

# THE ROYAL ENGINEERS JOURNAL.

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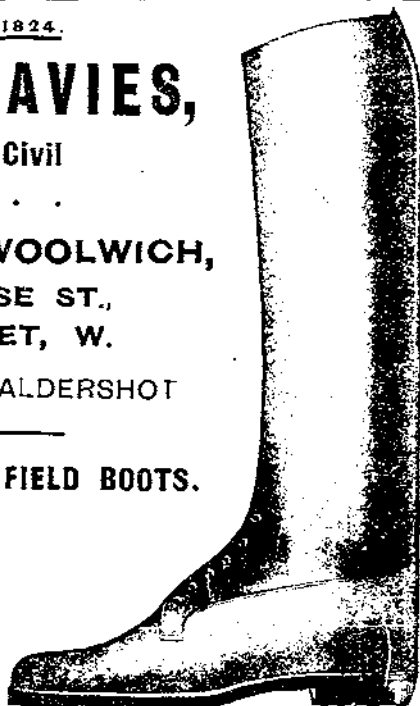
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## SOME NATIONAL ASPECTS OF TRANSPORT.

By the RT. HONBLE. LORD MONTAGU OF BEAULIEU, C.S.I., ETC.

(With the kind permission of the Executive Committee of the British Science Guild).

At the Annual Meeting of the British Science Guild on the 8th June, the Rt. Hon. Lord Montagu of Beaulieu, C.S.I., delivered the following address :—

Sir Isaac Newton once remarked that he felt like a child picking up pebbles on the shore of the great ocean of undiscovered truth. On this occasion I will not claim to be doing more than to be trying to pick up a few grains of sand. So distinguished an audience as this knows how specialized is the study of any great branch of modern science to-day, but I will try to avoid being too technical and lengthy in my remarks.

Automatic movement of any kind indicates life, and the science of movement in its relation to modern transport needs study as careful as the study made for generations past of movement in regard to celestial bodies, air, water, and animals. At the present moment, also, it must not be forgotten that political and social problems are many of them, closely bound up with transport in one or other of its forms. It is also interesting to reflect how analogous is the parallel between the human body and the body politic with regard to transport. Just as weak heart action, stagnation or undue pressure of blood, obstruction or weakness in the walls of the arteries or veins cause trouble in the human body, so *mutatis mutandis* defective systems of transport affect the nation's well being. Good transport facilities as in the human body mean a prosperous national life; while congested or impaired circulation directly or indirectly causes discomfort and disease. Moreover, it is now universally recognized that the civilization and development of a country can be judged almost more accurately from the excellence or otherwise of its transport than by any other test. Well did Rudyard Kipling say in his wonderfully prophetic story *With the Night Mail*, "Transportation is civilization."

I make, therefore, no apology for the subject of my address to you to-day. Indeed, the unprecedented and unsatisfactory state of nearly all our great transport agencies would have justified in any case the selection of this subject as one of special importance. It is a curious fact that for some time past, all over the world, there has been, generally speaking, hardly a single branch of transportation

by land, sea or air, which is paying a commercial return on the capital invested. The railways of this country, for instance, are being subsidized by the State to the extent of about £30,000,000 a year, and our tramway systems, both municipal and private, are almost all in financial difficulties. There is hardly a branch of transportation by land, sea or air which is paying commercially, and the biggest system of all in this country, the L.G.O. Company, of London, is now incurring an actual loss in the working of its services. In the country, as opposed to urban districts, however, the outlook is not quite so gloomy, and some transport companies, especially those who convey heavy goods, are paying their way, with, however, a gradually diminishing margin of profit. Shipping, until lately, has been the most paying branch of industry, but all the great authorities, including Lord Inchcape, now prophesy that difficult times lie ahead, and that owing to the great increase in cost of construction, coal and wages, the profits which have been earned during the last three or four years are not likely to recur. In regard to the air, it is estimated that the present wonderfully regular services between this country and the continent are being carried on at a loss, and ordinary civil aviation is so expensive as to render it difficult for private individuals to indulge in it. We are, therefore, face to face with the fact that if these various kinds of transport services are to continue, either the users of them will have to pay more, or the State, that is either the taxpayer, or the ratepayer, or both, will have to continue subsidies to transport undertakings.

