of this nature should exist.

This work contains admirable suggestions for the composition and formation of such a corps, and the question of organization, equipment, and training are dealt with in a thoroughly practical manner.

BOOKS OF REFERENCE.

VON LÖBELL'S ANNUAL REPORT ON ARMIES AND MILITARY MATTERS. XXXIVTH EDITION, 1907 (V. Löbell's Jahresberichte über das Heerund Kriegswesen. XXXIV. Jahrgang, 1907). Edited by Lieut.-General von Pelet-Narbonne. 495 pp., with 8 photograph plates. 8vo. Berlin, 1908. Mittler. 14s.

For a review of the 1906 edition see No. 2, page 20.

Part I, is a useful guide to the military systems and organizations of foreign armies. It

cannot, however, be relied on as accurate as regards numbers and establishments, and it omits mention of many important changes.

Part II. deals with the development of tactics, fortification, means of communication, and *matériel* in the various military states.

In a general survey of the year's progress in the countries dealt with, the authors note the prevalence of more moderate views on many points; notably as regards the dismounted action of cavalry, wide extensions of infantry, and the use of entrenchment in the attack. Infantry in most countries advance by longer rushes than formerly, and in parties of not less than a section; artillery support must go hand in hand with the infantry advance, but batteries will not always be able to accompany it, and permanent superiority of fire is soldom to be expected. Cavalry must co-operate on the battefield and in the pursuit; the moral exhaustion of infantry may offer the cavalry opportunities for shock action against them.

Machine-gun companies are being experimented with in many countries, and will probably be definitely allotted to infantry regiments.

Cyclists have been found useful auxiliaries both for cavalry and infantry. The company of 150 strong has proved the most serviceable unit, but in France the battalion organization with the cavalry division will probably be adopted.*

On the defensive, continuous lines are disappearing, and artillery and infantry positions are separately considered; but it is thought that the execution of a decisive counter-stroke, with this form of tactics, requires higher ability than formerly on the part of the commander of the force.

The silence of foreign manuals on the subject of "battles of encounter" is again commented on, but some warnings are also quoted against the German predilection for this form of combat, which is alleged to be inapplicable to large armies, and to encourage adventurous tactics for advanced guards.

Dealing with the several countries, Part II. reveals the profound difference between the French and German schools of thought, and while every development of tactics is held to justify the teaching of the German manuals, there is an inclination to exhibit the French methods as academic and unpractical.

In the attack the German tendency is to hold the enemy fast in front, while a decision is sought by fresh columns continually overlapping the flanks. The attacking units must use such cover as exists in the front allotted to them. The characteristics of the infantry attack are delayed opening of fire and dense firing lines when once fire is opened, whilst the guns are directed chiefly upon the enemy's infantry. The impulse for the assault is often given by the firing line.

In France the tendency is to seek a decision by the penetration of the enemy's front; open ground is considered impassable, and the attack only advances where cover exists. Distinct bodies of troops are used for the fire-fight and the assau't, the latter being delivered on a narrow front by the direction of the commander of the force.

Cavalry.—In Germany the cavalry are overcoming their dislike to the carbine, but are practically limited to the defensive in dismounted fighting. The English regulations on the subject are thought preferable by the authors. In France the lower standard of efficiency anticipated from the two years' system has caused the elimination of the light divisions, and is expected to lead to the introduction of cyclists as a support for the cavalry, and is held up as a warning against short service in this arm. There is alleged to be a tendency to wide outflanking manœuvres, which may prove dangerous before a vigilant enemy.

Artillery.—The chief points to note are the re-armament of the German Field Artillery with the 96 n/A. equipment and the projected increase of artillery in France. The new German and Austrian regulations are reviewed at length.

Colonel Balek's studies of the Siege of Port Arthur initiate a new cra in fortress warfare. Infantry must interest themselves more in this question, and artillery must cooperate with the infantry, as in field operations. Specially trained pioneer troops will be required for the struggle for the counterscarp.

Lighter bridging trains and improvised bridges are the subject of much attention in Austria, Germany, and France.

* Note by General Staff .- No such decision has yet been arrived at so far as is known.

Part II. also contains articles on telegraphy in South-West Africa, wireless telegraphy, small arms, and artillery matériel.

Part III. gives an account of the military expeditions which have taken place in the German Protectorates during the year, and an obituary for the armies of all nations is given in the concluding pages.

THE ENCYCLOPEDIA OF ISLAM. No. 1. Prepared by a number of leading Orientalists under the supervision of Dr. M. Th. Houtsma, a professor of the University of Utrecht, and Dr. M. Seligsohn. 64 pp. Svo. London, 1908. Luzac & Co. 38. 6d.

