The New Zealand Tunnelling Company.

Edited by
J. C. NEILL, A.O.S.M.

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By Mr Andrew Mills

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Andrew Miller
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5th June 1992

The New Zealand Tunnelling Company

1915-1919.

EDITED BY

J. C. NEILL, A.O.S.M.

(Late Lieut. N.Z. Tunnelling Company)

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Headquarters,
N.Z. Expeditionary Force,
XXII. Corps.
1535 DZ.
7th February, 1919.

O.C.
New Zealand Tunnelling Company.

On the departure of the New Zealand Tunnelling Company for England, I wish to place on record my high appreciation of the work done by your Unit since its arrival in France in the Spring of 1916.

The continued and arduous work performed by the Company in the neighbourhood of Arras in building dugouts, machine gun positions, and in road construction, was carried out in a spirit of devotion to duty, creditable in the highest degree to all concerned.

In the early Summer of 1917 the wonderful system of subterranean passages and shelters planned by the officers and completed by the men of the Unit were perhaps an essential element of the success of the momentous victory then achieved in that vicinity.

Later, until September of 1918, your Unit continued to perform valuable service with that unhesitating devotion to duty which has become a tradition of the New Zealand Tunnelling Company.

At Cambrai the Company constructed a bridge over the Canal du Nord by which the subsequent advance of the troops in the vicinity was greatly facilitated. This bridge was the longest self-supporting one constructed during the war, brought the Company under the most favourable notice of the British Military Authorities.

In conclusion, I desire that you will thank all ranks on my behalf for their work, which has been carried out under most trying conditions with the greatest skill, patience, and devotion. I consider that the army was most fortunate in having at its disposal such a skilled body of officers and men, accustomed to work underground, and that no unit of equal size did more towards the ultimate success for the allied cause.

(Sgd.) ALEX. GODLEY,
Lieut.-General,
Commanding N.Z. Expeditionary Force.

The New Zealand Tunnelling Company, 1915-1919

Chapter I.

The Birth of the Company.

This is the story of the Tunnellers, New Zealand Engineers Tunnelling Coy.: what manner of men they were, and just what part they played in the Great War of 1914-1918.

Most New Zealanders heard of the Company at the time of its formation—Auckland in particular knew it well—but a great silence swallowed it thereafter and except for occasional mentions in the casualty or honours list, the daily war news knew it not. Its work did not lend itself to headlines and rarely indeed did even official correspondents find its doings worthy of chronicle.

From those whose business it was to watch its work came praise unstinted, and many a British Division gave it heartfelt gratitude for protection against enemy mine and shell. With that and the knowledge of work well done the Tunnellers are content.

Tunnelling companies were unknown to the Army List prior to 1915 and perhaps will have no being in the future. They were formed to meet a special need in the heavily manned permanent

trench lines of that period, and when the methods of warfare altered they became general engineers, their civilian training fitting them for a wide variety of engineering work.

How great the need was then can be seen from the fact that the nucleus of the first company—the 170th Co. R. E. Tunnellers—arrived in France on the 20th February, 1915, and by June, 1916 there were 25 Imperial and seven Overseas companies actively engaged in mining—approximately 25,000 men. In the early days of trench warfare the opposing trenches at important strategical points were often very close and crowded with infantry. An attack across "No man's land" would be a costly and uncertain affair, but by driving a tunnel underneath and charging it with high explosives, the opposing line could be blown into the air, causing many casualties and much demoralisation to the enemy, and, further, the resulting crater could be made into a strong "Point d'appui" for a further advance.

This method at any rate appealed to the German General Staff—perhaps they had it all worked out before the war—and to do the work they employed special pioneer battalions composed entirely of experienced miners. By December, 1914, the British lines were becoming unpleasantly aware of this new form of frightfulness—it is not conducive to the highest morale to feel that at

any moment yourself and half of the surrounding countryside may ascend skyward in a column of smoke and brickbats.

Various engineer units and improvised mining sections were called on our side to take counter measures, but it was soon found that these had not even a sporting chance against the enemy's trained men.

Then the call went out for help from the miners of the Old Country and the Dominions and right willingly they responded. New Zealand was asked to supply one Company and in September, 1915, an appeal for recruits was issued by the Minister for Defence, only experienced miners and tunnel men being required, and applications for commissions were called from qualified Mining and Civil Engineers.

In spite of the fact that most of the unattached and adventurous spirits amongst the miners, as in all other sections of the community, had already enlisted in other units, no difficulty was found in filling the ranks. In addition to the usual medical tests, recruits were examined by Inspectors of mines as to their experience and fitness as miners, and approximately even quotas were taken from the different mining districts in New Zealand. By the second week of October, 1915, the entire company was assembled on Avondale Racecourse near Auckland, to go through a course of training prior to embarkation for Overseas.

Of what stuff the Tunnellers were made this record will shew—perhaps no more suitable body of men for the work ahead could have been found the whole world over. These were no boys playing at war, but mature men, hard of muscle, hand and face.

Rough they looked as the drafts came in in their "civvy" clothes, but splendidly typical of that race of bushmen, prospectors, miners and navvies who prepare the waste places of the earth for the feet of civilisation. Their manhood revolts at the snug, well ordered routine of city life, it drives them out to the wilds where hardships and the chances of sudden death are always their daily portion. Of discipline in the army sense they knew nothing, but they had been trained in many a camp and mine to obey orders promptly and intelligently and that training never failed through their years of service.

The officers, drawn chiefly from the engineering staff of the Public Works Department with a sprinkling of Mining engineers, had all handled this class of labour in civil life and knew and sympathised with its outlook.

Perhaps it was well in the end that the camp should be constituted as it was at Avondale though at the time it seemed the grossest of blunders.

Briefly, a camp staff of three officers and five unfortunate N.C.O's were required to reduce to

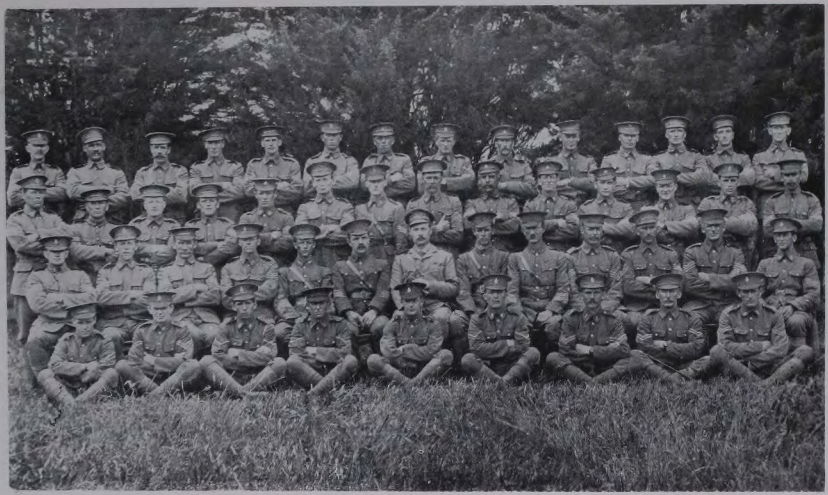
Officers of the Company, Avondale, December, 1915.

order and a proper respect for King's regulations a mob of 400 unruly tunnellers of whom neither officers nor men had ever had the slightest of military training, and to complicate matters the camp site was chosen on an open racecourse within easy reach of New Zealand's largest and gayest city.

Some said that the powers, tired of Auckland's persistent clamour to have the glory and perquisites of a camp of its own, had thrown the Tunnellers at it with a pious wish that Auckland would now be satisfied. Apparently Auckland was satisfied, for the only enthusiasm the citizens shewed to the company was when they bade it farewell.

Had the company gone into one of the established camps with its full equipment of atmosphere and machinery for converting civilians into soldiers, its path might not have been so rocky, but on the other hands officers and men mastered the elements of this new life together at Avondale, and evolved therefrom a conception of militarism that stood the strain of war wonderfully well. The training at Avondale was on ordinary infantry lines, the Tunnellers were over age to have benefited by the territorial system so it had to begin very much on elementals.

Early morning physical "jerks" with a gallop round the racecourse followed by six hours marching and countermarching in the blazing



N.C.O.'s of the Company, Avondale, December, 1915.

Auckland sun had a wonderful effect in renewing the youth of many an old work stiffened toiler. Of course at first they did not like it, they had enlisted to work, not to prance around on a parade ground, but very soon they entered into the spirit of the thing, they were so very anxious not to be left behind through any want of fitness.

It was really wonderful too how these men, drawn from the most independent class on earth, willingly and cheerfully surrendered to military discipline. They saw that it was necessary and that it was just and made no haggle over accepting it. The food was good and more than abundant and when the tents became flooded they slept equally well in the grandstand and tote-house. In after days the Tunnellers looked back on those days as perhaps the pleasantest in their military experience.

The date of embarkation was fixed finally, after several postponements, for December 18th, 1915, and as it approached the company organisation was completed. Four sections were constituted each at strength of three officers and 80 other ranks and in addition six months reinforcements of two officers and 90 other ranks.

Major J. E. Duigan, N.Z.S.C., was appointed to the command and an officer promoted from the ranks to complete the establishment. Attached to the company also were a medical officer and two

THE EMBARKATION PARADE, AVONDALE, DECEMBER 18TH, 1915.

medical orderlies belonging to the N.Z.M.C. and nineteen motor and horse drivers from the N.Z.A.S.C., making a total strength on embarkation of 17 officers and 429 other ranks. A Salvation Army Padre had been appointed to accompany the Tunnellers, but owing to some squabble he was left behind, never to be replaced.

Early in December the Company was reviewed by His Excellency the Governor-General and the Chief of Staff and warmly commended for the degree of military precision already attained.

On the morning of the 18th the company with kits packed and everything in order entrained for Auckland and had their first sight of the s.s. *Ruapehu* that was to be their home for many weary weeks ahead.

Just then she was not a happy ship for all hands including the cooks were on strike for payment at transport rates. As breakfast had been an early one and the only nourishment available being a scrappy ration of biscuits and cheese it was a very hungry company that fell in on the wharf, for the farewell march through the city to Grey's statue. Here speeches were made by the Minister of Defence and the Mayor,—a good square feed would have been more popular just then—and the Company returned to the ship through a cheering crowd of friends and well-wishers. Happily the strike had ended and the *Ruapehu* pulled out into the stream all in order for the voyage, quietly slipping through the entrance in the early hours of the following morning.

Chapter II.

The Way to War.

The old *Ruapehu* was on the whole a very comfortable boat, not overcrowded for a transport, and the food was plentiful and well cooked, Captain Clifford, her master, did all in his power to make the trip pleasant—he handled the Tunnellers with tact and understanding and won from them a genuine affection. He was greatly

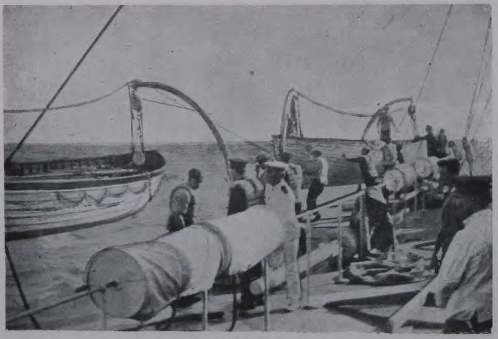
Christmas Box Parade.

attached to a pen of unhappy looking poultry kept on the boatdeck and would tell fabulous yarns of their egg-laying prowess. As they persistently refused to live up to their reputation on this trip,

some kind-hearted tunnellers surreptitiously introduced hardboiled eggs into the coop to the short lived triumph of the skipper.

On the 19th the Company awoke to find the *Ruapehu* headed south-east, the first intimation that the route lay around the Horn.

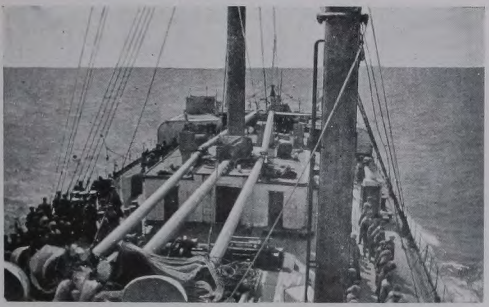
A very full programme of work for all hands was at once instituted and continued till the end of the voyage. Plenty of mental and physical exercise materially relieved the tedium and kept up the standard of fitness achieved in Avondale.



BOAT DRILL.

Concerts and sports were held frequently, an abundance of talent being available, the Company even possessed a poet whose topical ballads never failed to win roars of applause.

As the ship made her southing the temperature became noticeably lower than tropical Avondale and an issue of woollen goods knitted by the good ladies of Auckland was very gratefully received.



O.C.'s INSPECTION.

Tunnellers luck held in the matter of weather; the skipper assured us that he could not remember a finer passage during his many years in the trade. The *Ruapehu* reached Monte Video on the 8th January, but as it was neutral territory, she lay outside the three mile limit to coal and no one was allowed ashore.

From Monte Video she made a direct run to Dakar in French Senegambia to ship a 4.7 naval gun and gunners for defence from submarines, and here the O.C. obtained permission for a route march through the town on condition that the

Company landed and returned intact, a condition that was loyally carried out. The queer surroundings and especially the swarming negro quarters greatly amused the Tunnellers—they became musical, a rare thing for them, and whistled the "Marseillaise" vigorously as they tramped along.

PARADE AT SEA.

However, the white population shewed but faint interest, so when lined up on the wharf waiting to re-embark, the Tunnellers tried them with a Maori haka, and this had a very satisfactory effect.

On leaving Dakar the ship was definitely in the war zone and the usual precautions were taken. Here again the Tunnellers luck held for the German raider *Moewe* was operating right on the

Ruapehu's course, actually capturing the *Appam* within a few miles of her. Had the Germans known that the much more valuable *Ruapehu* was so close this history would never have been written, but the old ship made her leisurely uneventful way unimpeded until she dropped anchor in Plymouth Harbour on the 3rd February, 1916. What a wonderful tribute to the effectiveness of the British Navy that this slow defenceless boat (even an armed launch could have sunk her) could waddle half way round the world absolutely

MEDICAL AID.

unattended though crowded with troops and filled to the hatches with priceless foodstuffs.

On disembarking the Company immediately entrained for Falmouth, and a hilarious train load it was that cheered everything and everybody,

especially if it wore a skirt. Of Falmouth's welcome it is difficult now to write in moderation, so indelible is the impression it made. Bands met and conducted us to a civic dinner, a truly

WASHING DAY.

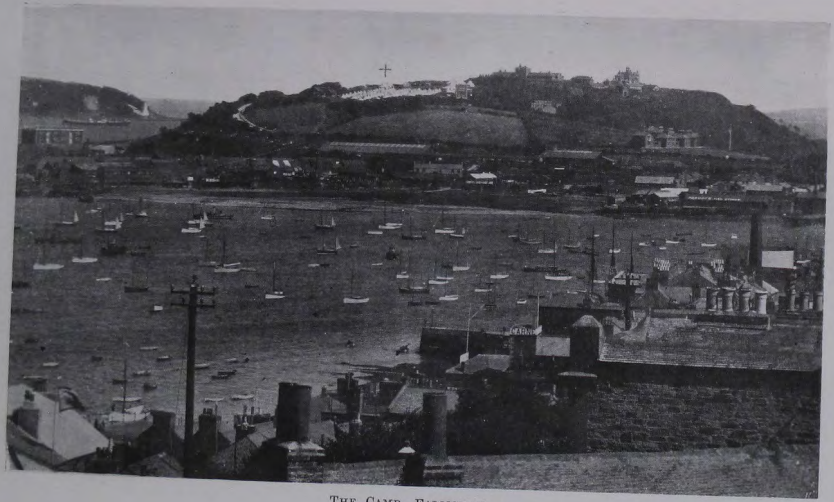
sumptuous repast with real beer, served by all the youth and beauty of that ancient town.

Perhaps the effect was heightened by contrast with eight monotonous weeks at sea and by the memories of Auckland's coldness, but certainly the depth and warmth of that memorable first welcome to Britain will never fade. Falmouth took the Tunnellers to its heart right from the start and until that midnight leave-taking a month later showered hospitality and all good things on their lucky heads. The Company had been

allotted a camp on the Hornwork, that picturesque promontory crowned by Pendennis Castle that divides Falmouth Harbour from the sea. There was no beauty about it that first night as the Company still headed by that devoted band, marched up the hill in pitch darkness against a howling gale and torrents of rain.

By the time huts had been allotted all hands were well soaked and as the kits with spare clothes were not available it was fortunate at any rate a good internal lining had been provided. Next day things were soon straightened out and the Company quickly and quietly settled down to work. The Garrison Commander, who had expected to deal with a wild and lawless mob of colonials, found instead an orderly serious lot of diggers who amply made up for their lack of military "savoir faire" by their keenness to do the right thing. The War Office made no provision for training the men in their own branch of the service or to enlighten them on the methods evolved in the new underground fighting in Flanders; as before, they were dependent on their own resources.

Infantry training was continued under three Instructors:—Sergeants O'Brien, Mahony and Bligh, kindly loaned by the Colonel Commanding the 7th Royal Fusiliers. O'Brien, most fluent of Irishmen and a fine type of Imperial Instructor became very popular with the Tunnellers, his



THE CAMP, FALMOUTH.

inseparable cane twirled like a shillelagh and his acrobatics, no less than his word of command fairly lifted men into a movement: his efficiency appealed to them, and his hurricane blast for the laggard was always tempered by a native wit. His talks on discipline, with accent on the "CIP" were most forceful, but his "long suit" was piling arms. His conception of the Company's activities in war were first the march to their job like soldiers, secondly to pile arms in immaculate order, thirdly to dig. For this last nobody could teach the Tunnellers and for the others the reality meant floundering in twos and threes up muddy trenches with rifles kept very handy for instant use. Nevertheless, O'Brien's training was not wasted for in the rest of their service the Tunnellers never forgot that they were soldiers as well as hewers of earth. O'Brien afterwards died as a soldier in the capture of Vimy Ridge. Peace be with his soul, for he was a man.

On February 12th the Company was reviewed by General Roper, Inspector of Royal Engineers, who was so favourably impressed that he pronounced it fit for service at once.

"Mobilisation stores" were issued, motor lorries, G.S. wagons and horses, motor cycles and mining equipment, and short leave to see something of England was granted to most of the men.

Shortly before the departure Sir Thomas McKenzie, High Commissioner for New Zealand, inspected the Company in review order and read a message from Lord Kitchener. "Please give my best wishes to the New Zealanders and say I am sure they will worthily uphold Anzac traditions."

At midnight on March 7th, the Company entrained at Falmouth for Southampton en route for France. the faithful Fusiliers band together with half the female population of the county giving it a touching farewell.

STRENGTH OF THE COMPANY ON EMBARKATION:

N.Z. Tunnelling Company, 16 officers, 407 other ranks.

N.Z. Medical Corps, 1 officer, 2 other ranks.

N.Z. Army Service Corps, 19 other ranks.

N.Z. Army Pay Corps, 1 other ranks.

Of these one officer and 69 men were left behind in Falmouth as reinforcements and were shortly transferred to the N.Z. Command Depot at Hornchurch.

Chapter III.

The Introduction to War.

The train bearing the Tunnellers reached Exeter about 4 a.m. on a bitterly cold morning and the men were surprised and delighted to find a band of ladies in the snow of that exposed platform with hot drinks and edibles ready for the whole trainload. Many New Zealanders afterwards shared in this hospitality which was continued during the duration of the war and the Tunnellers were glad to learn that the town had been officially thanked and presented with a flag on behalf of the N.Z.E.F.

From Southampton a cold night crossing landed the Company at Le Havre on the early morning of March 10th, the first New Zealand unit for the Western Front.

On arrival at the rest camp, one officer and 25 men were detached and ordered to proceed to the Royal Engineers Base camp at Rouen as reserves.

As an indication of the efficiency of the Company's infantry training, this detachment passed the "Bull Ring" or infantry examination ground in the minimum time of eight days, though a slight contretemps occurred the first day when they appeared on parade fully equipped with 50

rounds of ball ammunition in their pouches! Of course they should not have been there, they should have been on fatigues like the rest of the Royal Engineers, but they were new to war and wanted to learn all they could about soldiering and anyway there were plenty of fatigues later.

In the meantime the Company itself entrained for Tincques, a little station near the railhead and about 15 miles from Arras, detraining in the snow after the usual cold wearisome journey of a troop train in France.

Billets were obtained in the little village of Chelers near by, the Tunnellers' first experience of rural France. Anything more depressing than one of these villages in the winter time it would be hard to find, a collection of mud hovels each with its back to the filthy cobbled street and its family life centring round a huge manure pile the drainage from which soaks under the dwelling or into the household well. In summer perhaps they are more bearable because the mud has dried up, but instead there are swarms of flies and the warmth brings out the full savour of the smells.

The peasants who inhabit them are quite in keeping, dirty, sombre and avaricious, dragging a living from the soil by processes incredibly slow and laborious. The direct antithesis of the gay and imaginative Parisian, whom we in New Zealand look upon as the typical Frenchman.

On the 15th the Company moved up to Maroeuil, the 15 mile march on the cobbles with full packs up made a good introduction to real active service—there was a full crop of blistered feet that night when they settled down in the filthy and verminous quarters available.

Next day the Company took over the tunnelling work of the 7/1 French Territorial Engineers on a section of the line known as the Labyrinth, about 3 miles north of Arras, and took up its quarters in shelters in La Sabliere, a sunken road some 500 yards behind the front line.

As previously, the Company had largely to work out its own destiny for here it was thrown directly into the line without the slightest knowledge or training in the methods of underground warfare or even in elementary trench routine. The Labyrinth, a maze of intersecting trenches lay at the foot of Vimy Ridge and was a relic of the vain and terribly costly French assaults on that stronghold in the preceding autumn. Overlooked and dominated by the higher ground held by the enemy, the trenches were feet deep in liquid mud and devoid of direction boards, and the French mines mere shallow rabbit burrows with Hun galleries well below and amongst them: it was certainly a tough introduction. The immediate problem was to locate the exact position of the enemy mines, find out just what he was doing in them, and

then evolve a countermining system to drive him back to his own side of "No man's land."

The only possible method of locating an enemy underground is to hear him at work, hence the enormous advantage the Germans had in getting their galleries in first: he had only to refrain from working and we could not possibly know his whereabouts, he had just to wait until we got within striking distance and choose his own time to blow our workings to pulp.

It is a striking comment on German intelligence that in a year's hard mining and countermining he only caught us this way once.

He always underestimated the speed with which the New Zealand Tunnellers drove their workings (it was quite three times his own) and that perhaps contributed largely to his undoing. In order to magnify and to accurately determine earth noises our chief instrument was the Geophone, a pair of wooden discs about four inches in diameter by a inch and a half thick, in the centre of which was a layer of mercury contained between mica plates: these were connected by rubber tubes to stethescopic ear-pieces. In use the two discs were placed in contact with the ground and the listener knelt in front of them with ear-pieces adjusted. By moving one disc in an arc round the other until a particular sound was heard with exactly equal intensity in each ear, the direction of the sound was

located in the line at right angles to that between the centres of the two discs, a compass bearing of which could be taken.