Under these conditions it is natural that there is no building of new railways in this country, and that the making of new roads is not being readily undertaken. But at the same time the congestion on road and rail alike is becoming intensified every month, and so-called transport "facilities," every morning and evening in the larger towns, have resolved themselves into a daily struggle by thousands for a seat in a railway carriage, a tram, or a 'bus. The journey to work and the return home is often almost as exhausting to workers with brain and muscle as the daily work itself.

The solution of most of the problems of modern transport, apart from any political aspects of the case, is not easy. There is the outstanding fact, however, that somebody, either the public or the State, must pay more and pay at once, for the transport services that are being rendered, otherwise collapse is imminent. If the travelling public is to pay, then a considerable increase must take place in fares and freight charges without delay. Such an increase will undoubtedly have serious consequences in regard to trade and to individuals who have chosen their residences or based their commercial or family calculations on the original lower fares whether by road or rail. On the other hand, we can hardly look to the State for permanent help, for the State is already much too heavily bur-



dened, and at the moment cannot borrow at less than 6 per cent. High taxation, and fear of ultimate partial confiscation whether justified or not, has already led to a serious diminution in enterprise, and a decrease in the desire to save, and capital, therefore, for new transport enterprises, will be increasingly difficult and expensive to obtain. The investor, or in other words the person who habitually saves, is either hoarding or leaving his money on deposit at a low rate of interest. The ratepayer also, whether in town or country, is more highly rated than ever before, and rates in some localities, such as in the Potteries district, Hanley, for instance, have reached nearly 20s. in the £1. It is, therefore, difficult to see how more money can be obtained from the ratepayer and the taxpayer who, generally speaking, belong to one and the same class of citizen. It was recently suggested by Sir Henry Thornton, the General Manager of the Great Eastern Railway, that the State should help railways to borrow new capital for improvements. If this principle were adopted, would not tramways, public service by road, and roadways have the same claim as conveyers of the public? The larger non-railway transport companies, equally with railways, carry out services of the greatest value to the community, and if transport facilities are to be subsidized then all concerns carrying out such work must be treated impartially and alike.

On the other side of the balance sheet some economies are possible, and it may be said that the proposed abolition of competition, such as the combination of several railway systems, and the adoption of more scientific methods of handling traffic will save expense. The total amount of the saving, however, will probably be small and counterbalanced largely by the departmental expenses of the Government department set up to carry out control of transport. During the war, when railways were controlled, and very inexpensively and efficiently controlled as a national system, by the Railway Executive Committee, the savings were negligible compared with the rise in expenses, although there was no competition. Even now there is little real competition, most of the arrangements in regard to duplicate trains to the same locality still being in force. Moreover, the railway services in this country are neither so fast, frequent, nor convenient as those of 1914. I am of opinion, therefore, that it is not sound financially to rely on any saving sufficient to balance to any substantial degree existing or future deficits, whether those savings are derived from absence of competition or increased concentration or efficiency.

The recent statement issued by the representatives of the railway companies shows that not only has the cost of materials, coals, etc., increased by over 100 per cent. since 1913, but the wages are now well over £100,000,000 more than the pre-war amount. On the other hand the railway revenue has increased by £100,000,000, which just

meets the increase in pay. If railway men in general are entitled to the recent rises, and without entering into any controversy I am of opinion that a considerable proportion of the rise in the past has been justified and was necessary, owing to the rise in the cost of living, there is no hope of economy or cutting down expenses here. The wages bill indeed has not ceased to rise, but is still rising. More revenue to meet more expenditure is therefore the only sound policy, and more revenue means higher charges for passengers and freight. But will the revenue respond to the higher charges? I am doubtful, for we see everywhere the tendency more and more pronounced for traffic to leave the railway for the sea, the canal, and the road. This tendency to leave the railway has been noticeable for some time, and if it increases, the outlook for the railway is not a cheerful one, for increased charges will not bring in a proportionate or satisfactory increase of revenue. Again, investments in transport concerns contrast unfavourably with investments in nearly every other direction, and the same conditions also apply to tramway systems and to some extent to urban mechanical road vehicle services. It is difficult to see how under these conditions any new money can be raised except at an exorbitant rate or by postponing hitherto prior obligations.