This is the first instalment of a dictionary of the geography, ethnography, and biography of the Muhammadan peoples. The work promises to prove of value as a book of reference.

TRAVEL AND TOPOGRAPHICAL.

RICHARDS' COMPREHENSIVE GEOGRAPHY OF THE CHINESE EMPIRE. Translated into English, revised and enlarged, by M. Kennelly, S.J. 639 pp., 4 maps in pockets, and numerous maps in text. 8vo. Shanghai, 1908. T'usewei Press. 17s. 2d.

The original work was published in French in the year 1905, and has been brought thoroughly up to date by the translator.

The volume is divided into two books. Book I. deals with China Proper or the 18 provinces, and Book II. with the Outer Dependencies.

Book I. opens with a general geographical survey of the 18 provinces; the area and population of each is given, and a brief description added of the geology, mountain systems, climate, waterways, and vegetation.

In considering the geography of the country in detail, the author divides it into three regions, and devotes a section to each.

Section I. describes the northern portion, comprising the basins of the Huang-ho and Pei-ho.

Section II. deals with the central section, viz., the basins of the Yang-tzu and Huai Ho.

Section III. treats of the southern section, embracing the basin of the Hsi-chiang and the coast provinces of Fu-chicn and Che-chiang. A separate section (IV.) is devoted to a description of the coast line.

Section V. deals with the administration of the government, revenue and expenditure, the Imperial Maritime Customs, the Army and Navy, inhabitants and communications; this section also contains a brief history of the Empire.

In describing the military forces the author gives details of the modern army (Lu Chün as well as of the old troops), which tally in the main with those gathered from other trustworthy sources of information on this subject. Some details are given regarding arsenals and forts. In dealing with the physique and character of the inhabitants the author writes in a somewhat depreciatory vein as far as the latter is concerned. In the chapter on communications a useful list of postal roads is given, also a list of railway lines completed in 1907, with designation, particulars of management, and mileage (English). A separate list is given of lines under construction.

The historical chapter contains a tabular list of dynasties, as well as a concise account of the relations of China with foreign powers.

Book II., which is much more condensed than Book I., gives a short description of Manchuria, Mongolia, Chinese Turkestan, and Tibet.

The volume concludes with lists of the prefectures and sub-prefectures of the 18 provinces, Manchuria and Chinese Turkestan, an alphabetical list of the cities and towns of China arranged according to their radicals, and a similar list arranged according to their romanized names. There are five appendices and an excellent index.

A great feature of the work is that at the end of each chapter there is given a very complete list of standard authors (French, English, and German) who have dealt with the subjects of the chapter. The Chinese character is given in the case of all names and

technical terms. The transliteration of Chinese words is a great stumbling block to all European writers. The author has adopted the Nanking dialect (Southern Kuan-hua) in preference to Pekingese (Northern Kuan-hua), and has evolved a system of transliteration which he considers embodies the best elements of Morrison, Williams, Wade, Giles, and of the recent Postal List. His system has much to recommend it, and as the Chinese character is always given, there is no difficulty identifying the places named.

The names on the four maps in pockets are written in Chinese characters, and the prefectural and district towns indicated by special signs. The names of the treaty ports are underlined, and the romanized names of the more important places are given. The maps show by coloured washes the average altitude of the land and the depths of the adjacent seas. There are also 42 maps, diagrams, and illustrations in the text, illustrating the geological features of the country, the districts in the vicinity of the more important cities, railways, river systems, etc.

The work contains a very large amount of reliable information, is well up to date, and can be most thoroughly recommended to all persons desirous of obtaining a knowledge of the Chinese Empire.

MISCELLANEOUS.

INTERNATIONAL LAW IN THE RUSSO-JAPANESE WAR ON LAND FROM THE OFFICIAL DOCUMENTS OF THE JAPANESE GREAT GENERAL STAFF (La guerre Russo-Japonaise au point de vue continental et le droit international d'après les documents officiels du grand état-major japonais (section historique de la guerre 1904-5)). By Nagao Ariga. 8vo. 587 pp. Paris, 1908. A. Pedone. 128.

This is the Japanese official account of the leading cases of international law and the custom of war which were dealt with during the operations on land. As a collection of precedents the work is of the highest value, and will, without doubt, become a classic; for the British Army, which, except to a very limited extent in the South African War, has had no occasion to devote much time to the questions considered in it, it is of special importance.