By making this observation from two or more widely separated points and plotting the results on paper the intersections of the bearings would give the exact location. A simple and wonderfully

LISTENING WITH THE GEOPHONE.

efficient little instrument, provided the user had sufficient experience and was not too plentifully endowed with imagination. When it is understood that in listening with it in the solid chalk of our front, practically every sound within a radius of 300 feet was distinctly audible it will be realised that a lively imagination can produce some weird effects in the listening reports: one classic

sample distinctly heard a horse munching oats at 100 feet below the line—it could only have been a pre-historic fossil one!

To kneel or sit for hours at the end of a narrow gallery out under no man's land, in bad air, with only a guttering candle as protection from the ultimate dark, with every faculty concentrated on the sense of hearing alone to pick up the faint tap-tap of a Hun miner's pick, to separate that sound from the innumerable others, men walking on the trench boards far overhead, a sentry kicking his numbed feet against a firestep, the crash of a "Minnie" or the rattle of a machine gun, or even the scurryings and love affairs of the trench rats: to keep concentrated when it stops (the Hun is a very intermittent pick man), and to pick it up again the instant it starts, and then to determine exactly in which ear the sound is the stronger and to know that perhaps on this knowledge depends not only your own life and that of your mates, but also the lives of those patient infantry in the trench above, all this will be summed in the laconic official listening report "Enemy picking Intermittent Faint 18 deg." Or again, to listen through the night to the stealthy shufflings and dragging noises that indicate the enemy is charging and tamping his mine, to determine, when the last faint rustle ceases, that he is ready to blow and so warn the line; all this is the listener's job and perhaps

there was no other that strained body, brain and nerve as did this.

In those first days in the Labyrinth the Company knew nothing of the practice of Geophone listening, not a single member had had even the most rudimentary instruction, so it had to rely on its own native common sense and mine craft. On the 16th the first shifts went to work cleaning out the old French galleries and establishing listening posts, and by the 19th a new defensive mining scheme had been evolved for the whole section and the preparatory work started. The infantry then holding the Labyrinth were the 51st Division Highland Territorials, perhaps the most famous fighting division in the British Army. Splendid fellows they were, cheery, tactful, and very helpful to the Company so brand new to war: as when a tunneller, wandering along the trench, encountered a brawny Scot sitting on the firestep stripped to the buff and subjecting his shirt to a minute scrutiny and enquired the reason thereof. Jock regarded him with a long look of amazement not unmixed with pity, finally ejaculating "WHAT, have ye nae wee beasties yet"? then solemnly holding out something between fingers and thumb, "Ah weel, here's twa to make a stairt wi."

A party of officers, N.C.O.'s and sappers was despatched to an Army Mines School for instruction in listening, mine rescue work and other

"Proto" Instruction at Mine School

details of mining practice. When these returned to the unit they were replaced by others until all the officers and N.C.O.'s together with many of the sappers had taken the course.

Each Army had eventually such a school which acted also as headquarters for the Army Controller of Mines and as a supply centre for the technical equipment of tunnelling companies.

The course of instruction was invariably very strenuous and could be regarded as a rest only in the sense of being well behind the line, and so free from shell fire.

The chief instruction was in listening and the use of mine rescue apparatus, the latter a cumbersome affair of oxygen cylinders, valves and containers, strapped on by a sort of harness to enable the wearer to enter and work in a poisonous atmosphere.

The outer air is entirely excluded, the outgoing breath, after purification from carbonic acid, going into a bag to which oxygen is added from the storage cylinders, the amount being regulated at the wearer's pleasure by a valve and bypass, and the mixture retaken into the lungs.

One's first experience of the Proto, as the complete apparatus is called, is distinctly unpleasant and steady practice is necessary to make its use even bearable, the final test of the rescue of a

MINE RESCUE SCHOOL.
Reviving a victim of gas by use of "Novita" pure oxygen apparatus.
(Note dear old "Sapper Dummy" reposing in background.)

dummy in a horribly cramped tunnel well charged with smoke and then up an 80ft. shaft under the sarcastic eye and tongue of an Royal Engineer Sergeant is one not lightly to be undertaken without adequate preparation.

All the same there were jolly times at the school, for there met contingents from all the Tunnelling Companies in the Army area, and the tunnellers were men drawn from all the corners of the earth, and of the sort that make for good fellowship.

After a fortnight in the Labyrinth the Company handed over the sector to the 185th Tunnelling Company of the Royal Engineers and took instead the Chanticleer front, the trench system on the eastern outskirts of Arras destined to be its home for the next two years.

Chapter IV.

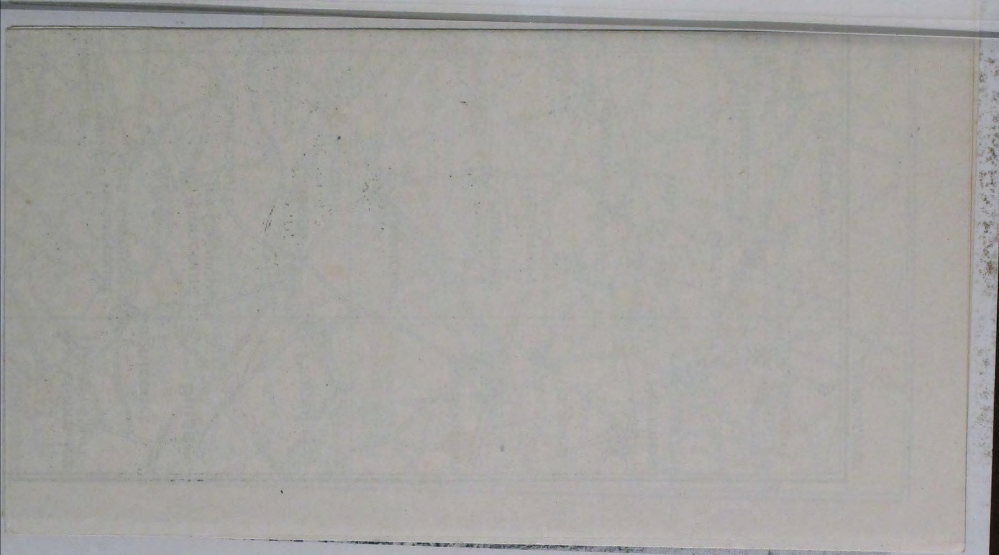
The Daily War.

On the 30th March the Company took up its quarters in Arras, most of the men in the "Manutention" a big French territorial barracks and the officers nearby. There was plenty of house room in Arras in those days, for except in the vicinity of the "Hotel de Ville" and the Cathedral the town had suffered very little from shell fire.

Most of the inhabitants had deserted it, but a sprinkling of small shops and estaminets found the soldiers francs well worth the risk.

Movement on the streets was prohibited during daylight, but in the evening the main street would be full of Tommies and Jocks, and picture shows and concerts were filled to overflowing almost within machine gun range of the enemy front line. Occasionally the Hun would lob a shell or two over, but chiefly directed at battery positions, so that everybody slept serenely in the fresh air of rooms above ground and altogether our living conditions were not too bad.

From the billets a walk of little over an hour up the communication trench would bring one to the front line trench along which and in the immediate support trench the mine entrances were



Hotel de Ville, Arras.

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HOTEL DE VILLE, ARRAS.

located. Each section of the Company had a definite number of jobs allotted to it and these jobs were worked continuously by the three reliefs into which a section was then divided, eight hours on and sixteen off.

This was the unvarying routine for many months, eight full hours hard slogging in the solid chalk and flints, till relieved at three, eleven or seven o'clock, then a good hour's plod back to billets along the trench, a rum ration, a hot meal and to sleep till time for the next shift: each day of the week or month exactly alike, the only variations being in whether it rained or snowed, whether the mud was liquid or merely sticky or in "Jerry's" supply of ammunition for "hate" purposes.

An officer from each section stayed continuously in the line, living in a central dugout and working mostly on a three days relief.

The mining position on this new front was very much the same as the Labyrinth, *i.e.*, the Germans had their mine system well developed with advanced galleries in places under our front line and very little in the way of a defence system on our side. As before the Company's job was to locate the enemy and then to drive him back into no man's land.

Continuous listening and vigorous development work were at once put in hand in the existing mines

and as the position of the enemy was ascertained, new workings were started to outflank him.

The Germans were evidently soon aware of the Company's activity for they frequently bombarded our mine entrances with an unpleasant assortment of high explosives and also worked furiously in their galleries; this latter move was not wise as by so doing they gave our listeners the much needed opportunity to locate them.

On the 7th April the enemy blew a "camouflet," evidently with the object of destroying one of our galleries, but did no damage beyond filling it with gas. A "camouflet" is an underground explosion that does not disturb the ground surface (that is, blow a crater), but which smashes the rock and incidentally any workings that may be therein within a certain definite area. This area can be accurately calculated from the amount of explosive used, and for a camouflet its radius cannot exceed the vertical distance from the centre of the explosion to the surface. It follows from this that for fighting purposes the side whose galleries are at the deepest level has a big advantage, for it can crump its opponent before he can hit back.

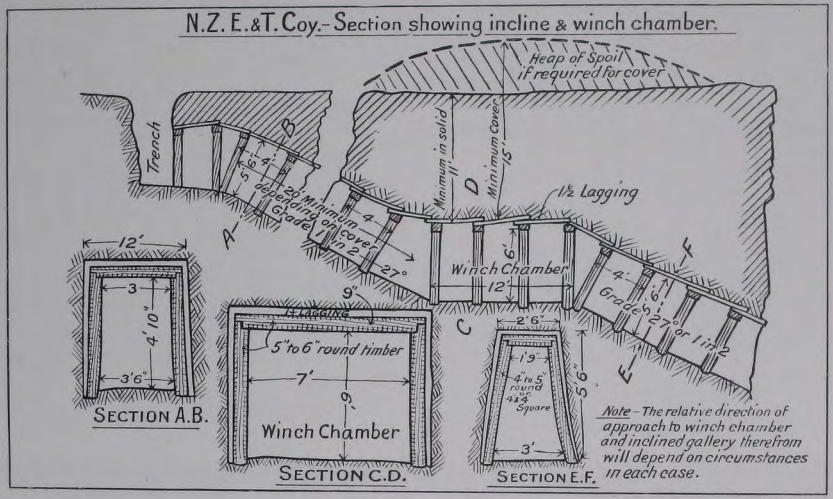
As a set off it takes more time to sink deep and progress is then slower because of the increased difficulty of getting away the spoil, and time is the very essence of this form of warfare.

Though a blow may not "crump" a gallery if it is in the immediate vicinity it is pretty sure to gas it. High explosives detonating in the confined space of a mine generate large quantities of carbon monoxide gas, the deadliest foe of the miner, both in peace and war.

Besides forming a dangerous explosive mixture with air, carbon monoxide in even minute quantities acts as a terrible poison when taken into the lungs. It is colourless and odourless so that unless its presence is suspected it takes a man unawares, canaries or white mice, both of which are very sensitive to its action, are always kept at mine dugouts in order to test suspected places. It attacks directly the haemoglobin of the blood, robbing it of oxygen, and the effect is cumulative from successive small doses. It is for the rescue of men overcome by this gas that the instruction in "Proto" is given at the schools, and Proto and Salvus sets were always kept handy together with the "Novita" apparatus for reviving a victim with pure oxygen.

Quite 75 per cent. of Tunnelling Company casualties in the mining days were caused by carbon monoxide gas.

For this first week at the Chanticleer the "footage" of gallery driven was 329 ft. for a total company strength of 14 officers and 299 other ranks. The effective strength had been



TYPICAL MINE ENTRANCE.

greatly reduced by an epidemic of colds and measles and to fill the gaps the reserve detachment of one officer and 29 other ranks that had been sent to Rouen rejoined the Company.

On this day, the 15th of April, occurred the first death of a member of the company, Sapper M. Tobin dying in hospital of broncho-pneumonia.

During the next week a detachment of the 14th Division Pioneers, four officers and 160 other ranks were placed under the Company's orders enabling an extension of the front as far as Agny on the right, nearly ten miles of active mining front for which the Company was responsible.

The New Zealand Tunnellers very soon adopted methods of their own in the work, more in keeping with their colonial experience than the orthodox methods of the Royal Engineer text books. The small cramped tunnels made by British, French and German tunnellers (a typical size would be 3 ft. wide by 4 ft. 6 in. high) did not appeal to our big men, who found they could make better progress with infinitely more comfort when they had decent room to swing a pick, consequently a typical New Zealand gallery would be 6 ft. 3 in. high by 3 ft. 6 in. wide.

Again, both British and Germans had one orthodox style of timbering, boxes of 3 by 10 ins. sawn timber dovetailed together top and bottom each set touching the last, so that a finished gallery

was smoothly panelled, sides top and often floor with good sawn timber.

This style well done certainly had a pleasing effect and it had also the advantage of requring the minimum of intelligence to put in, but to the New Zealanders its appeared wasteful, slow and even dangerous. Our men, used to driving in prospects and tunnels in all sorts of ground where timber is scarce and costly, always preferred to adapt their method of timbering to the special need of the ground and to dispense with timber altogether once the solid chalk was reached.

Instead of the costly sawn timber of the Royal Engineers they used any logs procurable, sometimes cut from the battered woods in the trench lines.

A round set of two logs and a cap at three, four or five foot intervals supporting "lagging" poles to hold the roof made a far stronger and cheaper job than the boxing, though perhaps not so tidy.

It was safer, too, for it would give ample warning before the danger point was reached in case of too heavy pressure from the surrounding country. The Tommy feels safer underground if he can't see the naked rock while a miner feels safest when he can keep his eye on it.

In planning the work too, the company soon departed from Royal Engineer methods. As a rule the system in vogue was to sink a vertical

shaft at a spot as far forward as possible, often from advanced saps beyond the front trench, till the desired fighting depth was reached for the galleries.

These shafts were extremely vulnerable both from enemy blows and from raiding parties, and they made the handling of the spoil hewn from the galleries a slow and laborious process, while in such exposed positions the problem of dumping the spoil once it reached the surface without disclosing the position of the shaft was well nigh insuperable.

On either side a mine entrance once discovered could be made practically unworkable by constant bombardment with trench mortars and field guns.

The New Zealand company preferred to commence operations from a little further back,—usually in or just off the immediate support trench, where the mine entrance could be more readily concealed and better facilities were available for dumping the spoil.

Owing to the extraordinary clearness with which aeroplane photographs showed every detail in the trenches this necessary concealment was a most important and difficult matter. The pure white chalk mined from the lower levels showed very plainly against the brown surface earth and all kinds of devices were used to camouflage it—mostly with negative results.

Air Photo of Opposing Trench Systems in "J Sector."
(Note exposures of white chalk near mine entrances.)

The company's experience was that the dump didn't matter much so long as it didn't too obviously give away the mine entrance.

A strengthening and building up of the "parados," or earth mound to the rear of the trench, by a wall of chalk filled sandbags gave freedom from direct observation for the dump and protection from rifle and machine gun fire for the dumping party. Some monumental "lighthouses" were left in this way in old J sector by the company—"Jerry" soon got tired of wasting ammunition on them and he never succeeded in crumping one of the entrances proper.

From the trench an incline at a grade of one in two led down to the hauling chamber with a cover of about twenty-five feet solid as a protection from trench mortar and shell fire. From the chamber an inclined drive, usually also at one in two grade, went forward and downward till the desired depth was reached. This was determined at Arras by the permanent water level, about ninety-six feet.

From the bottom of the incline the drive or gallery ran forward practically level, and in the finished system connected with a main lateral gallery running right along the front, approximately vertically below the front line trench. From this lateral, fighting galleries were pushed out wherever enemy activity underground was heard. This

lateral gallery was of great assistance in rapid communication between the various works, but its chief function was in promoting good natural ventilation. The air in a gallery and especially in an incline becomes very quickly vitiated, often so bad that candles refuse to burn, and this naturally effects the health of the miners as well as the footage driven.

Air pumps had always to be used in unconnected single galleries, but at best these are much inferior to a through natural current of air.

If there have been any blows in the vicinity, through ventilation is trebly important to prevent accumulation of gas which percolates to considerable distances through the chalk.

The spoil, hewn from the face, using the short double pointed "Hardy" miner's pick, was filled into sandbags and these placed on a small rubber tyred trolley, running on wooden rails, to be trammed to the foot of the incline. There the trolley would be hooked to a wire rope and hauled up the rails of the incline by means of an ordinary prospectors two handled barrel windlass in the haulage chamber.

From there the bags would be carried up the entrance incline to the trench and then emptied on the dump. This latter operation was performed by "fatigue parties" supplied by the infantry in reserve, the Tunnellers doing all the lower level

work with one sapper in charge of the windlass and one the dump. The untutored "Tommy" if left to himself was quite capable of letting go the windlass handle at a critical juncture allowing the weight of the truck to revolve the drum at tremendous speed, the iron handle probably braining either him or his mate, or at the dump, especially if "iron rations" were flying, of emptying his sandbag in the handiest spot and scuttling back to the incline for shelter.

The sapper in charge of the dump had no enviable job—out all night in the wet and mud—encouraging by example the unwilling "fatigues" to disregard danger and to do the work thoroughly, he needed great tact and ability to handle men. One of the hardest cases in the company found his ideal niche at this, by a quaint mixture of humour cajolery and bullying he could make the most unpromising bunch of surly "Yorks" perform marvels.

Chapter V.

The End of Mine Warfare.

By the 29th April, the position of most of the German offensive galleries had been definitely ascertained and a plan of attack could be made.

Briefly the position then was that in some places our galleries and the German galleries were advancing about parallel, but in opposite directions, the Germans being under our front line trenches and our faces well out under no man's land. In order to protect our inclines and main galleries these had been driven sufficiently distant from the supposed German workings to be out of camouflet radius so that to attack the enemy in the flank our galleries were forked in a Y and thus brought within striking distance.

By May 3rd four of these Y galleries were in position and loading was completed by the 5th the four being simultaneously fired at 10 p.m. The ascertainable effect was very much according to the plan, no craters were formed and our main workings were undamaged, while the German galleries in that area were probably completely cut off, any men working in them being certainly killed.

Judging from the tremendous bombardment the enemy opened on the trenches in the neighbourhood of our mines the next day we had annoyed him

MINE CRATORS IN J. SECTOR.

considerably. On the 12th this process was repeated with other German advanced galleries, four maximum camonflets forming a barrage of crushed ground along the whole of this stretch of front.

"Loading" meant a strenuous time for all hands. Ammonal was the explosive used by the British Forces—a grey inoffensive looking powder of tremendous power—nine ounces of it was the charge for the terrible little "Mills" bomb.

The Tunnellers used it by the ton; the camonflets described above each contained somewhere about 3,000 lbs.

It was packed in awkward tin lined boxes containing 50 lbs., and all the supernumeraries, headquarters, cooks, batmen, etc., were pressed to carry it up the trenches to the forward magazine.

From there it was carried to and lowered down the mine shaft or incline and conveyed to the face. At first the correct procedure was then to empty the tins into water proof bags because the tighter packing thus obtained was considered more effective. But it was a dangerous and unpleasant job, the ammonal dust staining everything it came in contact with, including arms and faces, a violent and lasting yellow, and later experience showed that the full explosive force was obtained if the unbroken tins were stacked in place. When the full charge was in place two electric detonators and

two ordinary detonators connected to safety fuse were inserted in separate ammonal tins or bags and the leads led back through the gallery to the firing point, the electric circuits being then tested for continuity and resistance. Then the charge was tamped—solid blocks of ten or twelve feet of packed sandbags filled with soft surface earth alternating with the same length of air space. This method gave the same resistance to the explosion as if the whole length had been packed solid.

Finally the electric leads were connected to the exploder ready for the word or rather the hour to fire.

The whole operation from the receipt of the order to load was a continuous feverish rush—for obviously if by any chance the enemy had detected that we were loading he would try to load and fire first and in a race with death in this fashion no delays can be tolerated.

Speed was always the big factor in mining and the New Zealand Tunnellers certainly wasted no time. The company footage for the week ending on May 20th was 582 feet 6 inches or 1.84 feet per man on ration strength. When it is considered what a relatively small proportion of the company's strength is actually hewing chalk—officers, N.C.O's, headquarters staff, batmen, cooks, etc., all deducted therefrom—this result would be considered remarkable in civilian life. Right

through the history of the company the job was always put first and supernumeraries were always reduced to the absolute minimum.

About this time an enemy mine was located on the extreme right of the company's front and the timely warning given probably saved many lives. "Jerry" was apparently rather rattled by our activity for he blew several camouflets well away from any of our galleries that could only be accounted for by an attack of nerves.

He still worked actively in the neighbourhood of our blows, but now we had no fear of him for he had been driven well back and in an even race we could always beat him.

On the 6th June, after an intense bombardment lasting two days, the enemy blew four big mines as a preliminary to a general attack. Three of the resulting craters were in the company's sector and one in the adjoining section to the north. Huge craters they were—the largest 147 feet in diameter and 38 feet deep, the mounds of chalk thrown up forming conspicuous landmarks. They were christened Cuthbert, Clarence and Claude in honour of a then popular revue.

Their effect may have helped the German attackers to get across no-man's land, but the actual damage to our personnel, trenches, or galleries was practically nil. The Norfolks and Warwicks suffered some casualties in the trench fighting before

CUTHBERT, CLARENCE AND CLAUDE MINE CRATERS.
From the air.

the Germans were driven out, but the New Zealand Tunnellers came off without a scratch. For the rest of June and all July mining progressed steadily without any spectacular features on either side; footage average per man per week for the period was 2.4 feet.

The first reinforcement, which had landed with the Main Body and been left in England joined the Company during this period.

On the 27th June Major Duigan, O.C. Company met with a motor accident necessitating hospital treatment and Captain Waters took command of the company. The enemy began to shell Arras with greater frequency, the company's billets having several narrow escapes—looking back it seems amazing that so many men could sleep in the open unprotected rooms so close to the enemy and yet escape all damage.

The tradition of the Company's luck was by this time well established for it was not till June 22nd, that we had our first fatal casualty from enemy action. Sergeant Vernon died from wounds received in the trenches on that day.

For three months the whole company had lived barely out of the enemy's machine gun range with a daily walk up the constantly "Straffed" communication trenches to work in the very front line itself—every man had had narrow escapes beyond counting—and yet till now no man had

been killed and very few wounded. It was no wonder that Tunnellers luck became proverbial. On the 4th August, the Germans for the first and only time caught us napping. They blew a large mine burying two of our sappers and injuring a third who were working in an advanced gallery, forty feet of which was lost.

No material damage was done to our main system. By this time the numerous blows and counterblows underground had impregnated the whole country with gas and we had several casualties from this cause, none of them fatal.

On the 19th August, Major Duigan rejoined us from hospital and took over command. For some time past the work had been organized to four reliefs per section in order to give a longer rest between shifts. Eight hours on and 24 off instead of eight on and 16 off on the three relief basis.

Even on this the strain was telling unduly on all the tunnelling companies and arrangements were made for each company to have a permanent rest camp a few miles behind the front and out of all but long range shell fire. One relief per section went back to this camp for three days, the other three reliefs returning to the eight on and 16 off basis in order that the work could progress continuously. In theory the idea was a good one but in practice it was not popular with our men, who

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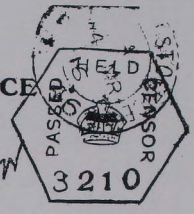
FIELD SERVICE

POST CARD



The address only to be written on this side. If anything else is added, the post card will be destroyed.