There can hardly be any doubt that the comparative cheapness of short-distance road borne traffic compared with similar rail borne traffic has already deprived the railways of much revenue. But before long roads made in the ordinary way will not be able to bear the increased continuous heavy mechanical transport. The time has now arrived, therefore, when we should consider whether special roads for mechanical road traffic from which all other traffic should be excluded, should not be provided, both from the point of view of alleviating the unfair burden borne by the present roads, which, except in respect of about half the main road mileage, are unfitted to bear this traffic and because only at very great expense can they be made suitable for carrying heavy mechanical traffic. The cheapness and superiority of transport on railways over roads has hitherto been due to the use of a steel wheel on a steel rail. The tractive force required to move a ton under such ideal conditions is only a pull of 15lbs. per ton. On an ordinary good tar macadam road on the other hand the force needed is about 40 to 45lbs., or three times as much, and as much as 100lbs. is needed in the case of a bad road covered with mud or dust. But there is no reason, as that distinguished engineer, Sir Frederic Bramwell, said many years ago, why a road should not be constructed of a material which had practically the same absence of friction as a rail. If so, road transport should require about the same power as rail transport. In regard to this, just before railways began to be made, what were called plateways were much in vogue in the North. These were tracks about 2ft. wide

for wheels only, made of steel plates over which the steel tyres of carts conveying coal or other minerals passed, the resistance being of course, hardly more than exists in the case of the steel wheel on steel rail. It would be quite feasible to lay down such a plateway between London and Birmingham, for instance, perhaps partly in metal and partly in concrete or in some other durable material which would reduce the tractive force per ton on the road to say about 20 lbs. per ton. The cost of a double track would, so far as I can estimate, be approximately that of a single line of railway, as it would be possible to use gradients up to 1 in 30, and hardly any buildings would be needed *en route*. The cost of operation also would be on a much smaller scale than on a railway, as there would be a very small permanent staff, no signals or stations, and few large bridges or viaducts. From the point of view of the producer and consumer, goods could be delivered from door to door without any intermediate handling, which is now a very expensive item in railway transport. If we extend this idea to big towns, to London for instance, it is conceivable that overhead roadways might be made from the suburbs for the exclusive use of fast-running road mechanical vehicles which would descend by means of lifts or connecting roads to the level of the streets at certain points. There might be alighting places and passenger lifts provided at the crossing of other streets, much in the same way as the overhead railway system in New York. A much higher average rate of speed could then be maintained by the road vehicles than those at present running in crowded streets also carrying slow horse traffic. I see no reason why overhead road traffic should not exceed the speeds of the ordinary suburban train services. I have always been convinced of the possibility and desirability of roads specially built and reserved for mechanical vehicles, and I am of opinion that to-day it is probably the best immediate solution of our increasing suburban traffic difficulties, and possibly of many other transport problems concerned with greater distances.

In a brief paper such as this it is impossible to discuss every national aspect of transport. But there is one suggestion as to how increased transport facilities should be assisted on which a word might be said. In the case of the extension by private or public capital of tramways, railways, or roadways, either outside large towns or into the areas which certainly benefit from better transport facilities, it may be asked whether the increased local values due to such construction should not contribute to the cost. To take a concrete instance, when the tube railway was extended to Golder's Green, a rise of between 300 and 400 per cent. took place in local values within the next two or three years. Towards this increase in land and house values the investor in the railway largely contributed, but the owners of the local property reaped the advantage

without risking or paying anything themselves. No one will accuse me of being prejudiced in favour of the undue rating of property or the undue taxation of land, and hardly anyone is now an advocate of the kind of land taxes brought in under the famous and now defunct Budget of 1909. But it is quite conceivable that what might be called a local transport benefit tax, might be levied on those who become richer by the extension of traffic facilities in their areas. The method of assessment and manner of collecting such a tax requires a great deal of consideration, and I am not prepared to go into details to-day. But there can be no doubt as to the inherent justice of asking that property of any kind, benefited by the employment of public or private money, should pay something for the benefit conferred. The revenue thus raised could be used in at least three directions: (1) To cheapen the rate at which the capital could be raised to carry out these services; (2) To diminish the amount of capital employed, for instance, by the land required for the line being secured free or at a low rate; or (3) to enable passengers' fares and goods rates to be fixed on a cheaper basis owing to the annual or other kind of contribution made by the surrounding property.