The author Professor Ariga, has been Professor of International Law at the Japanese Staff College since 1896; he was adviser to the Japanese Headquarter Staff in the China Campaign of 1894-5 (on the international legal aspects of which he wrote a volume in 1896), and during the late war was Legal Councillor on the Headquarter Staff of Marshal Oyama, and was specially sent down to advise General Nogi during the siege of and negotiation for the surrender of Port Arthur. He has been technical delegate at both The Hague Peace Conferences.

Although every Japanese General Staff Officer receives very thorough instruction in international law while at the Staff College, the Japanese authorities considered that in many cases an amateur knowledge of the subject was insufficient, so in addition to appointing their greatest living specialist to the Headquarter Staff in the field, and Prof. Akiyama (who represented Japan at the Geneva Conference) to advise the Minister of War in Tokio, they attached two international jurists to the General Staff of each army in the field, and one jurist to the General Staff of each army of occupation. The Japanese Great General Staff realized from the study of past campaigns that war cannot be carried on without affecting neutral powers, and that many diplomatic difficulties and claims for compensation may be avoided by authoritative instructions to the troops and correct treatment of cases in the first instance ; that as no advantage obtainable should be sacrificed in war, it is of immense importance that the utmost value should be extracted from existing international agreements and precedents ; that war is not a game but a business, a sinkor-swim struggle, not to be carried on in accordance with sporting instincts, but with a definite code, which must be interpreted not in the interests of humanity, but of one's own army.

In bringing the declaration of war to the knowledge of his people the Emperor of Japan specially drew the attention of officers as well as civil functionaries to the correct application of international law :— "We declare war against Russia by these presents, and we command our army and our navy to carry on war against her according to their duty and with all their might; we also command all our competent authorities to use all their efforts in the accomplishment of their functions, in order to achieve the object which our country is pursuing by all the means admitted by international law and custom."

The Legal Councillors, who were all chosen from the members of the International Law Association at Tokio, were in some cases officers of the reserve ; these served as officers ; the others served as Volunteers, but were given the relative rank of officers and wore swords ; a double triangle on the left sleeve and the absence of spurs were the only signs which served to differentiate them from other officers. "Every time that a question of international law came before the staff these councillors were consulted ; they were also charged with the drawing up of instructions and regulations on the subjects relative to the laws and customs of war."

The book is divided into 20 chapters dealing with :-(1) The outbreak of war and its immediate consequences; (2) The theatre of war; (3) Combatants and non-combatants; (4) Prisoners of war; (5) Sick and wounded; (6) Dead; (7) The organization and *personnel* of the medical service; (8) The Japanese Red Cross Society; (9) Means of injuring the enemy; (10) The slege and bombardment of Port Arthur; (11) The capitulation of Port Arthur; (12) The protection of life and property in Dalni and Port Arthur: (13) Military jurisdiction and martial law; (14) Limitation of the right of possession of arms; (15) Administration of occupied territory; (16) The duties of inhabitants of occupied territory; (17) The protection of missionaries, historic buildings, and large towns; (18) The occupation of Saghalien; (19) Nentrality on land; (20) The armistice and peace.

The book naturally contains very numerous matters of interest, to refer to all of which is not possible in a review of moderate length.

As early as the 4th January, 1904 (that is more than a month before war began), in a special edition of the *Official Gazette*, the Japanese Government forbade the press "to publish any news concerning the movements of troops and war vessels without special authorization of the Ministry of War and the Ministry of the Navy." It is remarkable that this notice was issued while peaceful negotiations with Russia were still pending ; it is a precedent that no doubt every Power will follow during times of strained relations, without fear of its being regarded as an unfriendly act ; it is merely a reasonable measure of precaution.

A proclamation was issued to the governors of provinces with regard to the treatment of Russian subjects resident in the Empire; these were given, "as an act of grace," complete freedom to go or to remain, and were assured of the protection of their lives, honour, and property, provided they went about their usual business, with the important restriction, however, "in the execution of necessary administrative acts, or the surveillance ordered and other measures taken by the naval and military anthorities for military purposes, the Imperial Government admit no restriction, and may limit in part the guarantee given as regards personal liberty, life, and property, and furthermore may forbid or limit any change of domicile or travelling, as they judge fit." As all Russian subjects were registered with the police in time of peace, no difficulty was found in controlling and protecting them.

Steamers were sent by the Japanese Government to the Siberian ports to withdraw Japanese subjects. The Governor of Vladivostok gave notice on the 3rd February that he was authorized to declare a state of siege, and when declared the Japanese residents would be obliged to leave within three days.