Mrs J. Ronayne
50 Tinahow Rd
Wellington
New Zealand

NOTHING is to be written on this side except the date and signature of the sender. Sentences not required may be erased. If anything else is added the post card will be destroyed.

I am quite well.

~~*I have been admitted into hospital.*~~

~~*sick*~~ / ~~*wounded*~~ ~~*and am going on well.*~~ / ~~*and hope to be discharged soon.*~~

~~*I am being sent down to the base.*~~

~~*I have received your*~~ ~~*letter dated*~~ _____ / ~~*telegram*~~ „ _____ / ~~*parcel*~~ „ _____

Letter follows at first opportunity

I have received no letter from you

lately / ~~*for a long time.*~~

Signature only. R. A. P. Ronayne

Date 12/3/1916

[Postage must be prepaid on any letter or post card addressed to the sender of this card.]

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were quite content to risk the shell fire to remain undisturbed in the comparative comfort of their Arras quarters. Somebody had to do the necessary "fatigues" at the rest camp and sometimes a relief found it anything but well named.

Our camp was at Agnez-le-Duisans, a village some seven miles from Arras, and consisted of a collection of wooden hutments comfortable enough in summer but horribly cold and cheerless in winter.

For the month of August the company's footage again headed the list for the whole British front with 2.3 feet per man per week.

On the 14th September the company suffered a severe loss in the death of Lieutenant Durant and Sergeant Pounceby who with eight of our men volunteered to accompany a night raid of the Cheshires into the German lines. Their job was to blow a passage for the raiding party through the enemy wire by means of a loaded pipe, and afterwards to investigate and if possible destroy any German mine entrances. The raid proved a failure, only Lieutenant Durant, Sergeant Pounceby and a sergeant of the Cheshires apparently reaching the German trenches. There they must have put up a gallant fight against overwhelming odds, for after the advance of next year a neatly kept grave was found at the Chateau St. Laurent just beyond the then German line, bearing on its oaken cross the inscription,

To the Memory of three brave Englishmen, Lieutenant Durant N.Z. Tunnelling Company and two N.C.O.'s.

In the darkness and confusion of the abortive raid no one had seen the three go forward and many of Durant's men spent the whole night searching no-man's land, in spite of heavy enemy fire, in the belief that he was lying out there wounded.

When long afterwards the news came through that dispelled all hopes, every man in the company felt that the world was poorer by the loss of two splendid men and comrades, and richer by their example.

Chapter VI.

The Battle of Arras.

About this time word was received of a probable early British offensive on the company's front and work was started on several Russian saps or shallow level galleries running out under no-man's land.

These galleries were in reality hidden covered communication trenches, enabling the German trenches to be quickly connected to our own following an advance. They were mostly in the soft earth overlying the chalk and in some instances had only a few inches of soil above their roof timber. It was a rush job and spectacular footages were put up, 27 feet per 24 hours being a common rate of progress in single galleries six feet by two feet six inches in the clear. Just as the men had got thoroughly into their stride at this work—it put new life into everyone to at last get a chance for an offensive instead of the state of defensive we had been tied to hitherto—news came that the attack was postponed indefinitely and therefore there was no particular hurry. The deep level mining activity was steadily easing up on both sides, our defensive system was now pretty complete and as we were not allowed to become offensive, that is, push across and blow up the

THE BAUDIMONT GATE, ARRAS.

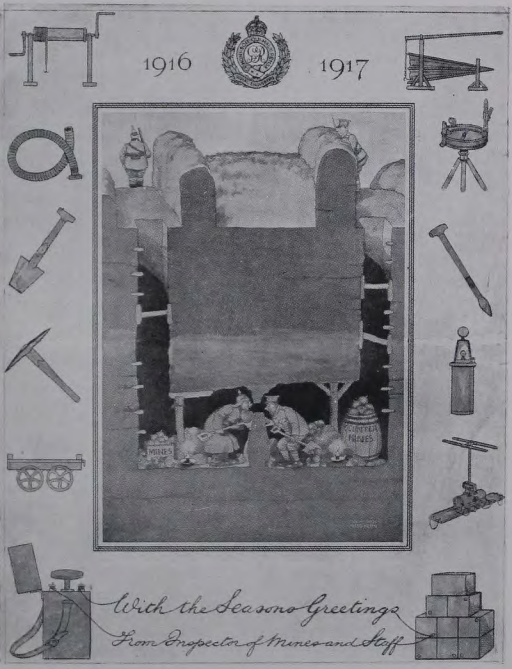
German strong points, we only needed to keep careful "listening watch" on the enemy and to take measures should he attempt anything. This he was less and less inclined to do, partly perhaps because he was now distinctly getting the worst of it in underground fighting, and partly because this form of warfare was rapidly becoming obsolete. The development of the giant trench mortars and howitzers made mining offensives unprofitable, for a concentration of these terrible engines could accomplish as great a destruction in five minutes as a laboriously dug mine taking five months to complete.

To the company at any rate the cessation of mine warfare meant a relief from ceaseless nervous strain if not from the steady labour of hewing chalk. No longer were the lines of the infantry dependent on its exertions and viligance—the risk of raid or shell was shared in common. In the mining days a tunneller was a revered and honoured guest in the trenches and was in frequent demand for expert opinion on mysterious noises heard in dugouts and bivvys. It was part of the Tunnellers duties to investigate any reports sent in by the infantry that enemy mining was suspected and many a long and muddy walk through the trenches did the Tunnellers have, almost invariably to find a mare's nest. These long lonely tramps—the New Zealand custom was to go alone—were

often fruitful of adventure, amusing and otherwise. Often they led to arrest as a spy, an experience that, if one had sense not to argue, usually ended pleasantly over a glass of whisky in company or battalion headquarters. Periodically rumours used to go round that a German spy disguised as a British officer was abroad in our lines and the New Zealand Tunneller, wandering unaccompanied at all hours of the day or night in unfamiliar trenches, was quite likely to be so identified by an excited Tommy with a month's leave for his capture in prospect—especially as the colonial's English had hardly the correct Oxford intonation.

This circumstance was once utilized by one of our officers to get one back on the company's incurable practical joker, who was due to relieve him in the trenches. Instead of handing over at the central dugout in the usual form he went round the infantry posts and solemny warned them that a Hun was about, pretending that he was a New Zealand officer.

The Jocks were immediately on the alert and the joker had not got far on his rounds when a bayonet at his ribs and a curt command to put his hands up brought him up all standing. Being comparatively new to the game he tried to argue and was soon marching down the trench half an inch ahead of a sharp bayonet point. Presently



TUNNELLER (*embarassed by the sudden encounter*):—"Er-er-third return 'Ammersmith, please!"

A CHRISTMAS CARD FROM G.H.Q.

the procession met our officer, who had been lying in wait and who was immediately hailed for identification. Calmly after a prolonged scrutiny he said "I don't know you, never saw you in my life before" and then departed for the mess rejoicing. The joker was a well guarded prisoner for some considerable time before he could prove his identity.

The postponement of the British attack on our front gave the company time to plan a more ambitious scheme of assistance than the few unrelated tunnels originally contemplated. This plan, improved and largely extended as the work progressed, was adopted by the Army commander and as a completed work on April 9th, 1917, the opening day of the battle of Arras, was the most notable achievement of the Company's career.

For the next five months practically the whole energies of the Company were devoted to this work, the forward billets were moved to cellars at St. Sauveur on the eastern side of the Arras railway station and the head quarters and workshops to the "winter billets" at Agnez-le-Duisans.

In the seventeenth century the city of Arras was the headquarters of the Spanish occupation of northern France and the Netherlands, and the modern city retains many traces of its former overlords. The Grande Place in particular might well be the Plaza of some Spanish town with its

THE GRANDE PLACE, ARRAS.

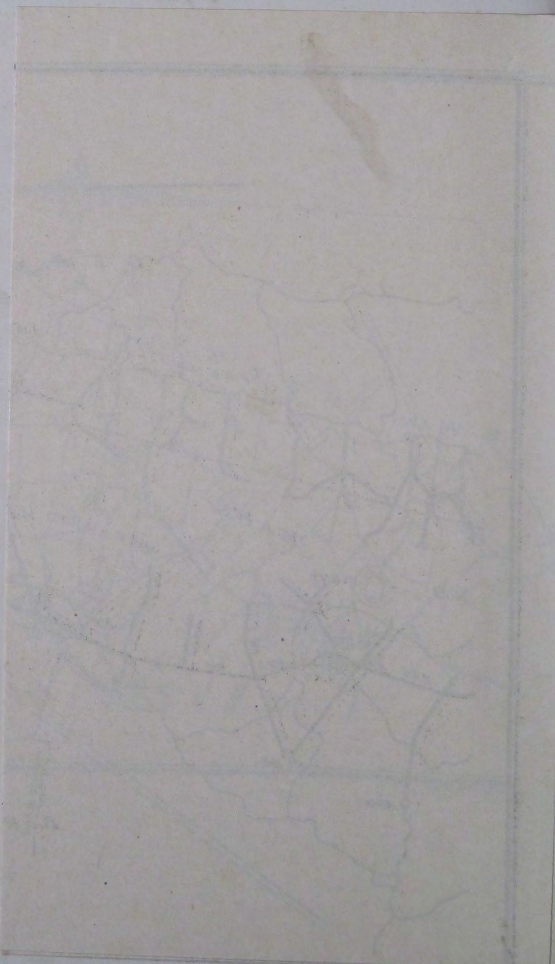
graceful Moorish collonades shading the entrance to roomy many arched cellars used then as now for shops and workrooms.

Below these upper cellars would sometimes be one or two further cellars for the storage of wines and other goods.

For four or five stories above ground rose the much ornamental facade of the house itself, the easily worked chalk blocks of its construction lending themselves well to deeply cut carvings and graceful design.

The oldtime builders chose their chalk blocks with care, for it was all mined from depths of from forty to ninety feet and leads and pockets of the right quality were followed and excavated just as a miner follows pay ore. Time has well justified their choice in the amazing state of preservation of their work exposed to the rains and frosts of centuries.

These cellars and underground quarries formed the basis of the scheme on which the company now embarked. They were to be connected, opened up, and made habitable for troops, so that when the day for attack came the men could issue from them safe, warm and dry, and utterly unsuspected by the enemy. Two series of these caves and underground quarries were discovered stretching towards the enemy lines, one under the suburb of Ronville and one under St. Sauveur and the Arras-Cambrai Road.



The Ronville caves were by far the larger, some of them immense caverns hundreds of feet in diameter and twenty to forty feet high. Pillars of chalk had been left at regular intervals to support the roof, but in the centuries that had elapsed since their abandonment, falls had gradually formed them into inverted cones springing away to the domed roof between, so high that it was barely discernable in the candle light.

To make these caverns safe and habitable was no easy matter, for as soon as they were opened to the cold wet winter air the chalk commenced to swell and crack, and slabs weighing many tons would come crashing down without an instant's warning. To timber up to the heights of these roofs was out of the question, so instead the floor was raised by dumping therein the chalk cut from the galleries and dugouts until the roof was close enough for clear observation and support.

In both the Ronville and St. Sauveur systems a main connecting gallery 6 feet 6 inches high by 4 feet wide was driven as far as the support trench where it branched into several galleries spreading out fanwise, whose ends were well under the German wire, within a few yards of his front line trench. The Arras ends of the two systems were connected to the Crinchon sewer, a beautifully bricked tunnel down which, between two footways ran the Crinchon stream. Several

easy graded approaches gave entrance to the sewer from the cellars in the Grande Place and other spots in the town. The entire system was lighted throughout from two electric generating stations designed, erected and worked by the company.

The main galleries were provided with a two foot guage iron tram line with numerous "lay-bys" to permit up and down traffic to pass.

Along the galleries too went four inch water mains and scores of "signals" wires, both ready to come to the surface well across No-man's land to follow the advance.

For long before the big day came these underground communications were in constant use and must have saved many lives. Along the brightly lighted gallery a constant stream of traffic went safely from the heart of Arras to the front line—ammunition, rations and engineers supplies were no longer carried painfully by fatigue parties along the wet and much strafed communcation trenches, but went easily forward on trucks dry and safe.

Familiar names guided the traveller—Wellington, Christchurch, Auckland, Dunedin, Invercargill, Russell, Nelson, Blenheim, etc., were the Ronville caves connected by Godley Avenue, while at St. Sauveur, King's road ran through Glasgow, Crewe, Chatham and London connecting with the Strand.

Well before "Zero" day, April 9th 1917, all arrangements were completed, the caves had all been levelled and made safe, the lighting completed, cook-houses, washing places and even latrines installed, gas tight doors fitted to all entrances. In all, comfortable and safe accommodation was provided underground for some twenty thousand troops. Only about half this number was ever actually in residence in them at one time, but in the aggregate probably thirty thousand men slept one or more nights in the caves and many time that number passed through them. Considering the nature of the ground and the difficulty of getting timber it is a great tribute to the mining ability of the company that beyond one or two small knocks not a single man of these thousands was hurt by falling chalk.

A large isolated cave was discovered lying well forward between the two systems and was converted, under the superintendence of the company medical officer, into a most complete dressing station, fitted with comfortable quarters for patients and staff and a beautiful little operating theatre lit by powerful electric lights. Many living dugouts were constructed opening off the main communication galleries for Brigade and even Division Headquarters on the day of battle.

Early in this new work the company reverted to the eight on and 24 hours off system of shift,

A Shift in Arras.

the Agnez-le-Duisans camp being used as head quarters for the A.S.C. and for the workshops, as a receiving depot for reinforcements and for men going and coming from leave.

The galleries, especially in the forward area, were commenced from several different points on the surveyed line and driven both ways to connect. By this method very rapid progress was made, some fine footage records being put up, the best being 1742 feet or 4.5 feet per man on ration strength for the week ending on December 6th, probably the best record in chalk for the British Army. Early in December the Company was visited by the Prime Minister of New Zealand, Mr. Massey, together with Sir J. G. Ward and General Richardson. The party was given a very hearty welcome by the Tunnellers.

During the month most of the 2nd Tunnelling reinforcements joined the company, the first men to arrive who had not come over with the main body. Another welcome addition was made by a detachement of 43 Maori Pioneers lent to assist in the big job. The Pioneers were great favourites with everybody, splendid toilers, always willing and cheerful; they supplied an inexhaustible fund of drollery and laughter that was sadly missed when they were recalled.

Their billet, a battered ex-estaminet on the walls of which nightly Hun machine gun bullets

thudded, they soon converted into a veritable salon. A wrecked piano appeared from somewhere and was made to give forth much harmony especially when entertaining some of their bosom chums—the Jocks.

Cobwebby bottles of rare old wine graced these convivial evenings—certainly wine could be bought in Arras at five francs and over the bottle—but rumour spoke of a proper corporal's guard that proceeded in full marching order with kits up to a certain quiet street, that there posted a sentry with fixed bayonet in correct military form, that subsequently the sentry was withdrawn also in due form and the guard marched away with kits that on close inspection would have been suspiciously bulgy.

It was on the vexed question of the timber supply that the Pioneers rendered great service to the Company. Mining timber was very strictly rationed and with our numerous works and especially the problem of catching up the caves the company was in chronically short supply, while adjacent Royal Engineer dumps would be piled with most desirable sticks. The Pioneers had a most effective way of raiding these tempting piles, affecting blank ignorance of the English language if caught in the act by an infuriated Royal Engineer officer or sergeant.

One of our officers who had collected a beautiful lot of timber for a special job, lowered it

with care down one of the shafts into the caves, but on going down to collect found not one stick. Some Pioneers had seen the timber coming down and carried every scrap along to their own particular work! On one occasion a party of Pioneers was working in the main St. Sauveur tunnel when a sergeant of the Gordon's came down in charge of a miserable little Bosche kept "as a sample" from a daylight Gordon raid. The Maoris had never seen a real live Bosche before and were immensely interested. They crowded round with many realistic gestures and haka attitudes, finally all going on their knees to the Gordon sergeant with a fervent prayer to give them the prisoner to take home to their billets as a pet and fatten him up. There wasn't a more abject little object on earth just then than that Hun under his iron helmet—and no wonder, for in the uncertain light of the electric in that underground place, the rolling eyeballs, protruding tongues and wild gestures of the Maoris would shake the stoutest nerve. It may or may not have had some connection with this, that a German communique shortly afterwards accused the British of employing New Zealand cannibals on the Western Front.

The Pioneers stayed with the company from the 9th December to the 27th February, being then replaced by New Zealand infantry.

On January 9th, 1917, Major Duigan having received a staff appointment handed over the command of the company to Captain Vickerman, who with the rank of Major was O.C. company for the rest of its sojourn in France.

As the winter advanced artillery and trench mortar activity increased greatly on both sides—the Tunnellers suffering a fair proportion of casualties, especially in the forward galleries or Russian saps which by this time were well out under No-man's land.

From a good safe twenty or more feet of cover under our lines the saps gradually rose till only a few inches of soil covered their roof timber. Almost daily one or other of them would be crumped in, usually by shell from our own side. As the knowledge of our work had at all costs to be kept from the enemy these breaks had to be picked up and covered at once, a risky job, while the British "toffee apples" were wire cutting in the vicinity. Several times parties of our men were cut off by a direct hit behind them, in one case a small tunnel 2ft. 6in. by 2ft. and 50ft. long was driven in the solid round a bad break in nine hours, a party being rescued from the forward end alive and well.

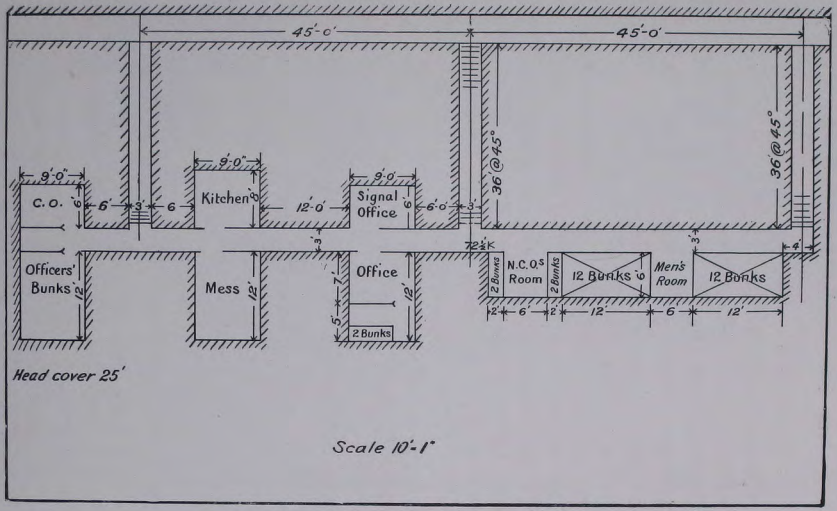
One sap holed into an enemy gallery, the break being carefully closed again in reserve for future use. Elaborate precautions were taken to keep the

Railway Station, Arras, from the Air.

enemy in ignorance of the work, the clay was excavated noiselessly with push picks, short spear like implements, the spoil falling into sandbags held to receive it. The floor was muffled and the men's boots wrapped in sacking and talking above a whisper was forbidden.

From the ends of two of the galleries horizontal holes were bored by means of a post hole borer and the "wombat" drill, the latter's bore was 150 feet long; these were charged with 9 lbs. of ammonal per foot run, contained in sheet iron cylinders, their purpose being on detonation to blow a deep trench from the end of gallery to the enemy parapet.

The gallery which had holed the enemy gallery was charged as a mine with 2200 lbs. ammonal and tamped. From others, machine gun position and entrances to No-man's land were completed except for a foot or two of surface soil which would be removed immediately before Zero hour. 110 gas doors and 60 gas curtains were fitted to the cave and gallery entrances. On April 4th, the day fixed for the opening of the preliminary bombardment, the company's work was complete and the majority of the men were sent back to the "winter billets" for a well earned rest, a party that had been resting there for the previous week going forward to take up battle positions.



BATTALION HEADQUARTERS TO ACCOMMODATE 28 MEN.

A copy of the following letter was received: "Commander Third Army,

"I wish to bring to the Army commander's notice the excellent work done by the New Zealand Engineers Tunnelling Company, during the past twelve months. First under Major Duigan and now under Captain Vickerman, the work of the company has been excellent. Not only have the men worked extremely hard and well, but the excellent relations that have been maintained with the various divisions shows a first class organization.

"I attach a copy of a report I have received from G.O.C. 3rd Division, which expresses the opinion held by the Divisions in the line of the New Zealand Tunnelling Company.

(Sgd.) A. Haldane,
Lieut.-General, Commanding VIth Corps."

"VIth Corps,

G4257 3rd Div.

"I wish to bring to the notice of the corps commander the excellent work done and willing help of the New Zealand Tunnelling Company in all their undertakings with the 3rd Division.

All work has been punctually and thoroughly carried out to my entire satisfaction without a hitch or difficulty of any kind.

(Sgd.) C. J. Deverell,
Major-General Commanding 3rd Division."

From the 4th to Zero hour—5.30 on the 9th April, 1917—a terrible bombardment was maintained on the German positions by guns of all calibres, the German reply, at first vigorous, gradually dying down as his guns were one by one put out of action. The company's duties consisted in patrolling the entrances, gas doors, galleries and caves—the latter being filled with troops—and repairing the constantly crumped forward saps.

In describing the battle of Arras perhaps the experiences of the party of Tunnellers in charge of one of the forward saps can be taken as typical.

On the evening of April the 8th the tunnel face was well under the German wire and some 25 yards from the parapet of his front line trench.

Near the end a short drive on each side and at right angles to the tunnel led to a prepared machine gun position that required only about a couple of feet of cover removed to be ready for mounting the guns to sweep the enemy parapet at close range.

Our orders were to remove this cover just before Zero and to open the end of the gallery itself into No-man's land, continuing it as an open trench into the German front line, immediately the battle opened.

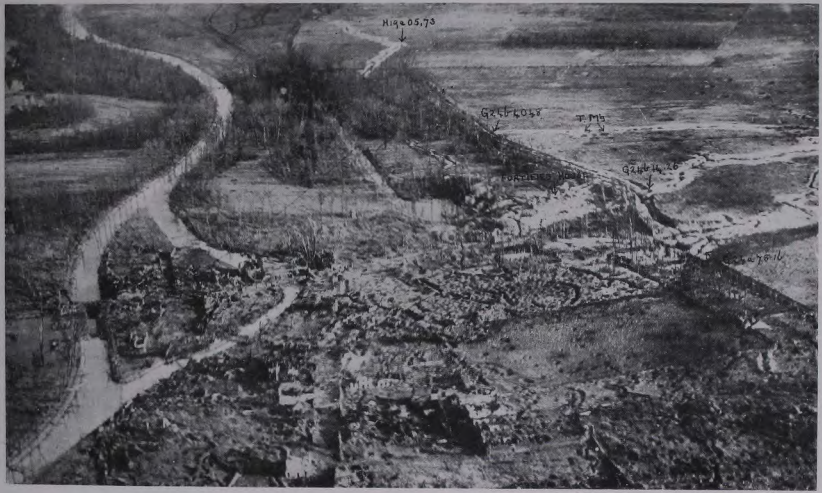
At 10 p.m. a concentrated bombardment with gas shell fired from trench mortars was opened on the enemy positions, continuing for more than an hour. Many of these shells fell short and landed

about our gallery, through the much broken roof of which the gas percolated, filling the gallery.