By the Road Board Act, the Board had power to take a strip of land 220 yards at each side of a new road in order to recoup itself for a part of the cost by the betterment and the increased value of the marginal areas. I would suggest to the Government that something on the same principle might be applied in the case of new railways, tramways, and roads. On the other hand, it should be remembered that in many rural districts the advent of a tramway or railway, and even in some cases of a main road, by no means increases values; and may even depreciate local property.

Comparative sparseness of population and privacy are increasingly regarded as of value in many country districts. Propinquity to transport facilities does not always mean a rise in values. To take an example, house property near Clapham Junction, Willesden, or any other large railway centre is of comparatively little value owing to the disadvantages resulting from the noise of traffic and the unattractiveness of the surroundings. A transport benefit tax would therefore need much consideration.

In regard to the problems of transport and the science of movement, I suggest that a rich man, if there are going to be any such people left in the future, would do well to endow a Chair of Transport at Oxford or Cambridge or one of the newer Universities, in order that the science of transport might be studied apart from the unscientific and disturbing influences of politics and the clamour of trade disputes. The national importance of studying transport problems may be gathered from the fact that dear transport makes distance a greater disadvantage, and if we are to spread our population—and the wisdom of doing so is obvious—we must have cheap transport to enable the

workers with brain and muscle to go between their homes and their work. Land and house values, salaries and wages, in most cases comfort or discomfort as well, depend to a large extent upon transport, and no housing scheme, however ably conceived and well financed, can succeed if the essential element of easy and cheap transport is lacking. I could say much on possible railway and tramway reforms in connection with this, but I have not time to deal at length with this subject this afternoon, but must reserve it perhaps for some further occasion. Nor am I able to touch upon such matters as the great increase in the sea speed of ships or the use of the air as a means of conveying goods and passengers. In regard to the latter point, I may say that I consider the airship to be the most promising vehicle for long distance services, while airplanes will probably be best for short services. I can also do no more than just mention the probability of use in future of gas suction plant for propelling locomotives, motor lorries, and ships, or refer to benzol and alcohol as being necessary and suitable for service in the internal combustion engine.

I have only been able to discuss briefly to-day a few of the problems which the student of the science of movement has to consider. Attempts to solve some of these problems are now being made by various public bodies without much practical experience, and in many cases without much scientific knowledge or research. The National Physical Laboratory has done splendid work in various directions including roads, but in regard to transport of all kinds, I am of opinion that the subject is so large and important that a special establishment is needed to carry out continuous research. It is remarkable that at present there is not a single Ministry concerned with transport to which a scientific staff in the true sense is attached, or a special branch in which these problems may be considered apart from the disturbing effects of politics or personal predilections and prejudices. The two Institutes of Civil Engineers and Mechanical Engineers are at present the only bodies which have really technical and scientific knowledge on many of these points. They are sometimes consulted now, but they might more often be consulted, by the Government. Among their members there are some whose opinions and services would be of great value. Government departments, however, have for many years past been somewhat contemptuous of science, and the Treasury has always been niggardly in its attitude towards invention and research. Moreover, I am sorry to say that I see little indication at present of any alteration in the Government's view towards science. Up to the beginning of the war all the great improvements in transportation were carried out by private enterprise at its own risk. Whether we take the case of James Watt and George Stevenson in regard to steam, Telford and Macadam in regard to roads, Charles Parsons in turbines, and Wilbur and Orville Wright in aviation, opposition and not

encouragement was their lot. And so it will probably be to the end of time.

It is, I conceive, the business of the British Science Guild to endeavour to place its services at the disposal of the nation and the governing authorities, whoever they may be. And if the British Science Guild can assist in imbuing the political leaders of great masses of our fellow-countrymen with a regard for science, it will have performed services which though they will be at the moment hardly recognised at their true value, will be of lasting benefit to the nation.

*THE CHIEF CITIES, PALACES, AND FORTRESSES OF  
ANCIENT ASSYRIA.*

*Communicated by the COMMANDANT, 1st K.G.O. Sappers and Miners.*

ASHUR—(Qalat Sharqat)—was founded about 2000 B.C., and is first mentioned in the Bible in Genesis, chap. X.

It remained the political and religious capital of Assyria until the reign of Shalmaneser I. (c. 1300 B.C.). This king, deeming that a capital, where all the treasures of the Assyrian Empire were stored, situated on the right bank of the Tigris was too exposed to attack from Babylonia, moved across the Tigris and north of the Greater Zab, where he founded Calah (Nimrud).