After occupying Vladimirovka, in the Island of Saghalien, the Japanese shot 20 inhabitants who had taken part in the defence, because they did not conform to one of the four conditions required of volunteers in Article I. of The Hague Rules, attached to the "Convention concerning the laws and customs of war"; they had no "distinctive mark visible at a distance" to show that they were combatants and to prevent their being able, when captured, to pretend they were praceful inhabitants.

Professor Ariga is, however, of opinion that Article 1 should not be too rigorously applied; it may occur that non-combatants and civilians on a line of communication may be required to assist in repelling a raid (as happened at Anju, where post and telegraph

officials, sutlers, and merchants took part), and it is surely not intended that they should be shot if they should be captured without a distinctive mark on their dress.

In dealing with the question of prisoners, Professor Ariga regrets that there is no conventional sign of surrender for individuals, and states there were many misunderstandings from lack of this. One Russian came up to a Japanese sentry and kissed him on the clueck, and was promptly attacked with a bayonet; "hands up," therefore, would not seem to be in general use. Possibly no army is much concerned with teaching its men to surrender.

After a battle, when a large number of prisoners were taken, a committee was appointed to deal with them; the president took command of the troops detailed asguard, and the members dealt with special questions. One staff officer attended to the documents found on the prisoners, another to their quartering and transport; a medical officer and a supply officer saw to their health and to their feeding.

As usual, both belligerents made a number of charges and counter-charges of cruelty, of firing on hospitals and ambulances, of abuse of the white flag and of the red cross flag, and of use of soft-nosed bullets. Professor Ariga points out the necessity of taking proper evidence and disposing of such cases at once.

The very careful regulations for clearing up a battlefield, burying the dead, and securing their property in accordance with the Hague Rules are given at length.

It is of some interest to find a learned professor, while admitting that it is a violation of the laws of war to take the clothing of a prisoner, defending the Japanese who took boots from the Russians, "because their object was not to enrich themselves, but solely to be in a position to serve their country better." Those whose wardrobes suffered in South Africa will appreciate the good motive.

Many of the cases which gave the Japanese trouble have now been set at rest by the Geneva Convention of 1906, but the new Convention has left a certain number of matters in doubt. For instance, from Articles 7 and 9 it might be argued that the medical *personnel* is protected "under all circumstances," even when it behaves in a manner harmful to the enemy; but the Japanese very rightly hold that persons displaying a red cross flag or carrying stretchers are not entitled to come to a place close to a hostile line, whence they could glean useful information. Professor Ariga holds they may be captured, or, if it is not possible to approach them, that fire may be opened in their direction to warn them to retire ; if they persist in advancing they may be fired on. Similarly, if a red cross its bows; if it refuses to stop, it may be fired on.

It is held that the medical corps has the right to make prisoners if attacked, for the best way of defending oneself against an adversary is to disarm him; but the author does not approve of the conduct of the staff of a hospital which assisted a battalion of heavy artillery to defend a village against some Russians who had come up from the rear, having lost their way in the retreat during the first stage of the Battle of Mukden.

It is regrettable to find that the word "dum-dum" is used by the Japanese to describe a soft-nosed bullet.

Professor Ariga decides that the ruse employed by General Lenevich by which he effected an undisturbed retirement at the Battle of Mukden, under cover of a truce tobury the dead, was legitimate. "It was our generals," he says, "who let themselves be deceived."

It was laid down in Japanese regulations that "the sole fact that the enemy hoists a white flag does not necessarily indicate an accomplished surrender, and fire should not therefore cease on this account; it is by sending *parlementaires* that arrangements are made."

The negotiations for the surrender of Port Arthur and the documents drawn up to carry it out are very fully dealt with, as are also the measures taken for handing over the fortress. They will no doubt form the precedents for all future proceedings of the kind. Four committees dealt with the handing over :-(1). The first, divided into four sub-committees, dealt with (a) the forts, batteries, arms, munitions of war; (b) ships; (c) provisions; (d) dangerous objects. (2). The second with prisoners of war. (3). The third with hospitals and sick and wounded. (4). The fourth with the ordinary inhabitants, the transfer of the civil administration, finances of the town, and other questions of detail.

During the siege the arrangement of suspensions of arms for collection of wounded and dead was left to the divisional generals.

The Japanese authorities declared that they took no responsibility for private property left behind unguarded in Port Arthur, or elsewhere in the theatre of war, as they had insufficient means at their command to prevent theft and fire :--"The Japanese Army can assume no responsibility for the private acts of thieves, burglars, incendiaries, etc."