A gas curtain was hastily rigged just behind the first opening—an incline up to the front trench —and efforts were made by a fire to draw the gas from the gallery, but in vain.

There was nothing for it but to go forward and open up the end so that a natural current of air would clear the gas out. These forward galleries were not electrically lit so it meant groping by dim candle light, through a hundred and fifty yards of narrow winding gallery with eyes streaming and smarting from the tear gas that got in under the box respirators. Arrived at the end desperate efforts were made to remove the cover to the open air, but to work effectively in a box respirator, almost blinded and after coming through the ordeal of the gallery, was a physical impossibility and constant relays of fresh men were necessary before at last the work was done and it was possible to tear off the suffocating gas masks and breathe the clear night air.

A machine gun section was waiting back behind the gas curtain to man the forward positions but not being miners they could not be induced to face the still gas filled gallery and so arrived at their battle postions too late, though so successful was the attack that their guns were not required. A wonderful battle picture was the reward of the



BLANGY, 5-1-17.

solitary watcher who remained on guard at one of these openings.

As the watch hands crept towards the fateful half-past five the first faint streaks of the wintery dawn began to colour the sky so that the dim outlines of the German parapet close at hand and the shattered stakes and wires of his entanglements all round could be faintly seen.

An ominous stillness had fallen along the whole battle line, almost terrifying after the infernal racket of the last few days.

Suddenly three tremendous reports in quick succession—the company's mines—a pause of a fraction of a second and then the enemy parapet disappeared in a spouting wall of flame, the opening barrage.

The watcher turned back to look towards our own lines and saw wave after wave of dim figures advancing steadily at a leisurely walk—Jocks and Tommies—as steady and unconcerned as at a field day at the base.

They waved and shouted cheerily to the Tunnellers as they passed and some of the wounded were glad to be helped to the shelter of the gallery.

All was hustle therein now and it was not long before our part was finished and the complete communication made to the German trench.

Our mines had been a complete success, the big one destroying two dugouts, some fifty yards of

trench and a concrete pill box, the others opening deep wide crater trenches almost into the German line.

As it turned out these communications across No-man's land were never used, the attack sweeping forward for four miles without check, but had it been held up at the first or second defence line they would have been priceless in consolidating the gains and sending up reinforcements for a further advance.

The general results of the battle of Arras are too well known to need description here, to those on the spot the high hopes based on the tremendous success of the first day were quickly dashed to earth when it was realized that no fresh troops were available to relieve and carry on the work so splendidly commenced by the few divisions which made the attack. For nearly a week these men fought day and night, repelling the counter attacks of the massed German reserves and doggedly pushing forward through the snow and mud till human endurance reached its limit and the line dug in some seven miles nearer Germany.

Chapter VII.

Still Digging.

At midnight on that same day two sections of the company started work on the Arras-Cambrai road clearing it for wheeled traffic through the old trench lines. For the next month roadmaking, chiefly on the Arras-Cambrai road, was the main business of the Company.

For the first couple of weeks bitterly cold weather, snow and mud made the job anything but pleasant; the road was practically the only way that guns, ammunition and supplies could get forward to supply a considerable area.

The enemy was quite aware of this and shelled the road with annoying frequency. At one spot a wag had nailed to a battered roadside tree the legend "Run Here," a little further on "Run Faster," and at Feuchy Chapel corner, the hottest spot of all, "Go for your life."

As dusk came a packed stream of G.S. wagons, lorries, ammunition limbers, pack-mules and troops would fill every inch of the road which ran high on an enbankment between the soaked and shell torn fields.

If at this time the enemy opened out over the whole length with shrapnel and high explosive, as he frequently did, the scene of confusion can be better imagined than described.

The Tunnellers as usual were very lucky and had surprisingly few casualties, among them, however, being Lieutenant Henry Metcalfe who was killed instantly by a shell fragment while on duty on the road.

Towards the end of April and the beginning of May the weather became fine and even hot, spring came with a rush of growth and blossom wonderful to our southern eyes, and a further advance pushed the Hun artillery back out of all but long range fire on the road.

Roadmaking became, except for the long walk to and from work, quite a pleasant occupation, though never perhaps altogether to the mind of the Tunnellers. By the middle of May the main road had been put in first-class order and the company began to get some of its own work again, first clearing out and making habitable some small caves found in the forward area and later constructing dugouts, machine gun and trench mortar emplacements in the newly established trench lines.

From May 1917 to the opening of the big German offensive in March, 1918, this was the Company's work and at the end of it there was no stretch of line in France better supplied with safe and comfortable dugouts for the troops and concealed machine gun positions for its defence.

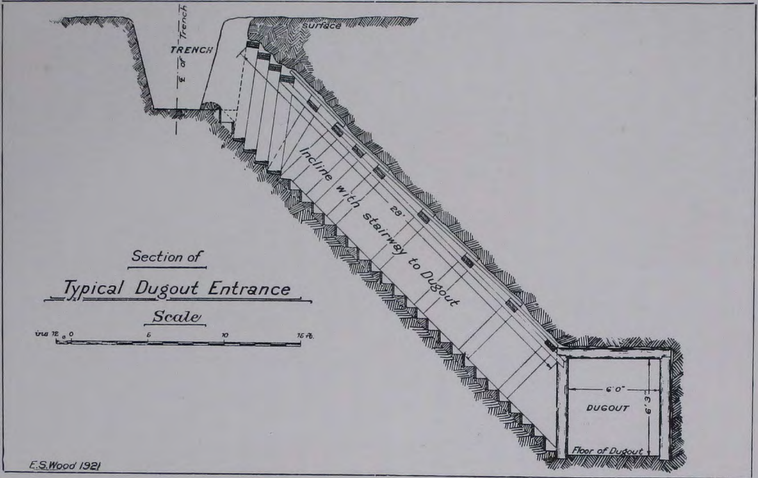
The Company's front extended from the Arras-Cambrai Road to about 500 yards north of the Scarpe River—about six miles on an air line—and on it they constructed no less than 180 dugouts and nearly a hundred concealed machine gun nests besides trench mortar emplacements, observation posts and underground communication galleries.

The standard type of dugout had two or more entrances on the forward side of the trench leading downward at a one to one grade with wooden steps to the dugout chamber.

The chambers were uniformily 6 ft. 6 ins. high by 6 ft. wide in the clear and might be anything from 30 ft. to 500 ft. long with 25 ft. of solid ground above the roof timber.

As in the mining proper the company did not follow the Royal Engineer's precedent of using box sets of sawn timber but followed the colonial style of round sets and lagging. This method was undoubtedly quicker, safer and cheaper.

Our average time for completing a 30 ft. dugout with two entrances was nine days; not one of our dugouts was even damaged by shell-fire or heavy ground. Our style not only used less timber but also inferior and more easily procurable timber —rough young pine cut from the French plantations instead of the sawn three inch boards from Norway and England. One of the first of these dugouts


surface
TRENCH
of Trench
Incline with stairway to Dugout
28'
6'0"
6'3"
DUGOUT
Floor of Dugout
Section of
Typical Dugout Entrance
Scale
E.S.Wood 1921

constructed by the Company was located in Shrapnel trench, immediately in front of Monchy-le-Preux. Shrapnel Trench was practically the front line at this spot, the stretch of ground between it and the enemy line being hotly contested for by both sides and the scene of continual raids and counter raids. The trench itself was at this time in places not more than waist deep, had very few traverses (deviation to localize the effect of a bursting shell) and was in a very bad state of repair, more like a series of connected shell holes than a trench. The enemy observers could almost look into it from the high ground in front and its name of Shrapnel Trench had not been bestowed without good reason.

The unfortunate infantry occupying it had a very bad time as there was absolutely no place to shelter from the weather or from the continual bombardments to which it was subjected. Any attempt to deepen or improve it in daylight could be immediately seen by the enemy and at night he shelled it almost continuously to discourage possible working parties.

One or two good safe dry dugouts to retire to during a strafe were badly needed and the New Zealand Tunnelling Coy was detailed for the job.

Obviously it was impossible for the shifts to come up from Arras, so quarters were made in a

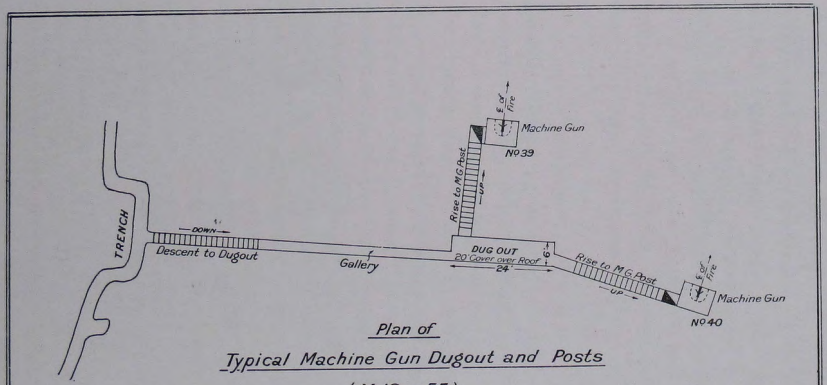
cave we had opened up under the ruins of Les Fosses farm, some thousand yards back and out of direct enemy observation.

He knew all about it though for he had used that cave himself and every now and then he would send over a salvo of 5.9 that made loitering in the fresh air above ground a risky proceeding.

The road from Arras was fit for traffic to this point, provided the traffic was expert at dodging shell holes, and the company's attached N.Z.A.S.C. motor lorry and horse drivers would come up after dark with timber and rations. No enviable job this, steering a tortuous course in pitch darkness among the shell holes on the greasy mud covered "pavé," where the faintest glimmer of a light would draw an instant response of bursting shell. The right of way choked with ration wagons, artillery limbers, ambulances—not many motor lorries ventured as far forward as ours—and all the mass of traffic that feeds the line during the hours of darkness.

At any minute the enemy might open his artillery on the road and in that congested space there was no escape.

For two years this was the nightly portion of our N.Z.A.S.C. and no men could have done their work more efficiently or with a finer courage than did these.


TRENCH
DOWN
Descent to Dugout
Gallery
DUG OUT
20 Cover over Roof
24
6
Rise to M.G. Post
UP
Machine Gun
No 39
Rise to M.G. Post
UP
Machine Gun
No 40
Plan of
Typical Machine Gun Dugout and Posts
(M.12.a 55)
Scale
Ft. 15 10 5 0 15 30 45 Ft.
E.S. Wood 1921

At Les Fosses farm too would report the "fatigues"—parties detailed from the infantry in reserve—to help carry the timber and do the unskilled work on the job. The shift hours were 7 a.m. to 3 p.m., 3 p.m. to 11 p.m. and 11 p.m. to 7 a.m. About three quarters of an hour before these times a party consisting of an N.C.O. and four sappers belonging to the company together with about sixteen fatigues—Jocks if we were lucky—all laden with timber, sharp picks, etc., would leave Les Fosses.

A stretch of about three hundred yards of open ground had to be crossed before dropping into Vine Avenue, the communication trench leading forward.

In daylight this stretch was traversed with caution and in twos and threes. Vine Avenue led straight forward down the slope of Monchy Hill and in its upper part was a deep well traversed communication trench, but in those early days almost feet deep in mud in rainy weather.

As it approached Shrapnel trench it became steadily shallower and worse kept, till at the point where it turned sharply to the left to merge into the latter it was little more than two feet deep. Officially this spot was "dead ground," that is, hidden by an intervening rise from enemy observation, but practically it was known as

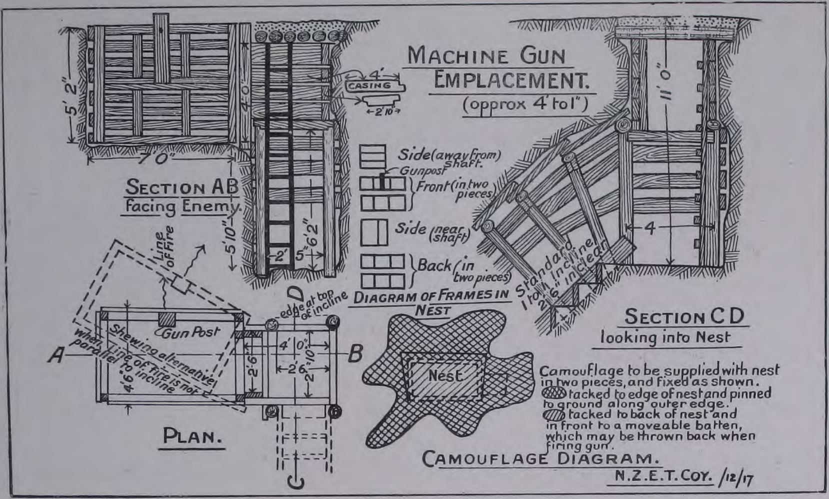
"Hell's corner" and most people wasted no time when negotiating it.

Arrived at the dugout site the party would take over from the previous shift, two sappers and half the fatigues going to each entrance.

In commencing a new dugout the trench side was first squared down in the line indicated by direction pegs previously put in by the company's surveyors and then sufficient excavation made to allow for the insertion of four vertical box sets forming a rectangular opening six feet three inches high and three feet six inches wide. The sets were made of 10 in. by 3 in. sawn timber, the cap or roof piece being doubled for extra strength and each set put in 10 inches lower than the proceeding one—the first set having four feet of solid ground above it.

The sets were then securely "tied" together and formed a sort of solid timber box leading forward and downward, the "sills" or floor pieces acting as steps. In a Royal Engineer or German dugout this method of timbering would be continued to the bottom of the incline, but our timbering altered after the first four sets, being set at right angles to the slope of the incline instead of vertically.

This meant not only a saving of timber, five feet three inch legs or uprights giving the same head room as the six feet three inch legs to the vertical sets—but made a much stronger job as the



MACHINE GUN EMPLACEMENT.
(approx 4' to 1")
SECTION AB
Facing Enemy.
7' 0"
5' 2"
4' 0"
5' 10"
6' 2"
2'
5"
4'
CASING
2' 10"
Side (away from shaft.)
Gunpost
Front (in two pieces)
Side (near shaft)
Back (in two pieces)
DIAGRAM OF FRAMES IN NEST
11' 0"
4
Standard Iron Incline 2' 6" in clear
SECTION CD
looking into Nest
Line of Fire
Gun Post
Shewing alternative when Line of Fire is not parallel to incline
4' 6"
edge at top of incline
A
B
C
D
4' 0"
2' 6"
2' 6"
2' 10"
PLAN.
Nest
CAMOUFLAGE DIAGRAM.
Camouflage to be supplied with nest in two pieces, and fixed as shown.
tacked to edge of nest and pinned to ground along outer edge.
tacked to back of nest and in front to a moveable batten, which may be thrown back when firing gun.
N.Z.E.T. COY. /12/17

timber support was then directly in line with the maximum ground pressure. These sets were made of rough young pine logs commencing at two feet apart and in good ground extending to four feet, the roof between being held by "lagging," poles or short boards resting on the caps of the sets. Special sets of wooden steps were laid on the floor for easily travelling. The inclines would continue downward till they reached a depth of about 32 feet below the surface when the "chamber" or dugout proper was commenced.

When finished this consisted of a space between the two entrances 30 feet or more long, six feet six inches high and six feet wide inside the timber.

The latter consisted of heavy sets of round logs a foot or more in diameter, three feet six inches from centre to centre, the roof "lagged" with pole or short boards resting on the caps. As the entrance neared the bottom the air usually became very bad and as soon as the centre line of the proposed dugout was reached a narrow untimbered drive was pushed through from each end so as to obtain a through current of air.

Until this was accomplished the men had to toil in an atmosphere so foul that often it was difficult to keep a candle alight, the narrow incline would be choked by "fatigues" who passed the spoil, filled into sandbags at the face, from hand to hand till it reached the trench.

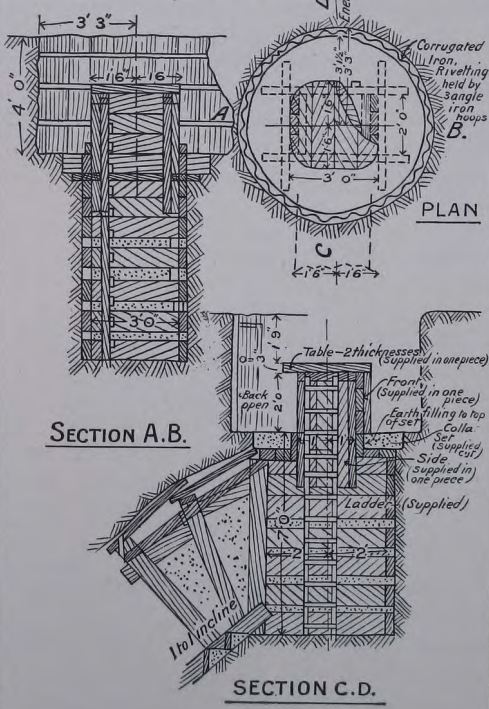
In a spot such as Shrapnel trench, under enemy observation the bags were stacked along the sides of the trench in daylight, all dumping being done at night. It was always an anxious job, the chalk had to be deposited outside the trench so as to give the enemy no clue as to the work going forward and to carry it far over the open, swept all through the night by machine gun and artillery fire, was impossible with the limited fatigue parties available.

Usually it was dumped against the rear side of the "parados," or mound of earth thrown up on the back of the trench, or in shell holes, and covered with soil before daybreak, but it had to be carefully done, for even a slight change in the topography showed up with painful clearness in the air photos.

Had the work been done by our own men who realized its importance, this would not have presented much difficulty, but the sapper in charge of the infantry fatigues sometimes had a trying time to get it done right.

On a wet muddy night a Tommy naturally preferred the safety and dryness of the dugout steps to floundering about in the open with fifty pounds of wet sandbag on his back and "Jerry's" iron rations whistling uncomfortably close, but all things considered the British infantryman did his work for us wonderfully cheerfully and well.

MACHINE GUN EMPLACEMENT.



Those manning Shrapnel trench at any rate fully appreciated the Tunnellers work—the difficulty was to keep them out of it.

As the only available cover, the dugout at all stages of construction became very popular during Jerry's frequent strafes and it took a very hard heart to order the whole and the wounded out into the shrapnel swept trench that the work could proceed.

However, finished it was in time—the precursor of many others in the same area.

Eight hours of the hardest toil and then the long trudge through the mud to Les Fosses cave, a much needed rum ration, a hot meal, and then to sleep till shift time came round again.

This was the routine for nine days and then came three days at the company's billets at Arras for a rest and clean up.

In June the company took over the camp of the 184 Company Royal Engineers on the outskirts of Arras and made it a very comfortable home for the men on rest.

Hot and cold shower baths and clothes washing arrangements were luxuries not to be despised after nine days in the line, and clean airy sleeping quarters and mess rooms helped to clear the accumulated candle smoke and dugout atmosphere from the lungs. Here also the Company installed a complete sawmill and workshops where the timber

and special requirements for the various jobs were prepared. The camp even possessed a quite passable tennis court.

Beyond a regular gas helmet and rifle inspection the men in rest were not worried by parades or drill, but every care was taken to make the period one of real rest.

A canteen was set going and provided a considerable variety of goods at very reasonable prices; it was much patronized by the other troops in Arras, possibly on account of the excellent quality of the beer supplied!

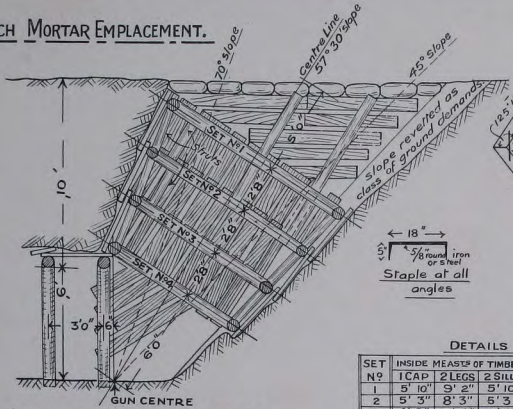
At any rate it yielded a substantial profit which was spent on the provision of extras to the daily rations in the way of vegetables, etc.

The problem of procuring sufficient timber for the company's work was always an urgent one and to meet it a salvage gang was put on the work of removing the timber from the dugouts in the old trench lines both German and British and this became our main source of supply.

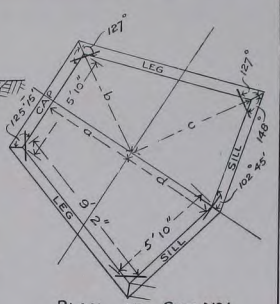
Among other jobs that fell to the company's lot during this period was the disposal of a huge quantity of ammunition that had been damaged and rendered unsafe in the explosion of several large storage dumps in the vicinity.

In the experiment some 13,000 shells mostly 18 pounders and 4.5 inch were lowered down into

TRENCH MORTAR EMPLACEMENT.



LONGITUDINAL SECTION OF PIT
(4' to 1")



PLAN OF SET No1

DETAILS OF SETS

SET	INSIDE MEASTS OF TIMBER			MEASTS FOR SETTING OUT			
No	1 CAP	2 LEGS	2 SILLS	a.	b.	c.	d.
1	5' 10"	9' 2"	5' 10"	5'0"	5'9½	6'9½	5'0"
2	5' 3"	8' 3"	5' 3"	4'6"	5'2½	6'1⅜	4'6"
3	4' 8"	7' 4"	4' 8"	4'0"	4'7⅝	5'5¼	4'0"
4	4' 1"	6' 5"	4' 1"	3'6"	4'0¾	4'9"	3'6"

TIMBER 7" DIA. ROUND

and stacked in one of our old mine galleries 95 feet below the surface.

A heterogenous mass of all sorts of shells and bombs collected from the old battle area was also stacked below and up the incline to within forty feet of the surface, the balance being tamped with earth.

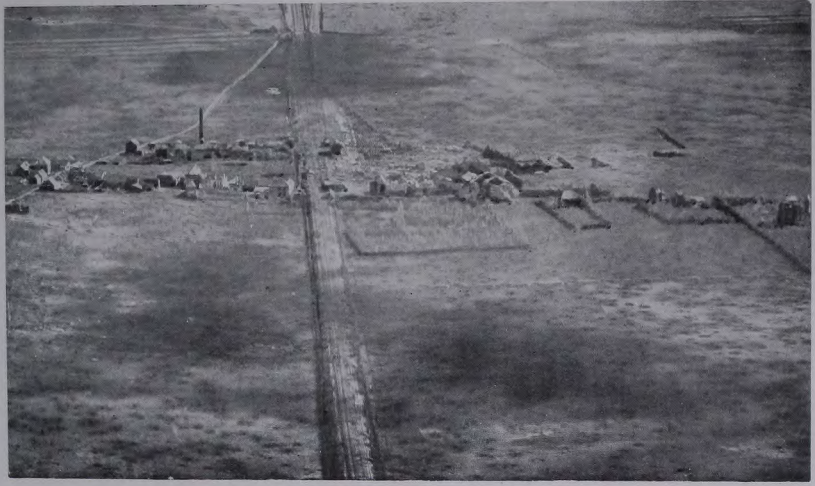
The charge when ready for firing had no less than 45 electric detonators Mark VII. in series on each of the two electric circuits.