Ashur, however, continued throughout to remain the religious capital and home of the patron deity of Assyria, and the excavated steles of Ashur range from the earliest times down to the days of Ashur-Bani-Pal (668-626 B.C.); that is to say, within twenty years of the fall of the Assyrian Empire.

At Ashur, the walls, quays, and fortifications of the ancient city have been most carefully and methodically excavated and traced on all sides. Already in the earliest days (c. 2000 B.C.) the rulers determined on fortifying the stronghold, and even after Shalmaneser I. transferred the political capital to Calah, Ashur's defences were strengthened and improved, until they culminated in a series of solidly built turret crested walls, pierced by eight battlemented gates.

Palaces abound, dating from all ages. But the ruins have been so methodically excavated that it is not easy now to follow their trace. The huge stage tower (ziggurat) attached to the oldest temple in Ashur, known as E-Kharsag-Gal-Kurra, "great mountain house of all lands," and sacred to Ashur the chief deity, has been uncovered and the temple itself traced back to Ushpia, a ruler who combined both priestly and royal functions.

A portion of the residential quarter of the city has been unearthed by the German expedition. Entire rows of private houses have been dug out; they were of simple brick construction, one-storied, and with rooms grouped round a courtyard open to the sky.

A notable discovery was the large series of steles of various commemorative inscriptions of rulers, their consorts, and high officials. No less than twenty-five rulers and three "ladies of the palace" are known to us by these steles. These include the famous Semiramis, who turns out to be the "palace lady" of Shamshi-Adad IV., who ruled from about 823 to 811 B.C.

It is evident that these monuments were erected by the rulers themselves and set up in various places of honour, and reveal in ancient Assyria, the custom of erecting monuments in public places.

The date of the destruction of Ashur is not definitely known, as is that of Nineveh, but it is outside the "Assyrian Triangle," and probably fell before the first onslaught of Cyaxares the Mede in c. 630 B.C.

CALAH or KALAKH (Nimrud)—was founded by Shalmaneser I. (c. 1300 B.C.), on the left bank of the Tigris, and north of the confluence of the greater Zab. In those days it was no light matter to move the capital from a site dedicated to the deified founder of Ashur. Shalmaneser ran the risk of offending, not merely his subjects, but the god who directed the destinies of the State. He insisted on the change from political and strategical motives, though he compromised on priestly questions by leaving Ashur the religious capital, and by beautifying its temples. Having secured his own capital on the left bank of the Tigris, he waged incessant and aggressive wars to maintain the Assyrian Empire.

Calah contains the remains of at least five palaces, namely :—

- (a) North-west Palace, built by Ashur-Nazir-Pal (c. 883–859 B.C.).
- (b) Central Palace, built by Shalmaneser II. (c. 859–824 B.C.).
- (c) Central Palace, restored and enlarged by Tiglath-Pileser IV. (c. 745–727 B.C.).
- (d) North-west Palace, re-built and enlarged by Sargon II. (c. 721–706 B.C.).
- (e) South-west Palace, built by Esarhaddon (c. 681–668 B.C.).

In addition to these palaces, Sir Henry Layard discovered the remains of buildings and tombs in the south-east corner of the palace mound, and a vaulted chamber to the north of these.

To the north of the north-west palace lies the site of the temple of the war god Ninib, with its tower.

The ruins have not been so thoroughly or systematically searched as those at Qalat Sharqat, but some valuable finds have been recorded, notably the "Black Obelisk" of Shalmaneser II. (c. 859–824 B.C.), and two statues dedicated to the god Nebo by Ramman-Nirari III., King of Assyria (c. 812–783 B.C.). The former of these, which contains an account of the Assyrian Kings' campaigns, is particularly interesting to us owing to the representation and description of Jehu, the son of Omri, paying tribute.

The Kings built their palaces in the south-west corner of the city, which was enclosed by walls measuring about 7,000 feet by 5,500 feet.

These palaces were adorned in the most elaborate manner. Their walls were covered with carved bas-reliefs representing hunting and battle scenes descriptive of salient events in the royal career, while their doors and gateways were guarded by sculptured beasts. Many



of these have now been removed, the largest share, through the perseverance of British excavators, having been secured for the British Museum.