In their empire, all necessary powers being provided by statute law, martial law is only proclaimed by the Japanese in a foreign country. No uniform code was promulgated; Marshal Oyama laid down that "the circumstances in which martial law is applied are so infinitely various . . . that it is best not to limit the liberty of action of the military authorities by uniform rules." The Commander of the Fourth Army did formulate and issue very clear and precise rules, but was ordered to withdraw them by Army Head-quarters. The legal councillors were, however, unanimously of opinion that rules are necessary :—"It is contrary to all principles of repression not to declare beforehand what acts are or are not punishable . . . the object of martial law is not to punish, but to menace with punishment, to prevent acts harmful to the army ; to attain this end publication is most necessary." The action of the Japanese Headquarter Staff is very significant, as it is no doubt founded on Continental practice. Professor Ariga gives a very useful list of headings to be included in martial law regulations.

Both Japanese and Russian Armies threatened, if they did not enforce, "collective punishment" of inhabitants for damage to railways, telegraph lines, etc. Article 50 of the Hague Rules reads :--- "No general penalty, pecuniary or otherwise, can be inflicted on the population on account of acts of individuals for which it cannot be regarded as collectively responsible." The Japanese kept inside the law by making villages, by notice, collectively responsible that no damage was done within a certain radius of them.

The Japanese authorities confiscated the property of inhabitants who had notoriously assisted the enemy as contractors, etc., and absconded, or were absent and did not surrender when the Japanese gained possession of their property. This would appear to be contrary to Article 46 of the Hague Rules, which says distinctly "Private property cannot be confiscated"; but apparently, by Japanese law, confiscation of property is still a penalty for treason, and Professor Ariga quotes as a precedent that "in 1870 the German Army confiscated, or menaced with confiscation, the property of men of military age in Alsace and Lorrain who, being absent from their homes, might be supposed to have participated in the grage against the German Army."

It will be observed from the precis given above that the practice of the Japanese Army, which is founded on a careful study of the best European precedents, differs in some cases from that observed by the British Army in South Africa. It cannot, however, be doubted that the Japanese Army gained very considerable advantages from the interpretations given by its experts, and similar interpretations must be expected in European warfare.

WHAT ONE OUGHT TO KNOW ABOUT THE GERMAN ARMY (Ce qu'il faut savoir de l'Armée Allemande). 112 pp., with 6 plates, 1 map, and diagrams in text. 8vo. Paris and Limoges, 1907. Lavauzelle. 15. 1d.

This little book, published probably in answer to the German pamphlet entitled "Was man von der französischen Armee wissen muss" (What one ought to know about the French Army), which was brought out in the early part of 1906, contains a concise and useful description of the organization, armament, equipment, and tactics of the German Army. As regards organization, the matter is not quite up to date, and many inaccuracies occur. Half-a-dozen pages at the end of the book are devoted to conversational matter, where the French and German are given for certain phrases which it might be useful for the soldier to know. A column is set apart for the French interpretation of the German

pronunciation. For example, the German rendering of the French sentence, "Faites attention et dites-moi la verité, ou je vous emméne," is given thus :---" Passn Si aouf ! ound sagn Si di Waarhait, odr Ich nême Si mit !"

The book is in a handy pocket form, easily carried in the field.

THE TACTICAL EMPLOYMENT OF ELECTRIC SEARCHLIGHTS (Die Elektrischen Scheinwerfer in militärtaktischer Anwendung). By Capt. Josef Aggermann. 100 pp., with 31 diagrams. 8vo. Vienna, 1908. 5s.

The author, who is the commander of the searchlight section at the Austrian fortress of Pola, intends this volume to be a handbook for the *personnel* of searchlight units. At the same time he anticipates that it will be of use to officers of all arms, especially to those who may have searchlight units under their command.

The book begins with a description of the *matériel* and organization of searchlight detachments in sufficient detail to render the subsequent discussion as to the tactical employment of these units intelligible to the general reader.





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MAPS 4 & 5. -Asia-Crimson Lake; Europe and "Novus Mundus"-Emerald Green ; Africa-Yellow Ochre.

on original. 72° × 5=360°. MAPS 6 & 7.-Asia-Crimson Lake ; Europe and America-Emerald Green ; Africa-Yellow Ochre.

- Centre from which Tropic of Cancer is described, 233 N.
- B Contre from which Arc of Equator is described; radius on original less than 9 inches.

Centre from which Tropic of Capricorn is described, asy S.

• Centre from which parallel 50° S. is described; radius on original about 84 inches.



Angle ABC

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MAP No. 1.





MAP No. 2.



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