None could fortell what such a novel charge would do and on the hour appointed for its explosion quite a crowd of spectators arrived on the scene, including the Corps commander.

They were certainly rewarded for, on the exploder handle being shoved home, a huge column of smoke and debris rose high in the air and slowly drifted leeward—it was reported that troops four miles away "stood to" for a gas attack—leaving a smoking seventy foot crater.

To produce this effect every single shell must have detonated with its maximum explosive force. Some day an enterprising Frenchman will develop a very payable copper mine there from the nose caps and driving bands of the shells.

Subsequently the Company put in a special gallery at Wanquetin to similarly dispose of some 60,000 shell remaining from the terrible dump explosion there.



THE CHEMICAL WORKS, ROEUX. JANUARY 1917.
Of evil memory."

efficient carriers and their queer ways afforded the Tunnellers lots of amusement.

No. 2 section completed its month at this work and No. 4 section that followed had put in a couple of weeks when it was suddenly ordered to Metz, a village just behind the front line some ten miles to the east of Bapaume.

The section's strength was then four officers and 99 other ranks and its job was to construct dugouts at Trescault and Beaucamp, two ruined villages in the line, in preparation for the big push for Cambrai.

It was a supremely rush job for it was then the 8th November and the attack was timed for the 20th, a tribute to the reputation of the New Zealanders for fast work that we were selected for the job.

The section had a most uncomfortable time, practically no shelter was available from the continuous misty rain, and no material could be obtained to make the living quarters more habitable.

It took well over an hour's struggle through the mud to reach the work and no fatigues were provided, so that we had to do our own labour of carrying timber and removing the filled sandbags.

The sudden concentration of troops seemed to have put the supply arrangements out of gear so that rations were very short and the Tunnellers

laid down in their damp cellars wet and hungry after the shifts work. But the jobs were finished well in time, every man working to the utmost.

This part of the line had been "a quiet sector" and was quite a new experience of trench warfare after the always lively Arras front.

No-man's land was almost a mile wide and one could wander along the front line trench for hundreds of yards without meeting a living soul.

On most days not half a dozen shells could be heard coming over in the twenty-four hours.

This unnatural quietude had an ominous feeling when one knew of the infantry, guns and tanks piling up in the fog just behind, ready to loose the roar of a great battle.

By the 16th November all the dugouts were finished and handed over, good jobs well and quickly done. Orders were received for half the section to join the 142nd Army troops company Royal Engineers for work on bridge building, the other half section being attached to the 146th A.T. Company Royal Engineers to assist on water supply during the advance.

The 142nd Company was detailed to construct a bridge strong enough to carry tanks weighing 35 tons across the Canal du Nord where it intersected the main Bapaume-Cambrai road, the steel bridge previously existing having been blown up by the enemy.

Had the attack been successful in rolling back the Hindenburg line to Cambrai this bridge would have been of supreme importance, as the Bapaume-Cambrai road would have been the main avenue for transport of reinforcements and supplies for the advancing armies. However, the battle, which opened most auspiciously in the greatest surprise of the war, very soon steadied down as the exhausted troops dug in to resist the desperate counter attacks of the enemy reserves. It was the story of the battle of Arras over again—a splendid initial success wasted because of insufficient troops to follow it up.

Again a few devoted divisions fought their way forward in the mud and bitter cold till human endurance reached its limit and all they could do was to hang on grimly to what they had gained. At the battle of Cambrai the nett result was the possession of a few square miles of precarious salient pushed into the enemy lines at the expense of thousands of the flower of the British army.

The main attack was to the south of the Cambrai road, a swinging movement northward being planned to capture the road and the dominating Bourlon Wood heights to the north of it.

This far the plan worked, but no farther and the enemy, instead of withdrawing his whole line

northward, hung on in a line roughly parallel to the road and at the bridge site a little more than a thousand yards to the north of it.

The road which ran on an embankment across the low ground traversed by the canal was thus under direct machine gun fire and impossible for traffic. However, as soon as the actual bridge site was clear of the enemy, work was commenced on its erection and in two nights' strenuous work in wind and rain under almost continuous machine gun fire the bridge was finished and ready for any load from tanks downward.

Mercifully the enemy did not shell the bridge during its erection and the Tunnellers got through without a casualty, the Royal Engineers with whom we were working were not so lucky, having several killed and wounded by machine gun bullets. Hardly had we returned to camp the next day for a much needed rest when word came that the bridge had been shelled and damaged, which meant another weary wet night trip to effect repairs.

On this occasion the company lost as prisoner of war a sapper who missed the party in the darkness, wandered into the German lines and was captured.

Beyond an ambulance or two the bridge was never used for wheeled traffic and a few days later was destroyed by our own engineers to prevent it falling into the enemy's hands.

The bridge work finished, this half section was moved to Trescault for work on a water pipe line. The camp, which consisted of taupaulin shelter on an open hillside, came in for most unwelcome attention from the German artillery during his big counter attacks on the 29th and 30th, having to be temporarily abandoned that night and eventually pitched on the fringe of Havrincourt Wood. Here the remnants of the other half section joined up with it making the section complete again.

This other half section had been prospecting for possible sources of water supply cleaning out wells, etc., in the newly captured territory.

On the night of the 29th its camp suffered a severe gas shell bombardment, killing the gas sentry before he was able to give the alarm. As a consequence both officers and most of the men in camp were badly gassed and became casualties.

Reinforcements were sent down from headquarters to make up strength and for another week or two the section worked in this region, constructing dugouts and sinking wells till much to the relief of all hands it was ordered to rejoin the company at Arras.

During the winter of 1917-18 the more settled conditions of work with regular three days period in rest, gave an opportunity for football that no New Zealander would neglect.

The Company could always produce both a Rugby and a Soccer team well able to uphold the mana of the All Blacks.

The Rugby team never suffered a defeat and won the championship of the region by capturing the IVth Division cup and medals.

It might perhaps be interesting to give the names of the team selected for the final of the cup matches played against the IVth Div. Artillery at Ronville on the 16th March 1918. Spr. Campbell, Cpl. Schmidt, Cpl. Wells, Sprs. O'Callaghan, McNeil, Lowe, Theed, Pilkington, Drvs. Earlly, McDougall, Sgt. Wheeler, Capt. Ronayne, Sprs. Goedicke, Taylor and Hodge.

More surprising perhaps is the success of the Company's Association team which won, among other competitions, the championship of the Tunnelling Companies' league.

At tennis and rifle shooting the Company was equally successful in competition with other units.

The New Zealanders' success in these sports was the more noteworthy in that they were never allowed to interfere with the work. Teams had to be drawn from the small proportion of men who happened to be on rest and from the head-quarters staff, so that the full strength of the unit was rarely available.

Chapter IX.

The War of Movement.

Up to the 21st of March, 1918, the opening day of the long expected German general attack, the Company steadily pursued its job of building dugouts in the line, till life seemed an endless routine of nine days up and three days down, varied only by the scarce chance of leave to England.

Then came the attack and the beginning of the war of movement and the end of the old trench routine, that had been the Tunnellers portion for just two years.

On the 22nd March the sections were withdrawn from the line and that night the whole Company was employed digging a new switch trench near Neuville Vitasse. A day or two later a battalion of the Black Watch held this trench against seven massed German attacks and thus saved Arras as a pivot on which the readjusted line to the south could turn.

Had Arras fallen the results would have been disastrous to the whole situation, but though some ground was yielded and with it the splendid series of dugouts and gun positions constructed by the Company in front of Monchy, Arras held in spite of the tremendous concentration of men and guns that the enemy threw against it.

It was an anxious and exciting time and the Company worked feverishly in digging trenches and preparing defences, on the night of the 28th actually manning some 1600 yards of reserve trench as a last barrier should the front line go.

Arras was heavily shelled from the opening of the attack, our camp being apparently the special objective of a devastating eleven inch high velocity gun. Though all around and among our billets was well dotted with big crump holes, by some miraculous chance not a single Tunneller was hit; other units billetted in the same vicinity suffered severely.

Orders were received to move to a new camp site near Dainville and the Company established itself in taupaulin shelters and tents under the lee of a big railway embankment.

Though always looked on as a very temporary abode this camp was the Company's headquarters for the next three months.

Since leaving Auckland the Company as a whole had always been billeted in hutments, houses or dugouts and cellars and the change to tents in the open fields together with the fresh air life of trench digging worked wonders in raising the general level of health and well being.

It was a pleasant camp in the early summer weather, nestling as it did under the lee of the big railway bank and looking out over cultivated

fields towards Warlus. A remarkably safe one too, for during our tenancy only a couple of shells fell near it and it was never bombed from the air.

From it the working parties were despatched to their various jobs by motor lorry, a pleasant change from the almost invariable long tramp before and after the day's toil in the old life. It was seldom now that the work lay in the actual front line system, a few strenuous nights telephone cable burying from the reserve to the forward positions being the worst.

Chiefly the work consisted of trench digging on the reserve lines, and to help in this the 108th Labour Company was put under the direction of the Company. An elaborate defence line was constructed across the town of Arras, the houses facing the main boulevards being connected up, and then strengthened and loopholed for rifle and machine gun fire, while at strategic points strong block houses were constructed.

In the event of the enemy breaking the front line the Company had orders to man these defences and hold them to the last—orders that fortunately had never to be carried out.

One Lewis gun had been issued to the Company and two additional ones were salvaged together with unlimited ammunition and a fair proportion of the men trained in their use.

A 25 yard rifle range was constructed in the camp and regular practice and rifle instruction given so that the Company would doubtless have put up a good fight had the occasion arisen.

Other works undertaken were the retimbering of the old cave system, unused since the battle of Arras, and the demolition and salvage of scores of hutments and other army buildings now too close to the lines to be tenable.

Charges of explosive were placed in most of the bridges and under important cross roads in the area ready for demolition in case of a further German advance, a contingency that seemed very much in the minds of the General Staff at the time.

Shortly after the beginning of this period the following letter was received from the Guards Division, with which the Company had worked for many months in the section north of Scarpe River.

"To O.C. N.Z. Tunnelling Corps.

"The G.O.C. Guards Division wishes me to express to you his appreciation of the excellent work done by the Company under your command while working in the section held by the Guards Division.

(Sgd.) M. McIntosh,
Lt.-Col. Gen. Staff Guards Division."

On the 14th July, 1918, orders came to move to Marieux to be attached to the IVth Corps, thus severing the Company's connection with the

XVIIth Corps with which it had worked so long and so happily.

A letter of appreciation received from the Corps commander, General Ferguson, is reproduced herewith, a tribute which the Tunnellers are proud to have earned.

O.C. New Zealand Engineers Tunnelling Company.

I wish to thank you and all Officers and men under your command for all the good work which has been done during the time that the Company has been attached to the XVII th Corps - We all appreciate very much the energy, good spirit, and devotion to duty which has characterized the work of the Company on all occasions -

I regret very much that our association has come to an end, and I wish all ranks good luck and success in the future -

Charles Ferguson
Lt. General

14/7/1918 Comm. XVII Corps

Marieux proved to be a real haven of rest. The work was to construct dugouts on the so-called "G.H.Q. line" a reserve system of trenches miles behind the fighting line.

For "fatigues" to carry the spoil Chinese and Russian Jew labour companies were supplied, the

former splendid workers, but the less said about the latter the better.

Here for the first time the Company came in contact with the New Zealand Division, whose rest camps were at Marieux and its vicinity, and to the Tunnellers it was real joy to be among our own mates again and to share in the luxuries of Y.M.C.A. huts and concert parties with which the Division was so well supplied. It is a pity that we could not have been with the Division in the years of trench warfare, but the fates ordered otherwise and perhaps we helped New Zealand by bearing her name without tarnish among the many British regiments that came and went on the Arras front.

For a month the Company stayed in its snug camp in Marieux wood, working six days only in the week and untroubled by the enemy; it built some beautiful dugouts whose only use will be as a show sight for tourists.

By the 21st August the beginning of the end had come and half the Company moved up to Hebuterne to construct a sleeper road from there to Rossignol Wood, just newly captured by the New Zealand Division.

The first night's camp at Hebuterne was rather lively as the Germans shelled the village heavily, but as usual the Tunnellers had the luck of it and suffered no hurt beyond a broken night's rest.

Afterwards the rest of the Company came up and headquarters were located at Bucquoy, a much battered village that had once been in no man's land. From this centre the Company worked on the various jobs assigned to it, road-making, well sinking and installing pumping plants and pipe lines, and constructing advanced Army headquarters at Ligny Thilloy.

For some little time reinforcements had ceased to arrive so that the Company's strength gradually dwindled and on the 3rd September it was posted to the lower establishment.

At this time the total ration strength was nine officers and 363 other ranks, but several officers were away on duty with other units—two with light railway companies and others acting as technical advisers to army troops.

A hint was received about this time that the Company might, in the event of the advance continuing, be used for bridging work and an officer and several N.C.O.'s were sent to the army bridging park at Rosel to glean all the information available there on the erection of army standard bridges. Though Rosel was not a bridging school, the detachment from the Company gained very valuable experience, thanks to the courtesy of the R.E. in charge, chiefly by experimenting in the putting together and dismantling of the different types of bridges in stock at the park.

While so engaged, the park happened to be visited by General Little, chief engineer Third Army, who apperaed keenly interested in the New Zealanders doings and it was probably due to this fact that the Company was selected to construct the big Havrincourt bridge.

Otherwise it is hard to see for what reason the New Zealand Tunnelling Company was chosen for this, perhaps the most difficult bridging work of the whole war. So far as its army experience had gone the Company had absolutely no bridging training nor had any member of it been given the benefit of a course of instruction at the army bridging schools.

Officially we were Tunnellers and nothing else, whereas Royal Engineer units such as Army Troops companies possessed full equipment and training for bridge building.

On the 23rd September definite orders were received to prepare for the erection of the Havrincourt bridge, work to commence on the opening of the attack four days later. Company headquarters was removed from Bucquoy to a site on the Bapaume-Cambrai road handy to the facilities (of the Bapaume Royal Engineer park) for unloading from the railway trucks the bridging material and reloading on to motor lorries for delivery at the bridge site.

THE HAVRINCOURT BRIDGE.
View from canal floor.

The type of bridge to be erected was the 120ft. span steel "Hopkins," designed to carry maximum army loads, 35 ton tanks, across a clear span between supports of 120 feet.

It was a new type of bridge designed by Captain Hopkins, O.B.E., an engineer attached to G.H.Q., and its principal advantage from a military point of view was that no individual part in its construction weighed more than half a ton, so the whole could be conveyed forward for erection by the lightest form of horse or motor transport.

On only two previous occasions had an erection of this type of bridge been attempted under actual service conditions, and on one of these at least the attempt had ended in failure and disaster.

These attempts had been made to bridge a gap not greater than that for which the bridge had been designed, 120 feet, but the task set the Tunnellers was infinitely complicated by the fact that the gap to be covered was no less than 180 feet.

The site was the crossing of the Canal Du Nord by the Hermies-Havrincourt road, the canal at this point passing through a cutting 100 feet deep and with a distance of 180 feet between the tops of the smooth brick walled sides. From an engineering point of view the task set Captain Holmes, who was acting O.C. Company in the absence of Major Vickerman on leave, verged on the impossible.

With barely three clear days to organize and plan an undertaking that in civil life would have entailed months of preparation, under the congested and hampering conditions of an imminent big push, with an untrained force of workmen, and with practically no engineering equipment, he was confronted by an engineering problem bristling with unknown factors on the rapid and successful solution of which perhaps depended the success of the big final advance.

Over seventy lorry loads, each weighing three tons, of bridge material had to be carefully unloaded from the railway trucks and stacked in the correct sequence down to the smallest bolt, so that the conveying lorries would deliver each piece in the exact order of its place in the erection.

The army system was to stock a bridge as a complete unit down to the very tools needed in erection, the whole acturately cut and prepared to fit together, so that the loss or damage of the most insignificent part could hold the whole work up till a duplicate could be obtained from some distant base.

The Hopkins bridge was stocked only in standard 120 feet units so for 180 feet span to be erected two complete units of a total length of 240 feet were supplied, a fact of extreme value and importance at the subsequent launching.

Up to the morning of the attack the canal banks at the bridge site were practically the British front line so that no preliminary work beyond the taking of measurements could be done. On the 27th September the 1st and 3rd Armies attacked the enemy along the whole line, the beginning of an advance that ended only with the signing of the Armistice on November 11th.

Early on that day the first convoy of 24 lorries loaded with material left Bapaume for the bridge site, but owing to the traffic restrictions and congested state of the few roads did not actually reach it and unload till nearly nine o'clock that evening.

More than once the big convoy, which had to travel along roads in full view of the enemy, came in for unpleasant attention from his artillery and while unloading at the bridge site the shells fell thick and fast, but fortunately nearly all on the opposite bank.

The Tunnellers luck again held for no one was hit and, perhaps more important, no bridging material was damaged. The bulk of the Company moved up the same day and pitched camp among the ruins of Hermies, little over a mile from the job, three officers and 48 other ranks of the 565 Army Troops Company R.E. being also attached to assist and gain experience on the work.

In order to utilize every available minute of daylight the whole force was divided into two reliefs, the first working from dawn to midday, and second carrying on from then till dark.

The plan of work was first to construct on the western bank the skeleton frame work of the bridge and then to pull this across the gap by means of derricks and tackle rigged on the eastern bank, all superfluous weight such as the decking being put in place once the main framework was safely across and bedded on its abutments. Accordingly at 6 a.m. on the 28th work was commenced on the erection of the main girders simultaneously with the preparation of the abutments and anchorages for the winches and derricks.

By 5 p.m. on October 1st the whole structure was completed ready for launching, the two big main girders, each weighing some 35 tons, being joined together and stiffened by just sufficient bracing to keep them steady and in place while moving across the gap.

The structure was jacked and lowered onto the rollers, the timber erection platform removed.

On the eastern bank the two big derricks were in place and the heavy steel ropes stretching through triple blocks connected them to the bridge, the rope falls being led to two heavy geared winches solidly anchored in place. The

HAVRINCOURT BRIDGE. LAUNCHING JUST COMPLETED.

western end of the bridge was connected by tackle to two other well anchored winches whose purpose was to steady the forward movement of the structure over the rollers.

All the tackle and gear supplied were designed for the standard 120 feet bridge and a way had to be found to counterbalance the extra strains from the additional 60 feet this bridge had to span.

Here came in the usefulness of the army system of supplying standard bridges complete, for in this case two 120 feet complete bridges were supplied and by erecting the whole length of 240 feet a counter balancing weight of 60 feet was left on the shore side of the rollers when the bridge was fully across, thus reducing the strain on the tackle to no more than on the standard type.

As an additional precaution some 20 tons of railway iron found in the vicinity was piled on the shore end of the bridge as an extra counter weight.

At daybreak on the 2nd the anxious work of launching commenced and inch by inch the big steel mass weighing 120 tons began to roll out over the gulf.

When thirty feet out the faulty construction of one roller caused a "cripple" in the main lower cord and launching had to stop while the structure was jacked up, the damaged beam taken out, replaced by a similar part taken from the shore end, and the faulty roller replaced.

Launching was resumed till 75 feet out, when further signs of crippling developed, and extra rollers were put in and wedged up to give a larger bearing surface to carry the weight.

Launching then proceeded smoothly till 110 feet of the distance had been traversed when a halt was called to change the tackle.

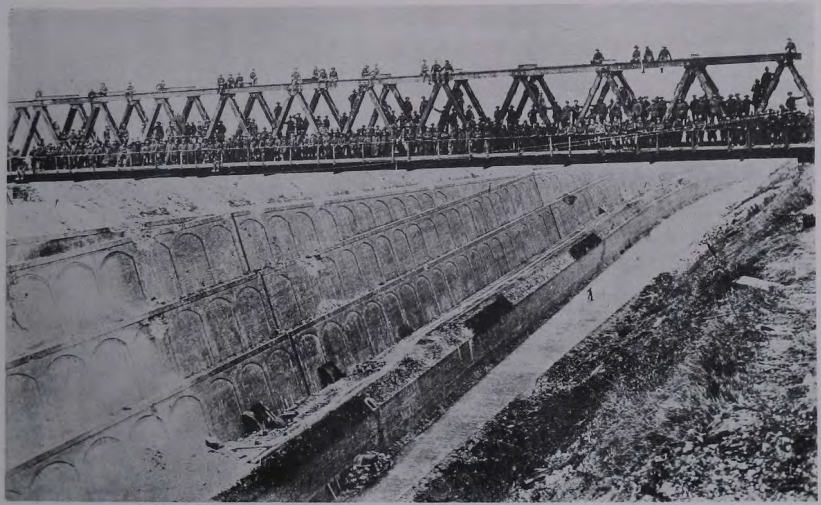
The wire rope supplied was of course not long enough to permit the triple gear stretching across the whole span, but up to this point the strain had been light so that a single block sufficed, but now as the point of maximum strain approached this had to be replaced by the triple blocks.

A job for cool heads this, hanging on to the skeleton iron girders suspended eighty feet above the dry brick canal bottom, in the wet half light of a raw October evening, while wrestling with the heavy blocks and wire ropes of the hoisting gear.

Next morning the launch continued, the whole structure sloping gently forward till, as it neared the eastern bank the bottom of the girders were some twelve feet below the abutment on which they were finally to rest.

Now came the supreme test of the derricks and tackle, for the bridge end had to be lifted bodily over this distance, and any failure would have spelt disaster.

Slowly the bridge rose, as the doubled gangs toiled at the winch handles, till the girders were



THE HAVRINCOURT BRIDGE UNDER FULL LOAD.

within six feet of their destination and then the right winch jammed!

Fortunately there was just room to build up packing on the edge of the bank to support jacks and lift the girders while the tackle was loosed and the winch cleared. No sooner was the strain taken once more than the other winch also jammed and the bridge had to be jacked up again to clear.

This was the last untoward incident, for the final pull landed the girders safely on their waiting bed plates just as darkness fell.

Next day the whole deck beams and decking was completed, a nerve trying job for men whose work had lain more under the earth than eighty feet above it. The surplus length of bridge used for the launching was dismantled and that together with the launching gear stacked for removal to the base.

By the 5th October, the eighth day from its commencement the bridge was finished complete with footways and handrails and opened for traffic.

The working hours had been 104 by a total strength of 14 officers and 310 men. The progress of the work, reputed to be the longest single span bridge erected in military history, aroused great interest in the whole army and among many notable spectators the Company was honoured on two occasions by visits from the Commander-in-Chief,

Brig.-Gen. Harvey, C.R.E. IV. Corps and some of the officers concerned in erection of Havrincourt Bridge.

Field Marshal Sir Douglas Haig. On the second of these visits, Sir Douglas Haig, who was accompanied by Mr. S. Gompers, the American labour representative, remained for some time a keenly interested spectator at a critical time during the launch, and on leaving ordered Captain Holmes to deliver the following message to the Company.

"I wish to convey to one and all of the New Zealand Tunnelling Company my appreciation of the excellent work done by the Company during the erection of the Havrincourt bridge and also of the work done since the unit came to France."

From the Engineer-in-Chief G.H.Q., the following message was received:—

O.C., N.Z. Tunnelling Company,

"Best congratulations to you and whole Company on successful launching of bridge. Excellent work well performed."