After the days of Shalmaneser I., Calah seems to have ceased to be a royal residence for a time, and the capital may have reverted for a period to Ashur, or the newer city of Nineveh. The latter city, however, did not definitely become the chief city of Assyria until it was rebuilt by Sennacherib (c. 706-681 B.C.).

**NINEVEH**—(Kouyunjik and Nabi Younis)—the best known of all Assyrian cities, owing to its connection with the Bible, was probably built during the reign of Ashur-Bel-Kala about 1100 B.C., that is, within a century of the days of King David. The goddess associated with its temple was Nina, the chaste and warlike consort of Ashur.

Entrenched behind the Tigris, Nineveh was secure from sudden attack, and the coolness of the night rendered the heat of the day more tolerable to Assyrian Kings, who, when not engaged in war, were accustomed to spend the summer here in preference to their more southern palaces.

Ashur-Nazir-Pal (c. 883-859 B.C.), after his victorious campaigns, decided that the city of Nineveh was not large enough to display the wealth of his conquests. It was here that he had marched rebel chiefs in ignominy through the streets and put them to torture and death before the eyes of the crowd. It was here that the skins of his captives, flayed alive, were hung round the city walls; but the palace was not large enough for the multitude of his captured women and slaves. He therefore removed to Calah, where he built his most famous palace.

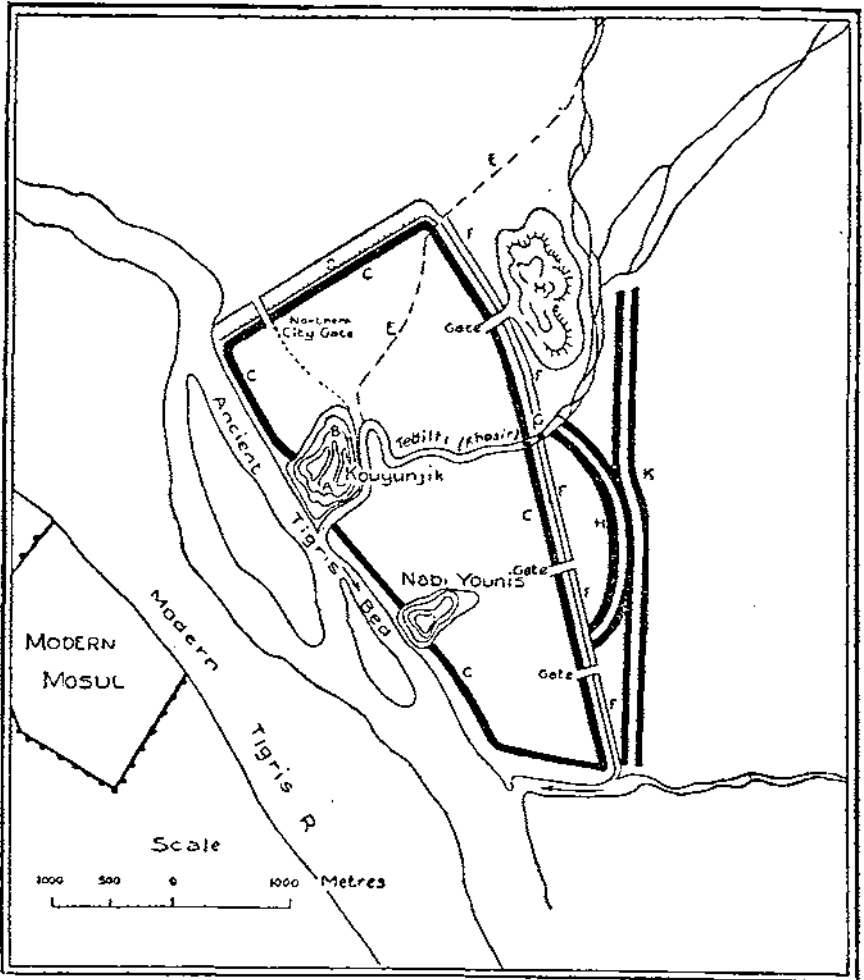
Nineveh fell into decay until the days of Sennacherib (c. 706-681 B.C.), who undertook the restoration of the whole city, and laid out avenues, streets, canals, quays, gardens, and aqueducts. Twenty thousand captives from among the Kalda, the Arameans, the Mannai, Cilicia, Palestine, and Tyre were impressed. Precious woods were brought from Syria, and marble from the north.