From the chief engineer Third Army:

"Congratulate you and your Company on completion of fine bridging feat."

Chapter XI.

The End of the War.

For the next three days the Company was employed in clearing up the bridge site and the erection of big camouflage screens to hide the structure from possible enemy observation.

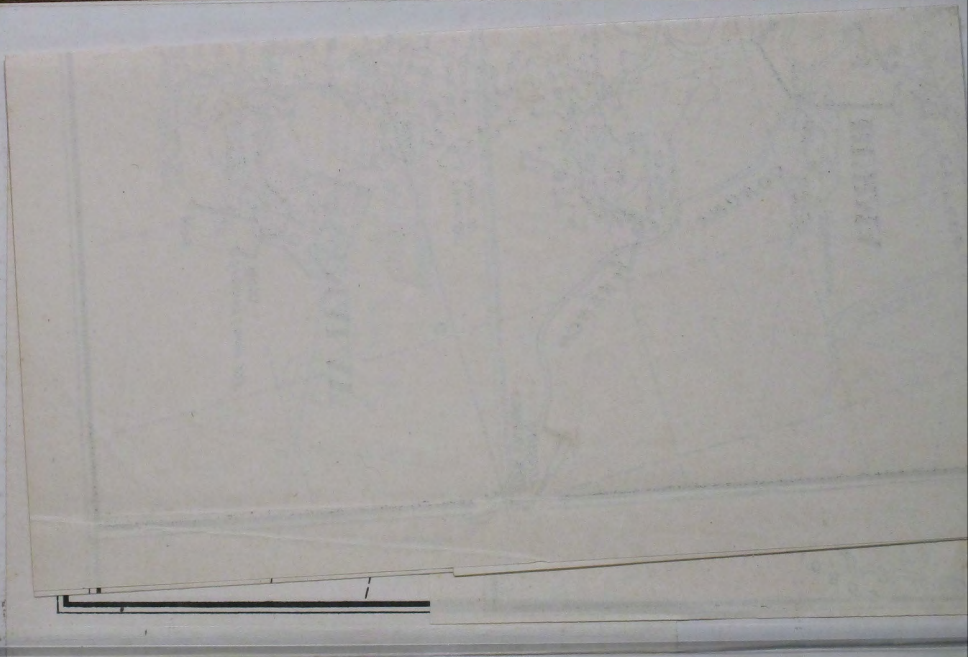
On October 8th orders were received to erect a bridge over the Canal de l'Escaut at Noyelles-Sur-L'Escaut.

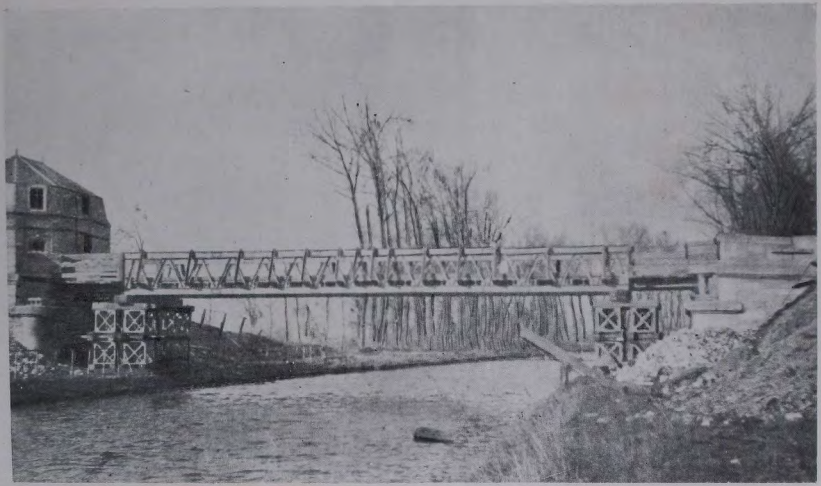
The gap to be bridged was 82 feet 8 inches and it was proposed to use a 60ft. girder span across the central portion, the canal itself, resting on ten feet piers built up on the tow paths and connected with the roadway at each end by 11 feet spans of rolled steel joints.

Early on the 9th the lorry convoy conveying about 100 men and the bridging material left Hermies for Noyelles, but owing to the congested state of the roads did not reach the bridge site till 10.30 a.m.

Work was immediately commenced on erection of the main girders, each being constructed and launched across the gap separately by the same methods as in the previous bridge.

The enemy was still dropping a few shells in the vicinity, but got no direct hits on the Tunnellers or their work.





STEEL GIRDER BRIDGE AT NOVELLES-SUR-L'ESCAUT.

The conditions under which the erection proceeded could not very well have been more adverse.

The narrow cobbled road which had led direct on to the old bridge, destroyed by the retreating enemy, was packed by a continual mass of traffic which turned off at the bridge approach to cross the canal by a temporary wooden bridge some fifty yards higher up.

The only available work room was on the narrow footpath to one side and on this the big girders, some individual sections of which weighed 1 ton 9 cwt., had to be put together and then manoeuvred into position for launching.

A bridge of similar type was being erected a few miles away at Masnieres and had come to grief during the launching, and much of the hoisting gear belonging to our bridge was diverted by the C.E. to help pick up the mess.

Consequently all sorts of make shift contrivances had to be devised with the material available, involving a considerable waste of time.

In spite of all difficulties the bridge was opened for traffic by 6.30 p.m. on the 11th, a total working time of 25 hours, easily a record in speed of construction for a bridge of this type.

About four hours work were necessary the next day to make all work permanently secure and to fix hand rails and approach guards, but all

through the night the bridge had carried a stream of heavy traffic urgently wanted forward.

A section from the Company was sent off to complete the Masnieres bridge, which, though a simpler job and started two days before ours, was still unfinished.

On October 15th the Company moved to Cambrai and occupied billets in empty houses once more, the first since leaving Arras.

It is impossible to imagine anything more unclean and abominable than these houses from which the Hun had evacuated the inhabitants and turned over to the tender mercy of his troops.

It took two days of hard and unpleasant labour to make them habitable, every article of metal had been ruthlessly torn down and sent away and things for which he had no value wantonly destroyed and befouled.

Work was commenced on a large heavy traffic bridge over the Canal d'Escault at Cambrai, 120 feet long by 20 feet wide and completed in about a week, the work being greatly delayed by the difficulty in getting delivery of material.

Another part of the Company's work at Cambrai consisted in searching for "booby traps" and delay action mines left by the enemy.

Not at all a pleasant part of a Tunnellers' work this—several delay action mines were found and successfully "dudded" without accident.

On the 27th October No. 4 Section was ordered forward to Solesmes, then just captured, to build a bridge over the river Selles.

The section reached Solesmes after a muddy arduous march late that night, wet and tired, but started work on the bridge as day-light broke at 6.30 a.m. next morning.

A wooden bridge previously existing at the spot had been demolished by the enemy and the first work was to clear the remains away to make room for the new structure.

The total length from bank to bank was 54 feet and the bridge was to consist of three spans of rolled steel joists resting on two piers to be built in the stream. The C.R.E. IVth Corps in detailing the job estimated the time for completion as three days.

By 7.30 a.m. the old bridge had been completely cleared away, the men working strenuously often waist deep in the icy water.

As there was yet no sign of lorries bringing the material for the new bridge, the piers and abutments were built with timber salved from the old structure, even the spikes and nails being pulled and reused.

When eventually the material arrived all was in readiness for laying the girders and at 5.30 that evening the bridge was opened for traffic, a total working time of ten hours.

The C.R.E. on being informed of the fact sent his heartiest congratulations to all ranks and perhaps to better purpose a double rum ration, very grateful and comforting to wet and weary men.

The next big works undertaken by the Company were the repair of a steel railway bridge over the canal d'Escault and of a ferro concrete road bridge over the railway, both at Cambrai.

These successfully accomplished the Company moved to St. Vaast where in four days it constructed a railway bridge 112 feet long in seven spans resting on wooden trestles.

The enemy in his retreat had made a very thorough job of his demolition, every bridge was destroyed and roads and railways cratered—he had even made unusable every rail by means of a charge exploded at the joints. All the supplies for the rapidly advancing troops had to go forward on the few hastily repaired roads woefully inadequate for the traffic.

Had the enemy made a determined stand at this stage the advance must have halted till the railways were repaired sufficiently to bring up the supplies without which a big fight would be impossible.

In these conditions the annoyance of the Tunnellers was extreme when, on the completion of the St. Vaast bridge they were left unemployed in camp at Solesmes for four whole days. It was

not till November 11th "Armistice day," that work was started on a new job, bridging the river Sambre at Pont-sur-Sambre.

Nothing could be imagined flatter than the reception given to the news, so eagerly longed for through the long years of war, that at last the

BRIDGE AT PONT-SUR-SAMBRE.

enemy had capitulated. There was not the slightest sign of the wild enthusiasm that prevailed in every city in the Empire. Men say that the long term prisoner at last released from goal, steps hesitating and slow into the open world. Perhaps the Tunnellers too, so long held fast in the iron grip of war, found it hard to realise the great news meant that soon they would be no longer cogs in the military machine, but free men back in a world that belonged to the dim past. Or perhaps a deep wonder kept each man silent,

that he should have come to the finish unscathed while so many of his mates lay under the white cross or lingered on as war scarred wrecks.

For a while at any rate life went on just the same, the Tunnellers still worked as if the fate of armies depended on their individual exertions.

The Pont-sur-Sambre bridge, a wet and difficult job, steadily progressed and half the Company moved to Mauberge for the erection of two bridges in that famous old town.

Along the route everywhere the Company was greeted with smiles and offers of refreshment and

STEEL BRIDGE AT MAUBERGE.

Mauberge itself was gay with tricolor bunting and Union Jacks.

Part of the town is built on an island in the river Sambre and, as all the connecting bridges had been very thoroughly blown up by the Germans,

the inhabitants thereof were marooned except for a very temporary bridge made of single planks floated on barrels.

All the roads converging on the town from the eastward were packed with an unending stream of refugees, perhaps the most pitiable sight of the war. Unable to convey their queer vehicles and goods across the river these poor people camped in ever increasing numbers in the sodden fields, waiting patiently till the bridges could be replaced.

WOODEN TRESTLE BRIDGE MAUBERGE.

The Tunnellers started work on the 15th November on the two bridges, one a 76 foot single span steel bridge across the main canalized stream and the other 96 feet in length, a wooden trestle bridge in four spans leading from the island to the outer gate. Both jobs presented considerable difficulties, the former because of the cramped

space for the erection and the latter because of the difficulty in procuring material, which had to be salvaged from abandoned German dumps.

By the evening of the 18th both bridges were finished, to the joy and admiration of the populace, who had taken a great interest in the progress of construction. The old "Maire" in particular expressed on behalf of the town the utmost gratitude and amazement at the rapidity with which the work was accomplished and he proposed to confer some sort of civic honour on the Company, but, alas, next morning early the Tunnellers had to depart, and so never received the official thanks of Mauberge.

Chapter XII.

The Home Coming.

Orders had been received for the whole Company to march to Fayt-le-Franc, a village just over the Belgian border, on transfer to the XXII. Corps Second army.

The Pont Sur Sambre bridge, 100 feet long in five spans, was finished on the 19th and on the 20th both halves of the Company had settled into billets at Fayt-le-Franc and neighbouring villages. It was understood to be merely preparatory to joining up with the N.Z. Division for the march to Cologne, and the Company had instructions to smarten up its appearance and practice its ceremonial drill, in order that it should worthily uphold the dignity of New Zealand in the enemy country.

In the meantime the Tunnellers were far too useful to be left idle and they were immediately put to work, road making, bridge building and in locating and unloading the explosive charges left by the Germans in every bridge, culvert and road crossing through the coal mining districts right up to Mons.

The strength of the Company was then 20 officers and 350 other ranks and it steadily dwindled as members with special claims for

speedy demobilization were despatched to London en route for New Zealand.

A certain amount of drilling was done, but it cannot be said that the Tunnellers, after nearly three years of war in which ceremonial had no part, took to it very keenly now that the war was over.

Road making in the mud of Belgian winter gave few chances either for much polishing of buttons and boots, and soon the Company knew that it would not be numbered among the troops of occupation in Germany.

Towards the end of December the Company moved to the neighbourhood of Mons, undertaking a concrete and steel railway bridge at Lourches and the draining of an inundation caused by the German blowing up some railway viaducts at Spiennes.

On the 28th December all remaining men of the 1914-15 classes were despatched to the base for demobilization, and for another month the remainder of the Company, now reduced to eight officers and 175 other ranks, worked steadily at lowering the flood waters of the Spiennes inundation.

A special order of the day by the Commander-in-Chief, Field Marshal Sir Douglas Haig bestows very high praise on the work of the Tunnellers.

"A large number of men are now being withdrawn from the Tunnelling Companies for

urgent work at home. Before they leave the country I wish to convey to the controllers of mines and to all ranks of Tunnelling companies, both Imperial and overseas, my very keen appreciation of the fine work that has been done by the Tunnelling companies throughout the last four years. At their own special work, mine warfare, they have demonstrated their complete superiority over the Germans, and whether in the patient defensive mining, in the magnificent success at Messines, or in the preparation for the offensives of the Somme, Arras and Ypres, they have shown the highest qualities both as military engineers and as fighting troops. Their work in the very dangerous task of removing enemy traps and delay action charges, on subways, dugouts, bridging, roads and the variety of other services on which they have been engaged has been on a level with their work in the mines.

They have earned the thanks of the whole army for their contribution to the defeat of the enemy.

Their fighting spirit and technical efficiency has enchanced the reputation of the whole corps of Royal Engineers, and of the engineers of the overseas forces. I should like to include in the appreciation the work done by the army mine schools and by the Australian Electric and Mechanical Mining and Boring Company."

At last on the 22nd January, 1919, all stores and equipments were handed over and the unit entrained at Mons for Le Havre.

As a sample of what a journey in a troop train meant in France, the itinerary of this worst and fortunately last one taken by the Tunnellers is worthy of record.

The Company entrained at Mons at 5 p.m. on January 22nd in goods trucks, covered certainly, but quite empty except for the dirt and litter left by previous occupants, absolutely devoid of seats or any method of heating, but plentifully supplied with holes in the floor and sides through which the Arctic wind of January in France had free access.

Twenty men or more were crammed into each truck, the packed mass of human bodies, if it did not make for comfort, at any rate kept the general temperature above freezing point.

The train left Mons at 6 p.m. reaching Raismes at midnight. Here the men detrained and were accommodated in a schoolroom. A supply of hot water was obtained and tea made, the first meal since noon.

At 4 a.m. the Company entrained once more, stumbling into the trucks allotted to them, in the bitter dark. All that day, the 23rd and till 5 p.m. the next, the 24th the train crawled along, through Douai, Arras of the many memories,

St. Pol and finally Etaples. Most of the time it snowed and all of the time it was bitterly cold, the men lay huddled in those horrible trucks and for food had their rations of cold bully beef and biscuits with never a hot drink to help it down.

At Etaples the Company detrained and marched to No. 4 reception camp where a much needed hot meal was provided and tents allotted for the night.

A very short night, for 2 a.m. the next morning "Reveille" once more and by 3 a.m. all were again in trucks bound for Le Havre.

All that day "the 25th," the weary journey continued through Abbeville and Rouen till finally at 2 a.m. on the 26th the Company detrained at Le Havre and marched to No. 2 rest camp, a well merited name, for a hot meal and good sleeping quarters were speedily forthcoming.

On the 29th the Company embarked aboard s.s. *Lydia*, arriving at Weymouth next morning, and thence by train to camp at the New Zealand Depot at Larkhill on Salisbury Plains.

The following extract from a valedictary letter received at this time by Major Vickerman from the Controller of Mines is worthy of publication, as showing the estimate in which the Company was held by its technical chiefs.

"I went to Fayt-le-Franc with the Chief Engineer who was anxious to see and thank your

Company for the splendid work you have always done out here, which has not only enchanced the reputation of the Tunnelling service, but also that of the engineers in general. I am very sorry on my own account that we missed seeing you before you left, because I have very much personally to thank you all for in the way you have administered your Company, and carried out every task so that the controller of mines never had any worry or fear that things were not going exactly as they should. Colonel Stokes always felt in the same way as this in regards to your Company, therefore I thank you on his account as well as my own. I hope you will all have a good trip and a happy home coming."

It was not till the 14th March that the Company as a unit under the command of Captain Daldy, M.C., embarked on s.s. *Ionic* for the final journey. All ranks had a fortnight's leave to bid farewell to the many friends they had made in the United Kingdom.

A pleasant uneventful voyage *via* the Panama Canal ended when the s.s. *Ionic* dropped anchor in Auckland Harbour at 9 p.m. on April 23rd, 1919, and next day the New Zealand Tunnelling Company had ceased to exist.

* * * * *

A fortunate Company, fortunate in its undertakings and fortunate in that its duty lay rather in conserving life than taking it, but above all

fortunate in those splendid men who, knit together by the bonds of common service and real brotherhood, made the Company what it was.

Scattered as they now are, in mine, railway and the bush, wherever life is roughest and work hardest and most dangerous, the spirit of the Company lives on in them, that spirit which counted self as nothing while the job and the honour of the Company were all in all.

ENGINEERS TUNNELLING COMPANY.

MAIN BODY

Left December 18th, 1915, on H.M.F.T. "Ruapehu."

4/1325	Major Duigan, J. E.	4/1228	Lieut. Watkinson, H.
4/1218	Captain Vickerman, H.	4/1284	Sergeant Jones, T. R.
4/1232	C.S.M. McKee, J.	4/1276	Corporal Hill, C. R.
4/1694	Q.M.S. Rainbow, T. V.	4/1249	2nd Corpl. Clifford, F. H.
4/1321	Sergeant Wheeler, C. C.	4/1318	Lance-Corpl. Valentine, A.
4/1297	Lance-Corpl. McAffer, J.	4/1253	Sapper Colledge, J. E.
4/1241	Sapper Brown, A.	4/1258	Sapper Davies, J.
4/1287	Sapper Lamb, E. T.	4/1260	Sapper Evans, W.
4/1502	Sapper Dickson, C.	4/1263	Sapper Fisher, M.
4/1234	Sapper Jones, M. J.	4/1265	Sapper Green, F.
4/1373	Sapper McGregor, P. E.	4/1273	Sapper Hearn, T. J.
4/1311	Sapper Reardon, E.	4/1268	Sapper Henrickson, P.
4/1477	Sapper Theed, A. M.	4/1271	Sapper Henrickson, C.
4/1676	Sapper Gardiner, J. D.	4/1355	Sapper Henrickson, H.
4/1592	Sapper Tasker, R. E.	4/1272	Sapper Horsfall, S.
4/1219	Captain Campbell, L. B.	4/1292	Sapper Lockhart, R. M.
4/1278	Sergeant Jackson, R. H.	4/1296	Sapper Middleton, W. D.
4/1240	Sapper Butler, M.	4/1308	Sapper Pratt, W.
4/1257	Sapper Drew, A. S.	4/1313	Sapper Spence, R. H.
4/1269	Sapper Hessey, G. E.	4/1316	Sapper Tilsley, W. D.
4/1282	Sapper Johnston, A. J.	4/1231	Lieut. King, G. W.
4/1280	Sapper Jones, P.	4/1293	Sergeant Leeds, A. T.
4/1314	Sapper Tabb, J. D.	4/1306	Corporal Pink, C. W.
4/1315	Sapper Tomlinson, D. B.	4/1210	2nd Corporal Ryan, J.
4/1246	Sergeant Clarke, J.	4/1264	Lance-Cpl. Graydon, G. P.
4/1245	Corporal Coventry, H.	4/1243	Sapper Cotterell, W. L.
4/1259	2nd Corporal Edwards, T.	4/1251	Sapper Cossey, O. C.
4/1312	2nd Corpl. Spraggon, E.	4/1267	Sapper Graham, T.
4/1254	Sapper Clare, E.	4/1620	Sapper Hoffmann, D.
4/1250	Sapper Collins, T.	4/1285	Sapper Kelsey, W. H.
4/1262	Sapper Flinn, F. W. H. S.	4/1294	Sapper Mitchell, S.
4/1274	Sapper Howard, H. J.	4/1644	Sapper Russell, K.
4/1277	Sapper Irvine, W.	4/1317	Sapper Taylor, W.
4/1286	Sapper King, T. H. C.	4/1248	Sapper Cahill, W. H.
4/1295	Sapper Morton, A.	4/1255	Sapper Denniston, F.
4/1298	Sapper McClair, M.	4/1290	Sapper Leith, J. C.
4/1300	Sapper McDonald, H.	4/1304	Sapper Noonan, H.
4/1301	Sapper McQuillan, E.	4/1322	Sapper Weeks, G. W.
4/1303	Sapper Neilson, A.	4/1390	Sergeant Slyfield, R. G.
4/1582	Sapper Perry, J.	4/1349	Sapper Fox, J. M.
4/1580	Sapper Prentice, J.	4/1370	Sapper McDonald, J. W.
4/1319	Sapper Wadsworth, E.	4/1391	Sapper Smith, T.
4/1320	Sapper Williamson, J.	4/1647	Sapper Worth, E. W.
4/1599	Sapper Wood, A. J.	4/1345	Corporal Evans, P.

MAIN BODY—*Continued.*

4/1323 Sapper Ainsley, W.
4/1333 Sapper Capper, H.
4/1340 Sapper Dargan, S.
4/1353 Sapper Harris, G. A.
4/1362 Sapper Mannix, W. M.
4/1368 Sapper McClare, J.
4/1372 Sapper McGuinn, J. F.
4/1387 Sapper Rickard, E.
4/1363 Sapper Marr, A.
4/1397 Sergeant Williams, G. P.
4/1695 2nd Cpl. Poppleton, G. P.
4/1331 Sapper Brook, W.
4/1346 Sapper Farrell, F.
4/1350 Sapper Fry, A. R.
4/1358 Sapper Jones, R. J.
4/1367 Sapper Murray, W. A.
4/1374 Sapper McIntyre, J. E. M. E.
4/1382 Sapper Perry, D.
4/1229 Lieut. Wigley, A. J.
4/1384 Lce.-Cpl. Powneeby, C. S.
4/1332 Sapper Broadhurst, W. P.
4/1335 Sapper Chilvers, H.
4/1343 Sapper Doyle, J.
4/1351 Sapper Groves, T. J. A.
4/1360 Sapper Lloyd, C. G.
4/1375 Sapper McKenzie, M. S.
4/1386 Sapper Race, G.
4/1392 Sapper Trenberth, G. F.
4/1394 Sapper Wells, C.
4/1224 Lieut. Holmes, J. D.
4/1416 Sapper Crump, W. A.
4/1421 Sapper Ensor, W. H.
4/1460 Sapper O'Brien, F. J.
4/1479 Sapper Vallelly, F. C.
4/1436 Corporal Jones, F. C.
4/1431 Lance-Cpl. Hargreaves, C.
4/1415 Sapper Corrin, H.
4/1418 Sapper Drake, L.
4/1439 Sapper Killen, H. P.
4/1442 Sapper Laycock, H.
4/1465 Sapper Read, J.
4/1473 Sapper Stewart, T.
4/1648 Sapper Tonge, J. R.
4/1486 Sapper Williams, J.
4/1402 Corporal Brown, H.
4/1463 Lance-Corpl. Perry, C.
4/1404 Sapper Boyes, W. E.
4/1408 Sapper Brownell, T. L.
4/1425 Sapper Finch, S.
4/1445 Sapper Little, F.
4/1449 Sapper Meder, G. H.
4/1244 Sapper Coldicutt, W.
4/1609 Sapper Crocker, E. J.
4/1266 Sapper Goodsell, G.
4/1270 Sapper Hanratty, J. J.
4/1279 Sapper Jackson, H.
4/1291 Sapper Lyttelton, J. J.
4/1305 Sapper Newman, R.
4/1637 Sapper Taylor, J.
4/1242 Sapper Bates, G. H.
4/1256 Sapper De Grey, J. E.
4/1289 Sapper Leahy, R.
4/1682 Sapper Lynch, J.
4/1307 Sapper Pink, H. H.
4/1220 Captain Waters, D. B.
4/1326 Sapper Barker, W. H.
4/1357 Sapper Jones, C.
4/1381 Sapper Parker, W. J.
4/1395 Sapper Wilson, C. D.
4/1324 Sergt. Alexander, W. E.
4/1318 2nd Corpl. Needham, H.
4/1328 Sapper Behrent, H. F.
4/1334 Sapper Carney, E.
4/1347 Sapper Finlay, J. L.
4/1354 Sapper Hawthorn, A.
4/1365 Sapper Mockford, H.
4/1371 Sapper McDonald, D.
4/1383 Sapper Power, T.
4/1398 Sapper Worth, W. H.
4/1222 Lieut. Daldy, R. H.
4/1543 Corporal Rooney, R. R.
4/1337 2nd Corporal Colhoun, R.
4/1341 Sapper Dare, H. J.
4/1348 Sapper Fitzgibbons, J.
4/1352 Sapper Hancock, G.
4/1359 Sapper Lennane, W.
4/1369 Sapper McClymont, F. G.
4/1376 Sapper McLean, K. B.
4/1389 Sapper Shekelton, C.
4/1364 Sergeant Meyer, H. E.
4/1330 Sapper Brady, D.
4/1336 Sapper Clark, J.
4/1645 Sapper Davis, G. E.
4/1344 Sapper Edwards, W.
4/1288 Sapper Lloyd, E. J.

MAIN BODY—*Continued.*

4/1366 Sapper Murdock, A.
4/1385 Sapper Punch, G. B.
4/1388 Sapper Sarich, A. E.
4/1393 Sapper Treston, P.
4/1396 Sapper Williams, G.
4/1407 Sapper Brooks, T. E.
4/1417 Sapper Dunshea, W.
4/1447 Sapper Martin, M.
4/1472 Sapper Stewart, M. A. W.
4/1462 Sergeant Pope, H. C.
4/1422 2nd Cpl. Fergusson, E. J.
4/1412 Sapper Champ, D.
4/1419 Sapper Drake, T. F.
4/1438 Sapper Keig, E.
4/1440 Sapper Killen, W. J.
4/1446 Sapper Le Compte, D.
4/1467 Sapper Schmidt, A. A.
4/1476 Sapper Tippett, R. J.
4/1480 Sapper Vaughan, F. C.
4/1450 Sergeant Murphy, J.
4/1482 2nd Corpl. Walsh, T. P.
4/1401 Sapper Ashford, T.
4/1405 Sapper Brady, M.
4/1423 Sapper Fahey, B.
4/1441 Sapper Kirkby, D. J.
4/1448 Sapper Meder, D.
4/1459 Sapper Olsen, —
4/1466 Sapper Russell, R. McI.
4/1478 Sapper Tuck, J.
4/1487 Sap. Williamson, G. McG.
4/1226 Lieut. Ronayne, R. H. P.
4/1586 Sergeant Roberts, M.
4/1400 2nd Corporal Allison, J.
4/1452 Sapper Barclay-McIntyre, G.
4/1413 Sapper Champ, E. J.
4/1469 Sapper George, H.
4/1427 Sapper George, S.
4/1433 Sapper Hodgetts, J. E.
4/1461 Sapper Porter, J.
4/1468 Sapper Sutton, W. J.
4/1481 Sapper Walter, J.
4/1649 Sapper Young, A.
4/1432 Sapper Hartland, E. W.
4/1455 Sapper McLeod, A. M.
4/1534 Sergeant O'Brien, D. Q.
4/1531 Sapper McClelland, A. C.
4/1537 Sapper Perry, W.
4/1542 Sapper Robson, J.
4/1551 Sapper Tulloch, A.
4/1541 Sergt. Richardson, E.
4/1499 Lance-Cpl. Cornwall, H.
4/1493 Sapper Blackburn, J.
4/1496 Sapper Clode, S. M.
4/1519 Sapper Ker, J. B.
4/1521 Sapper Meade, E. H.
4/1524 Sapper Morris, H.
4/1530 Sapper McManus, J. E.
4/1540 Sapper Renment, W. J.
4/1556 Sapper Waters, H.
4/1560 Sapper Wilson, W. A.
4/1516 Sergenat Leeden, A. G.
4/1528 2nd Corporal McGhee, W.
4/1497 Sapper Cameron, C.
4/1498 Sapper Cooper, J.
4/1501 Sapper Duxbury, J.
4/1513 Sapper Kelly, D. O'K.
4/1512 Sapper Kroesen, B.
4/1520 Sapper Mahoney, J. J.
4/1652 Sapper Radcliffe, B.
4/1547 Sapper Smith, J.
4/1558 Sapper Williamson, J.
4/1553 Sergt. Vernon, S. E. P.
4/1634 Corpl. Rostgard, N. K.
4/1491 Sapper Barnett, E. A.
4/1690 Sapper Calloway, W.
4/1503 Sapper Dunn, H.
4/1505 Sapper Fairweather, G. L.
4/1514 Sapper Kevan, S. W.
4/1523 Sapper Metcalfe, M.
4/1527 Sapper McComb, T.
4/1536 Sapper Pearce, C. H.
4/1653 Sapper Williams, F. J.
4/1457 Lieut. Neill, J. C.
4/1587 Sergeant Stow, D.
4/1613 Sapper Garner, A.
4/1628 Sapper Matthews, P.
4/1640 Sapper Tomsett, T. C.
4/1584 Sapper Ryan, A.
4/1622 Sapper Lomas, C.
4/1666 Sapper Steele, A. C.
4/1575 Sapper O'Loughlin, C.
4/1638 Sapper Tatham, W. R.
4/1574 Sergeant O'Neill, P.
4/1585 2nd Cpl. Rafferty, W. H.
4/1562 Sapper Adams, C.

MAIN BODY—*Continued.*

4/1654 Sapper Blackmore, J. H.
4/1657 Sapper Connolly, J.
4/1471 Sapper Smith, G. H.
4/1485 Sapper White, G. T.
4/1484 Sapper Wilson, A. E.
4/1230 Lieut. May, L.
4/1429 Corporal Hatch, G.
4/1453 Lance-Corpl. McKay, A.
4/1403 Sapper Bolster, W. J.
4/1414 Sapper Compton, G.
4/1426 Sapper George R.
4/1428 Sapper Harrison, W. E.
4/1435 Sapper Hunt, J.
4/1470 Sapper Seymour, G.
4/1475 Sapper Tredinnick, S. G.
4/1483 Sapper Webster, J. E.
4/1410 Sapper Carolan, E.
4/1430 Sapper Hesketh, T.
4/1227 Lieut. Thompson, F. N.
4/1631 Sapper King, A.
4/1535 Sapper Paxton, W.
4/1539 Sapper Richardson, W. J.
4/1550 Sapper Sweatmore, S.
4/1557 Sapper Wedlake, J.
4/1532 2nd Cpl. Newman, A. H.
4/1492 Sapper Baxter, J.
4/1490 Sapper Braddon, R. G.
4/1506 Sapper Forbes, J.
4/1522 Sapper Marsh, H. W.
4/1525 Sapper Mucklow. R.
4/1529 Sapper McKenzie. J. A.
4/1538 Sapper Quigley, A.
4/1549 Sapper Snodgrass, A. C.
4/1559 Sapper Wilson, A. S.
4/1221 Lieut. Collyns, G. S.
4/1546 Corpl. Smith, W. J.
4/1510 Lance-Cpl. Johnstone, J.
4/1691 Sapper Condell, W.
4/1500 Sapper Dingwall, G.
4/1509 Sapper Hudson, T. E.
4/1511 Sapper King, J.
4/1518 Sapper Leitch, J.
4/1526 Sapper McCallum, J.
4/1545 Sapper Sinclair, W.
4/1548 Sapper Smith, J. D
4/1554 Sapper Young, J. N.
4/1225 Lieut. Metcalfe, H. E.
4/1643 Lce.-Cpl. Caldwell, W. D.
4/1489 Sapper Brannigan, J.
4/1494 Sapper Carroll, S. A.
4/1504 Sap. Fairweather, A. M.
4/1507 Sapper Craff, A. H.
4/1515 Sapper Lind, J.
4/1651 Sapper Mitchell, M. J.
4/1533 Sapper Neylon, M.
4/1552 Sapper Thompson, R. M.
4/1544 2nd Cpl. Sinclair, J.
4/1223 Lieut. Durant, W. M.
4/1688 Sapper Avery, W. E.
4/1569 Sapper Leahy, J. N.
4/1578 Sapper Pennell, T.
4/1577 Sapper Poole, B. H.
4/1633 Sapper Parsons, J. L.
4/1687 Sapper Turnbull, J.
4/1696 Sapper Windsor, G. J.
4/1627 Sapper McCormick W. S.
4/1610 Sapper Debenham, W. E.
4/1591 Corporal Stanley, W. J.
4/1598 Lance-Cpl. Wright, J. W.
4/1655 Sapper Barker, J. W.
4/1411 Sapper Calder, J.
4/1563 Sapper Crawford, E. R.
4/1565 Sapper Cullen, J. E.
4/1566 Sapper Fraser, P. S.
4/1567 Sapper Griffiths, A. H.
4/1659 Sapper Hunter, T.
4/1662 Sapper Mack, J.
4/1664 Sapper MacRae, A. H.
4/1600 Sapper Wilkinson, T.
4/1660 Corporal Keane, M.
4/1564 Lance-Corpl. Capill, W. R.
4/1233 Sapper Fenton, A.
4/1570 Sapper Milne, J.
4/1665 Sapper McLaren, D.
4/1573 Sapper Olliver, J. E.
4/1588 Sapper Spencer, J. T.
4/1590 Sapper Sweeney, C.
4/1593 Sapper Thompson, P.
4/1595 Sapper Traue, C.
4/1603 Sergeant Brown, H.
4/1611 2nd Corporal Eaton, S.
4/1601 Sapper Blackwell, A. E.
4/1607 Sapper Challis, H. G.
4/1673 Sapper Foley, D. L.
4/1621 Sapper Hughes, T. G.
4/1625 Sapper McAneny, E. B.

MAIN BODY—*Continued.*

4/1636 Sapper Shea, J.
4/1639 Sapper Tobin, M.
4/1238 Sapper Wood, C. R.
4/1635 Corporal Schenck, A.
4/1619 Lance-Corpl. Higgins, H.
4/1689 Sapper Bartlett, H. H.
4/1672 Sapper Brain, G.
4/1700 Sapper Cunningham, R.
4/1614 Sapper Gilbert, F. A.
4/1235 Sapper Haszard, W. A.
4/1236 Sapper Langius, D.
4/1674 Sapper Lewis, A. H.
4/1629 Sapper Meylor, J.
4/1658 Sapper Farnworth, J.
4/1567 Sapper Griffiths, A. H.
4/1568 Sapper Hartley, T.
4/1661 Sapper Leith, D. A.
4/1663 Sapper Maitland, W.
4/1576 Sapper Ormiston, W.
4/1675 Sergeant White, A. G. E.
4/1561 2nd Corpl. Austin, W. J.
4/1698 Sapper Brown, H. F.
4/1671 Sapper Hutchinson, R. D.
4/1451 Sapper Murphy, T.
4/1572 Sapper Naughton, M. J.
4/1579 Sapper Phillips, N.
4/1589 Sapper Stevens, O.
4/1594 Sapper Tarrant, C. B.
4/1596 Sapper Tierney, T. J.
4/1597 Sapper Vickers, J.
4/1608 Corporal Comber, W. J.
4/1632 Lance-Corpl. Norris, J. R.
4/1606 Sapper Cameron, A.
4/1612 Sapper Faircliff, G.
4/1617 Sapper Harrison, H.
4/1670 Sapper Langridge, S.
4/1626 Sapper McAneny, F. E.
4/1697 Sapper Taylor, T.
4/1641 Sapper Twigger, T.
4/1693 Sergeant Parnell, C.
4/1615 2nd Corpl. Hales, R.T.
4/1261 Sapper Allison, A.
4/1604 Sapper Bostock, H.
4/1602 Sapper Brown, H.
4/1677 Sapper Geach, T.
4/1616 Sapper Harvey, A. R.
4/1679 Sapper James, A.
4/1443 Sapper Leahy, W. F.
4/1624 Sapper Lunn, G.
4/1571 Sapper Morrison, H.

ARMY SERVICE CORPS.

5/890 Corporal Laycock, Ivan
5/897 Driver Pillenger, A. G.
5/891 Driver Mennie, A. H.
5/894 Driver McDougall, A.
5/887 Driver Earlly, E.
5/898 Driver Reed, W. T.
5/900 Corporal Samson, G. T.
5/892 Driver Mitchell, A. D.
5/888 Driver Faurey, D. J.
5/895 Driver Nicholson, A. L.
5/836 Driver Brabant, H. A. B.
5/893 Driver Grainger, R. J.
5/885 Driver Bernasconi, P. V.
5/884 Driver Barnett, B.
5/889 Driver Gerrard, G.
5/882 Driver Allen, H. L
5/883 Driver Allsop, E. J.
5/892 Driver Ridings, W. A.
5/896 Driver Pickering, H. V.

MEDICAL CORPS.

4/1327 Major Gordon, C. H.
3/1655 Lce.-Cpl. Flewellyn, C. J.
3/1656 Lance-Cpl. Davies, F. H.

ARMY PAY CORPS.

21/26 Sergeant Forgie, C. C.

2nd REINFORCEMENTS.

Left 26th June, 1916.

21468	2nd Lt. Barrance, K. McI.	21467	2nd Lt. De Latour, H. A.
21371	Sergt.-Major Fletcher, J.	24501	Q.M. Sergt. Norton, E. R.
21372	Sergeant Beilby, C. S.	24502	Sergeant Clapson, W. L.
21437	Sergeant Hansen, W. F.	21384	Sergeant Priestly, A. S.
21385	Sergeant Stevens, F. A.	21450	Sergeant Thornton, O. G.
21383	Corporal Brown, F. W.	21389	Corporal Dunkley, F. E.
21373	Corporal Stevenson, W.	21397	2nd Corpl. Bowes. W.
21434	2nd Corpl. Cooper, R. S.	21455	2nd Corpl. Simons, A. S.
21458	Sapper Allan, S.	21465	Sapper Beckett, J.
21388	Sapper Bennie, A.	24500	Sapper Brown, W.
21403	Sapper Burne, A. D.	21416	Sapper Burns, J. W.
21469	Sapper Butler, A. E.	21419	Sapper Casebourne, P. T.
21376	Sapper Christiansen, E. D.	21470	Sapper Clarke, J. F.
21433	Sapper Comerford, R.	21386	Sapper Coward, L. J.
24499	Sapper Creasy, A. J.	21404	Sapper Crossley, A. D.
21408	Sapper Daniel, W.	21415	Sapper Dench, J. C.
21431	Sapper Dooley, W. J.	21426	Sapper Driscoll, R.
21432	Sapper Dunne, R. W.	21435	Sapper Finnie, J.
21451	Sapper Gibson, W.	24498	Sapper Goodman, W.
21436	Sapper Gunton. C.	21452	Sapper Hall, J.
21423	Sapper Hammond, E.	21413	Sapper Hares, C. H.
21438	Sapper Harrington, J. C.	21381	Sapper Heron, H.
21453	Sapper Hodge, A.	21449	Sapper Horncastle, C.
21405	Sapper Hutchison, D.	21414	Sapper Hyland, H. T.
21387	Sapper Inglis, A. E.	21391	Sapper Irvine, J.
21399	Sapper Johnstone, A.	21439	Sapper Jones, E. W.
21422	Sapper Kiely, T. J.	21409	Sapper Lepper, DeL. T.
21442	Sapr. Macfarlane, W. H. S.	21378	Sapper McLachlan, W.
21400	Sapper Marshment, P.	21402	Sapper Mart, G.
21440	Sapper Mitchell, R. J.	21427	Sapper Morgan, W. F.
21417	Sapper Moriarty, M.	24496	Sapper Morris, F. E.
21428	Sapper Murray, M.	21392	Sapper Naylor, A. C.
21393	Sapper Nicol, J.	21418	Sapper Ogden, G.
21420	Sapper Parkin, H.	21412	Sapper Paterson, J. R.
21379	Sapper Perrott, H. P.	21454	Sapper Phimester, H. R.
21460	Sapper Pimblett, J. T.	21443	Sapper Pinn, E. W.
21394	Sapper Porteous, J.	21411	Sapper Richmond, E. E.
21466	Sapper Robb, J.	21463	Sapper Russell, J. T.
21446	Sapper Ryan, J. J.	21424	Sapper Samson, J.
21445	Sapper Shannahan, P.	21447	Sapper Sharkey, F.
21448	Sapper Smith, G. R.	21444	Sapper Smylie, T.
21374	Sapper Spivey, A. E.	21421	Sapper Thomasr A.
21461	Sapper Thompson, I	21395	Sapper Townley, R. B.
24497	Sapper Triner, W. C.	21398	Sapper Turner, T. G.
21457	Sapper Warren, W.	21380	Sapper Wells. C. P.
21425	Sapper Williams, G.	21456	Sapper Wilson, W. H.
21462	Sapper Worsley, S.	21406	Sapper Wragge, W.

NEW ZEALAND ARMY SERVICE CORPS. (Attached).

16158 Driver Doyle, P.
16173 Driver Mathews, S.
16182 Driver Thomson, D.
16160 Driver Forbes, D.
13528 Driver Oliver, E. A.

3rd REINFORCEMENTS.

Left 15th November, 1916.

37490 Lieut. Thorne-George, M.
6/667 C.S. Major Lauchlan, J. W.
37458 Sergeant Forcutt, H. F.
30378 Sergeant Gosse, P. H.
37509 Sergeant O'Keefe, J.
37492 Sergeant Waugh, R.
37522 Corporal Mattock, R.
37476 Corporal Zenovich, G. D.
36165 Lance-Cpl. Radford, A. C.
37529 Lance-Cpl. Stuart, C. G. G.
37463 Sapper Allan. J.
36934 Sapper Anderson, H.
35627 Sapper Bailey, R. W.
34319 Sapper Barlow, L. F.
18446 Sapper Barnett, G.
37472 Sapper Best, C. J.
37525 Sapper Bottomley, A. R.
37497 Sapper Carlyon, I. A.
30713 Sapper Chute, T.
37500 Sapper Connolly, E. J.
37517 Sapper Connor, J. E.
1/600 Sapper Cornaga, A. E.
35632 Sapper Crosbie, W. T.
17624 Sapper Dale, R. T. H.
18258 Sapper Davis, C. L.
30686 Sapper Dick. J. R.
37503 Sapper Dowdle, W. P.
37512 Sapper Drane, W.
37514 Sapper Earnshaw, D.
37539 Sapper Ellis, G.
37502 Sapper Emmett, A. L.
37475 Sapper Fearon, I.
37466 Sapper Fulton. W. M.
35605 Sapper Friel, D.
37541 Sapper Glass, W.
35638 Sapper Hames, J.
37504 Sapper Hayes, A.
35369 Sapper Hendry, D.
37465 Sapper Jackson, H.
37469 Sapper Kelly, A. W.
37515 Sapper Kennedy, J.
37470 Sapper Laney, V.
37495 Sapper McIntosh, R.
37494 Sapper McLeod, J.
35644 Sapper Main, J.
37521 Sapper Martin, B.
34476 Sapper Miller, G.
37481 Sapper Morrison, A.
35611 Sapper Mounter, J.
30716 Sapper O'Neill. D.
37468 Sapper Parr, M.
37452 Sapper Petrie, J.
37453 Sapper Porter, D.
35647 Sapper Ralph, T. J.
37457 Sapper Richardson, H.
37459 Sapper Robertson, R. M.
6/714 Sapper Rooney, J. J.
37478 Sapper Ryan, J. W.
37550 Sapper Siever, C. J.
37487 Lieut. Collier, E.
4/1 Q.M. Sergt. Lewis, A. P.
37486 Sergenat Frost, F. L.
37451 Sergeant Jordan, C. H.
37546 Sergeant Slaughter, J. W.
12/1748 Corpl. McWilliam. G.
37544 Corporal Nicholas, J.
37548 Lance-Cpl. Kellar. G. P.
37545 Lance-Cpl. Russell, W.
37460 Lance-Cpl. Walsh, G. R.
37536 Sapper Allan, J. M.
37533 Sapper Andrews, H. J. H.
37498 Sapper Bankier, J. A.
37507 Sapper Barrett, F. J.
37456 Sapper Beck, D. H.
37485 Sapper Bolger, J.
37511 Sapper Cain, E.

3rd REINFORCEMENTS—*Continued.*

37551	Sapper Cassidy, J. G.	37482	Sapper Morrison, D.
37537	Sapper Comerford, M.	37543	Sapper Nelson, H.
37501	Sapper Connolly, J.	37513	Sapper Page, A.
37538	Sapper Cooper, J. F.	37535	Sapper Pennell, H. W.
18257	Sapper Crosbie, J. S.	37480	Sapper Port, R. A.
37488	Sapper Cunliffe, S.	37455	Sapper Price, J. E.
37474	Sapper Davies, E.	37505	Sapper Reilly, W.
37524	Sapper Delaney, J.	37532	Sapper Robertson, D.
34500	Sapper Docherty, F. J.	37489	Sapper Rogers, J. J.
37499	Sapper Downes, A. G.	33201	Sapper Ross, S. C.
37462	Sapper Drysdale, J.	18487	Sapper Sellars, A.
35260	Sapper Eichler, A. E.	18274	Sapper Simpson, R.
37526	Sapper Ellison, W. R.	37477	Sapper Smale, F. E.
37540	Sapper Eves, T. F.	35375	Sapper Smith, D. W.
18262	Sapper Follas, R.	37530	Sapper Stewart, W.
37527	Sapper Fraser, S.	37506	Sapper Tar, H.
37496	Sapper Gerard, W. E. F.	37510	Sapper Tibbott, J.
37528	Sapper Gorman, F.	37516	Sapper Tucker. T.
37519	Sapper Hartley, D.	37467	Sapper Waddell, W.
37531	Sapper Hedge, R. V.	35653	Sapper Webster, J. S.
37518	Sapper Heslin, P.	37467	Sapper Sutton, H.
35640	Sapper Jenkins, D. L.	37552	Sapper Smith, B. G.
37520	Sapper Kenna, J.	37461	Sapper Smyth, M.
37454	Sapper King, R.	6/1729	Sapper Straight, R.
37484	Sapper Loney, J. R.	37547	Sapper Taylor, W.
37483	Sapper McKenzie, N.	37549	Sapper Trevorrow, P.
37542	Sapper McVeigh, J.	37523	Sapper Vercoe, F. A.
35661	Sapper Malone, J.	37534	Sapper Walker, R.
37473	Sapper Martin, W. H.	37491	Sapper Wesley, J.
37508	Sapper Moore, W. H.		

4th REINFORCEMENTS.

Left 16th February, 1917.

37575	Lieut. Tattley, E. W.	37553	Sapper Davies, H. C.
33132	Coy. S.M. Purchas, C. P. G.	37586	Sapper Dunn, H.
32503	Sergeant Bradley, E. F.	37563	Sapper Flanagan, D.
37569	Corporal Jordan, J. M.	37617	Sapper Foley, F.
37556	Corporal Masters, W.	37564	Sapper Freeman, J. J.
37600	Lance-Cpl. Lemon, F.	37616	Sapper Gentlemun, W.
37584	Lance-Cpl. White, E. D.	35659	Sapper Goedicke, A. C.
37612	Sapper Bollington, A.	37583	Sapper Hamilton, R. D.
37573	Sapper Brown, A. E.	37590	Sapper Hannon, M.
37609	Sapper Buckingham, C.	37605	Sapper Harrison, E. S.
37562	Sapper Collins, C. N.	37610	Sapper Hedgman, J.
37593	Sapper Crowe, W. H.	37614	Sapper Hennessey, P.

4th REINFORCEMENTS—*Continued.*

40322 Sapper Hotham, A. D.
37597 Sapper Kirkby, J.
37565 Sapper Laird, W.
37588 Sapper Light, A.
37602 Sapper McNeill, J.
37578 Sapper Marshall, J.
37601 Sapper Merton, F.
37603 Sapper Penrose, J.
37566 Sapper Pitman, J. J.
37611 Sapper Rourke, J.
40249 Sapper Sandwith, S. R.
37557 Sapper Stuart, D. C.
37615 Sapper Tomlinson, F. N.
37604 Sapper Turnbull, T. A.
37585 Sapper Young, J.
37608 Lieut. Shannon, H. G.
33077 Sergeant Annand, B. C.
40936 Corporal Grange, L. I.
33118 Corporal Kitching, V. C.
37567 Corporal Morrison G.
37558 Lance-Corpl. Smith, J.
37596 Sapper Abbott, M. C.
37560 Sapper Bourke, J.
37555 Sapper Brown, J.
37598 Sapper Byrne, J.
37577 Sapper Cronin, J.
37554 Sapper Daly, B. A.
40307 Sapper Dean, W. G.
37618 Sapper Dyer, W. J.
37571 Sapper Foden, T.
37581 Sapper Fearson, W. J.
37570 Sapper Gardiner, R. J.
37582 Sapper Gillan, A.
37580 Sapper Hamill, P.
37559 Sapper Hanton, A.
41085 Sapper Hardwick, M. A.
40561 Sapper Hart, C. L.
40214 Sapper Heenan, R. E.
37579 Sapper Holt, W.
37599 Sapper Jones, E.
37576 Sapper Kneebone, C. W.
37607 Sapper Laloli, L. W.
35643 Sapper Lowe, T. F.
37595 Sapper McVicar, J.
37574 Sapper Mercer, J.
37572 Sapper O'Sullivan, J.
39673 Sapper Petterd, R. H.
37591 Sapper Rogers, J. A.
40643 Sapper Sanderson, J.
37568 Sapper Smith, J. C.
37613 Sapper Sullings, A. W.
37592 Sapper Turk, J. C.
37589 Sapper Williams, W.

5th REINFORCEMENTS.

Left 26th April, 1917

47952 Lieut. Cooper, T.
47279 Coy. S.M. Mosley, J. T.
46223 Sergeant Ball, T. M.
37678 Sergeant Moore, R. F.
37695 Corporal Packwood, R. H.
37684 Corporal Teixeria, W. G.
26/1109 Lance-Cpl. Ford, A. A.
37653 Lance-Cpl. Wilmott, W.
37638 Sapper Adams, J. W.
37640 Sapper Bartlett, J.
37724 Sapper Bowmar, A.
37714 Sapper Broadbent, T.
37693 Sapper Caldwell, T. T.
37645 Sapper Farmes, E.
37698 Sapper Colledge, F.
37672 Sapper Connolly, E.
37661 Sapper Corbett, J.
37717 Sapper Cummack, J.
37674 Sapper Curtis, C.
37703 Sapper Easton, G.
37669 Sapper Evans, H. J.
37697 Sapper Fisher, S.
49704 Sapper Furlong, H. J.
48713 Sapper Green, C. J.
47591 Sapper Guy, W. D.
47593 Sapper Hickey, W.
37656 Sapper Hutchison, G.
37729 Sapper Jones, E. H.
37713 Sapper Kelly, J.
37706 Sapper Kinnear, F. J.

5th REINFORCEMENTS—*Continued.*

37663 Sapper Low, V. T.
37696 Sapper McCoy, R.
49443 Sapper McIntosh, W. G.
37664 Sapper McLean, F. G.
37689 Sapper Matthews, W. B.
37665 Sapper Moir, W. J.
37709 Sapper Monteith, J. C.
49521 Sapper Murdoch, W.
37668 Sapper O'Connor, W.
37619 Sapper Palmer, W.
37712 Sapper Paterson, W.
37652 Sapper Polglase, J.
43082 Sapper Roycroft, J. L.
37723 Sapper Sibelin, J. H.
37655 Sapper Smith, J.
37688 Sapper Struthers, W.
37659 Sapper Thomson, W.
37685 Sapper Wheeler, J. A.
48131 Sapper Wooding, M.
45643 Lieut. Langdon, H.
37637 Coy. Q.M.S. Baker, A.
37673 Sergeant Coulter, W. H.
48503 Corporal Hill, W. J.
28823 Corporal Taylor, W. H.
37670 Corporal Wilson, R. A.
37666 Lance-Cpl. Smith, A.
37639 Sapper Ableson, J. J.
37719 Sapper Barrett, A.
44893 Sapper Berosh, M. G.
37716 Sapper Broadbent, S.
37641 Sapper Burr, C. C.
37671 Sapper Colledge, A. McC.
37699 Sapper Colledge, J. F.
37702 Sapper Cooper, T. H.
37715 Sapper Cranston, A.
37642 Sapper Curran, D.
37675 Sapper Dare, T. G.
37643 Sapper Eccleston, T. J.
47523 Sapper Finnie, T.
37667 Sapper Flynn, A.
43625 Sapper Comm, A. W.
37700 Sapper Graham, W. F. R.
37676 Sapper Hawkins, S. N.
37662 Sapper Hooper, F.
37728 Sapper Johnstone, J. C. S.
37687 Sapper Jones, O. L.
37677 Sapper King, J. E.
37720 Sapper Little, W.
49523 Sapper Lynch, P.
48346 Sapper McGuire, J.
37721 Sapper McIver, S. D.
37681 Sapper McNeil, H.
37649 Sapper Mill, J.
37679 Sapper Molloy, T. J.
37680 Sapper Morris, T. W.
37651 Sapper O'Brien, C. P.
37725 Sapper O'Oonnell, J. J.
37711 Sapper Partington, E.
37705 Sapper Patterson, W. E.
37707 Sapper Rodgers, J. R.
37682 Sapper Russell, G.
49469 Sapper Senior, R. D.
37722 Sapper Staniford, T.
37690 Sapper Symons, W. C.
37704 Sapper Wells, J. F.
37692 Sapper Wilson, J.

6th REINFORCEMENTS.

Left 26th July, 1917.

53843 Lieut. Lawn, N.
48778 Coy. S.M. Campbell, O. N.
60408 Sergeant Meenan, J.
37660 Corporal Cockerell, F.
60432 L.-Cpl. Thompson, A. P. L.
60437 Sapper Bagshaw, A. F.
55366 Sapper Bowker, C. H.
60415 Sapper Callery, P.
55364 Sapper Cargill, T. E.
60439 Sapper Davidson, J.
55371 Sapper Downs, C.
60426 Sapper Feary, G. L.
60412 Sapper Hamlet, F.
60409 Sapper Hayes, G.
60410 Sapper Hinde, J.
60433 Sapper Jenkins, R. H.
60430 Sapper Jones, W. T.
55363 Sapper Meyer, S. V.

6th REINFORCEMENTS—*Continued.*

55374	Sapper O'Callaghan, W. J.	60440	Sapper Dennehy, W. J.
49563	Sapper Phelan, T.	60419	Sapper Durham, C.
55375	Sapper Riley, F.	60400	Sapper Flynn, G.
55377	Sapper Rouse, W. H.	60436	Sapper Harrower, A.
60434	Sapper Smith, T. J.	60435	Sapper Henderson, T.
55372	Sapper Telfer, H. W.	37654	Sapper Hynes, W. F.
55368	Sapper Whitehead, E.	55369	Sapper Jobe, E.
60422	Sapper Jones, A.	60438	Sapper McLaughlin, J.
48809	Lieut. Walmsley, S. H.	19/199	Sapper Neville, C. C.
60407	Sergeant Gordon, H. T.	60414	Sapper Olsen, A. W.
60403	Corporal Cassidy, W. H.	55362	Sapper Rennie, S.
37701	Lance-Cpl. McPhee, C. D.	60417	Sapper Robinson, J.
60420	Sapper Aweock, C. P.	60406	Sapper Smith, A. J.
60418	Sapper Bowden, J.	55373	Sapper Telfer, A. W.
55379	Sapper Callaghan, J. A.	55361	Sapper Wallace, W. A.
60441	Sapper Campbell, J. C.	55376	Sapper Wyatt, F. S. W.
55370	Sapper Chessell, T.		

ATTACHMENTS TO COMPANY FROM OTHER UNITS

4/804	Lieut. McMeeking, G. H.	10662	Sapper Pink, G.
8/3231	Sapper Dare, A. E.	26578	Sapper Drake, F. R.
4/877	Sapper Tucker, J. T. P.	26/983	Sapper Brown, R. M.
29882	Sapper Stevenson, R.	29732	Sapper Callery, E. B.
26/747	Sapper Cain, W. G.	10/2889	Sapper Clare, H.
24/397	Sapper Carruthers, J.	25/615	Sapper Dalton, R. P.
8/2557	Sapper Clark, F. C.	13/2323	Sapper Goddard, C. W.
12155	Sapper Dorsa, B.	24/1391	Sapper Heldt, J. A.
10/3903	Sapper Hedgeman, S.	8/396	Sapper Hibbs, W.
26/269	Sapper Heron, J.	24/490	Sapper Keil, W.
8/127a	Sapper Johnson, C. C.	23/821	Sapper Matheson, G. S.
25/1175	Sapper Lynch, M.	26/716	Sap. Mitford-Burgess, P.
12/3742	Sapper Maule, T.	23/224	Sapper McClure, L.
23/214	Sapper Morgan, F.	26/893	Sapper Pijacum, J.
10/3965	Sapper McRae, M. McL.	29856	Sapper Porthous, C.
10/3979	Sapper Pilkington, B.	26/641	Sapper Tavendale, R. J.
12/224	Sapper Quelch, H.	23/319	Sapper Whitfield, F. J.
23/1858	Sapper Vallett, C. H.	6/2330	Sapper Woods, J.
12/3199	Sapper Wilson, J.	6/1667	Sapper McTague, H.
27321	Corporal McKeich, J. H.	Captain J. F. Richards, R.A.M.C.	
5000	Sapper Gregg, C. G. L.	Lieut. A. Rutherfurd, R.E.	

KILLED IN ACTION OR DIED OF WOUNDS WHILE IN THE FIELD.

37596	Sapper Abbott, M. C.	4/1450	Sergeant Murphy, J.
4/1401	Sapper Ashford, T.	4/1384	Sergeant Pounceby, C. S.
4/1492	Corporal Baxter, J.	18487	Sapper Sellars, A.
4/1645	Sapper Davis, G. E.	4/1553	Sergeant Vernon, S. E. P.
16160	Driver Forbes, D.	4/1392	Sapper Trenberth, J.
4/1284	Sergeant Jones, T. R.	4/1539	Corpl. Richardson, W. J.
4/1511	Sapper King, J.	4/1562	Sapper Adams, C.
4/1369	Sapper McClymont, F. G.	37474	Sapper Davies, E.
4/2111	Sapper McLoughlon, H.	21431	Sapper Dooley, W. I.
4/1449	Lance-Cpl. Meder, G. H.	37462	Sapper Drysdale, J.
21420	Sapper Parkin, A.	4/1344	Sapper Edwards, W.
4/1538	Sapper Quigley, F.	4/1423	Lance-Cpl. Fahey, B.
4/1543	Corporal Rooney, R. H.	37563	Sapper Flanagan, D.
37546	Sapper Slaughter, J. W.	4/1267	Sapper Graham, T.
4/1475	Sapper Tredinnick, S. J.	60438	Sapper McLaughlin, J.
37491	Sapper Wesley, I.	4/1542	Sapper Robson, J.
4/1323	Sapper Ainslie, W.	55628	Sapper Rolls, G. W.
5/884	Corporal Barnett, B.	72912	Sapper Scott, W. H.
37553	Sapper Davies, H. C.	37477	2nd Cpl. Smale, F. E.
4/1223	Lieut. Durant, W. M.	35375	Sapper Smith, D. W.
8/2943	Sapper Healy, F.	4/1638	Sapper Tatham, W. P.
4/1358	Sapper Jones, R. J.	4/1639	Sapper Tobin, M.
4/1526	Sapper McCallum, F.	21398	Sapper Turner, T. G.
4/1665	Sapper McLaren, D.	4/1238	Sapper Wood, C. K.
4/1520	Sapper Mahony, J.	4/1598	Sapper Wright, J. W.
4/1225	Lieut. Metcalfe, H. E.		

WOUNDED.

4/1323	Sapper Ainslie	4/1257	Sapper Drew, A. B.
4/1400	Sapper Allison, J.	21/412	Rifleman Duke, F.
37640	Sapper Bartlett, J.	4/1344	Sapper Edwards
4/1328	Sapper Behrent, H. F.	4/1421	Sapper Ensor, F.
30378	Sapper Bosso, V. H.	4/1347	Sapper Finlay, F. L.
37716	Sapper Broadbent, S.	18750	Sapper Flannagan, T.
4/1331	Sapper Brooke, W.	37667	Sapper Flynn, A.
21383	Sapper Brown, F. W.	37617	Sapper Foley, F. J.
24500	Sapper Bryan	37537	Lance-Cpl. Fraser, S.
4/1643	2nd Cpl. Caldwell, W. D.	37466	Sapper Fulton, W.
4/2557	Sapper Clark, F. C.	4/1507	Sapper Graff, A. H.
4/1253	Sapper Colledge, J.	47591	Sapper Guy, W.
4/1608	Corporal Comber, W. J.	35783	Sapper Hamilton, R. C.
17001	Corporal Crump	4/1616	Sapper Harvey, A. R.
21408	Sapper Daniels, W.	4/1345	Corporal Hawthorn, A.
34500	Sapper Docherty, P. J.	40214	Sapper Heenan, R. E.

WOUNDED—*Continued.*

4/1571 Sapr. Hutchinson, K. D.
4/1278 Lieut. Jackson, R. H.
21430 Sapper Jones, E. E.
4/1631 Sapper King, J.
4/1670 Corporal Langridge, S.
4/1291 Sapper Lyttelton, J. J.
23224 Sapper McClure, L.
4/1452 Sapper McIntyre, B.
4/1432 Lieut. McKee, J.
37595 Sapper McVicar, J.
21443 Sapr. Macfarlane, W. H.
4/1664 Sapper Macrae, A. R.
4/2078 Sapper Matheson, N.
4/1230 Lieut. May, L.
4/1651 Sapper Mitchell, J. N.
4/1451 Sapper Murphy, T.
37544 Sapper Nicholas, F.
4/1632 Corporal Norris, J.
37619 Sapper Palmer, W.
4/1579 Sapper Phillips, N.
12/234 Lance.-Cpl. Quelch
4/1565 Lance-Cpl. Rafferty, F.
4/1539 L.-Cpl. Richardson, F. J.
5/879 Driver Ridings, W. A.
55628 Sapper Rolls, G. W.
4/1310 Sapper Ryan, J.
4/1369 Sapper Sheckleton, C.
4/1544 Corporal Sinclair, J.
21448 Sapper Smith, G. R.
21373 Sapper Stephenson, W.
21458 Sapper Allen, B.
60427 Sapper Bagshaw, A. F.
4/1639 Sapper Bartlett, H. M.
4/1601 Sapper Blackwell, A. E.
4/1565 Sapper Bradford, C. G.
25/592 Rifleman Brooke, T. H.
4/1241 Sapper Brown, A.
27555 Sapper Brown, J.
4/1219 Captain L. B. Campbell
37551 Sapper Cassidy
4/1644 Sapper Codyre, J.
4/1221 Lieut. Collyns, G. S.
4/1457 Sapper Connolly, J.
36545 Private Culshaw
4/1340 Sapper Dargan, S.
37512 Sapper Drane, W.
37462 Sapper Drysdale, J.
4/1611 Corporal Eaton, S.
37539 Sapper Ellis, G.
41658 Sapper Farnworth, J.
4/1263 Sapper Fisher, M.
4/1371 Sapper Fletcher, J.
4/1262 Sapper Flinn, D.
37667 Sapper Forbes, J.
4/1350 Sapper Fry, R.
4/1266 Sapper Goodsell, G.
4/1265 Sapper Green, F.
4/1615 2nd Cpl. Hales, R. T.
37559 Sapper Hanton, A.
4/1431 Sapper Hargreaves, C.
37531 Sapper Hodge, R. V.
21381 Sapper Heron, H.
21414 Sapper Hyland, H. J.
37728 Sapper Johnston, J. C.
4/1265 Sapper Kelsey, H.
37607 Sapper Latoll, S. W.
4/1518 Sapper Leitch, J.
4/1630 Sapper McClair, F.
4/1369 Lance-Cpl. McClymont
4/804 Lieut. McMeking, J. E.
10/3955 Sapper McRea, M.
12/1746 Sapper McWilliams, G.
4/1529 Sapper Mackenzie, J. A.
37556 Sapper Masters, W.
37650 Sapper Matthews, T. B.
4/1523 Sapper Metcalfe, M.
24496 Sapper Morris, F. E.
4/1522 Sergt. Newman, H.
4/1521 Sapper Meade, E. H.
30776 Sapper O'Neill, D.
4/1536 Sapper Pearce, C. N.
21443 Sapper Perrin, E. H.
4/1652 Sapper Radcliffe, B.
4/1465 Sapper Reid, J.
21411 Sapper Richmond, E. E.
21466 Sapper Roble, J.
21463 Sapper Russell, J.
4/1470 Sapper Seymour
18874 Sapper Simpson. R.
37568 Sapper Smith, J. G.
4/1547 Lance-Cpl. Smith, J.
4/1472 Sapr. Stewart, M. A. W.
4/1587 Sergeant Stow, D.
37506 Sapper Tar, H.
4/1593 Sapper Thompson. P
21450 Sapper Thornton, O. G.

WOUNDED—*Continued.*

4/1316	Sapper Tilsley, W. D.	4/1532	Sapper Thompson, R. F.
4/1475	Sapper Tredinnick, S. G.	4/1598	Sapper Tierney, T. J.
37467	Sapper Waddell, W.	4/1648	Corporal Tonge, F. R.
4/1675	Sergeant White, A. B.	4/1318	Sapper Valentine, A.
4/1675	Sergeant Whyte, A. G. F.	4/1556	Sapper Waters, N.
4/1396	Sapper Williams, O.	37584	Sapper White, E. D.
23/1858	Sapper Willett, C. N.	4/1486	Sapper Williams, J.
4/1335	Sapper Wilson, C. D.	4/1320	Sapper Williamson, J.
21406	Sapper Wragge, W.	4/1559	Sapper Wilson, A. S.
4/1554	Sapper Young, J. H.	12/3199	Sapper Wilson, J.
37690	Sapper Symons, W. E.	4/1649	Sapper Young, A.
4/1638	Sapper Tatham, W.		

HONOURS LIST.

D.S.O.

Major Duigan, J. E.
Major Vickerman, H.
Captain Holmes, J. D.
Captain Richards. H. J., N.Z.M.C.

MILITARY CROSS.

Captain Campbell, L. D.
Captain Daldy, R. H.
Lieut. Collyns, G. S.
Lieut. Wigley, A. J.

DISTINGUISHED CONDUCT MEDAL.

Sapper Butler, M.
Sergeant Clifford, F. H.
Sergeant Hatch, G.
Sapper McLean, K. B.
Corporal Neilson, A.
Lance-Corporal Norris, J. R.

MILITARY MEDAL.

Corporal Bernasconi, P. V.
2nd Corporal Bolger, J.
Lance-Corporal McClymont, F. G.
Lance-Corporal Nicolas, J. W.
Sapper Phillips, N.
Corporal Richardson, W. J.
Sapper Seymour, G.
Sapper Williams, W.
Sapper Williamson, J.
Sapper Wilson, N. E.
Sapper Young, J.

MERITORIOUS SERVICE MEDAL.

Sapper Dean, W. G.
Sapper Fisher, M.
Sergeant Newman, A. H.

HONOURS LIST—*Continued.*

MENTIONED IN DESPATCHES.

Major Duigan, J. E.
Major Vickerman, H.
Captain Holmes, J. D.
Captain Richards, H. J.
Lieut. Jackson, R. H.
Lieut. Watkinson, H.
Sergeant Dare, H. J.

BELGIAN CROIX DE GUERRE.

Corporal Stow, D.

MEDALLE BAR ST. CRED, 2nd CLASS.. ROUMANIA.

Sergeant Clifford, F. H.

PARCHMENT CERTIFICATE FOR MERITORIOUS AND EFFICIENT SERVICE.

Sergeant Crump, W. A.
Corporal Bernasconi, P. V.
Sapper Leahy, J. N.
S.-Sergeant Meyer, H. E.
C.Q.M.S. Rainbow, T. V.

PROMOTED TO COMMISSIONED RANK.

32077	Sapper Annand, B. C.	4/1293	Sergeant Leeds, A. T.
38824	Sapper Bartley, F. P.	4/1232	C.S.M. McKee, J.
21372	Sergeant Beilby, C. L.	37508	Sapper Moore, W. H.
48778	Sergeant Campbell, O. N.	4/1534	C.S.M. O'Brien, D. Q.
5/887	Driver Earlly, E.	4/1541	Sergeant Richardson. E.
4/1422	Sergeant Fergusson, E. J.	4/1390	Sergeant Slyfield, R. G.
21/26	Sergeant Forgie. C. C.	4/1312	Sapper Spraggon, E. J.
5/889	Driver, Gerard, C.	21450	Sapper Thornton, O. G.
5/893	Corporal Grainger, R. J.	21395	Sapper Townley, R. B.
4/1378	Sergeant Jackson, R. H.	4/1482	C.S.M. Walsh, T. P.
4/1516	Sergeant Leeden, A. G.	4/1321	Sergeant Wheeler, C. C.

THE NEW ZEALAND
TUNNELLING COMPANY BY J.C. NEILL