His palace was magnificent, with its woodwork of fragrant cedar and cypress overlaid with gold and silver, alabaster and sculptured marble panellings, and brilliantly glazed tiles.

Twelve bronze lions, twelve winged alabaster bulls, and twenty-four limestone goddesses kept watch over the entrances; vines and gardens were laid out; parks and private hunting grounds were prepared for the royal chase, while eighteen aqueducts secured the water supply of the city. The artistic merits of the bas-reliefs executed by Sennacherib depicting the triumphs of his reign, can be seen to-day, in the examples removed from Kouyunjik by Layard and others, and now lodged in the British Museum.

Esarhaddon, (681-668 B.C.), the successor of Sennacherib, added to the improvements of the city of Nineveh, but his energies were more

directed to the area now covered by the mound of Nabi-Younis, which has never been excavated.



PLAN OF NINEVEH.

- Kouyunjik {
- A. Palace of Sennacherib c. 705-681 B.C.
  - B. Palace of Ashur-Bani-Pal c. 668-626 B.C.
  - C. Ancient City Wall Main Rampart.
  - D. Northern Fosse.
  - E. Ancient Canal.
  - F. Main Eastern Fosse.
  - G. Sluice Gates.
  - H. Demi-Lune Outworks.
  - K. Outer walled Fosse.

Ashur-Bani-Pal (668-626 B.C.), perhaps the greatest of the Assyrian kings, during his long reign of 42 years, built a new palace to the north of that of Sennacherib. The walls were even more splendidly covered with limestone bas-reliefs, generally representative of his campaigns.

Greatest of all his works of peace, he founded and collected a library that has come down to us, and opened up for us the history of both Babylonia and Assyria. Ashur-Bani-Pal sent scribes to all parts of the ancient world and copied texts, historical, legendary, and divine, and stored them in the royal library. Altogether 30,000 inscribed tablets have been recovered up to the present, from this collection. Amongst these are historical texts and stories of the Creation and Deluge, myths and legends, incantation texts, medicinal prescriptions, astrological handbooks, birth omens, animal omens, divination of dreams; in fact, almost every branch of literature and science of the ancient world is represented.

Twenty years after the death of Ashur-Bani-Pal, Nineveh was captured by the allied forces of the Medes and Babylonians; but by an act of Providence, as the palaces crumbled into ruins, and the bricks became earth again, this same kind mother earth covered the treasures of Ashur-Bani-Pal and Sennacherib until the middle of the nineteenth century, A.D.

Externally, the ruins to-day do not appear very interesting. Sir Henry Layard and his successors took the precaution of filling in the passages through which they penetrated into the heart of the ancient palaces. Nevertheless, the mound of Kouyunjik to-day represents the accomplishment of the fate foretold by the ancient Jewish prophet Nahum; and the rescue of its history from oblivion 2,400 years after the fall of Nineveh is one of the triumphs of the nineteenth century.

THE LAST DAYS OF NINEVEH.—The fortified heart of Assyria was bounded by the Tigris on the south-west, the Greater Zab on the south-east, and the foothills to the north. The southern apex, near the confluence of the Greater Zab and Tigris, was protected by the ancient fortified city of Calah. Nineveh, the capital, was the chief fortress and main keep, the final stronghold of the Empire.

Before the last century of Assyrian existence, the Medes from the mountains had made their presence felt. Outlying fortresses to meet this danger were built to the north and east of Nineveh; of these, Dur-Sharrukin (Khorsabad), and Imgur-Bel (Balawat), have been identified, the former being built by Sargon II. about 710 B.C., while the latter already had a palace built by Shalmaneser II. (c. 859-824).

The problem before the invaders from the north-east was first to break through and neutralize this outer defensive line. Starting from Amadana (Hamadan) a Median king could choose either the road through the Karind Valley or a more northerly one passing through the modern Sulaimaniyah. Though the difficulties in the mountains were greater in this case, it allowed the possibility of the great feature of ancient tactics—surprise. Only two successful actions need be fought in Assyrian territory before the heart of

Assyria was reached, one in the neighbourhood of the Altun Kupri fords and the other at Arbailu (Erbil), or the fords over the Greater Zab west of it, where in later years Alexander the Great defeated Darius and decided the fate of the Persian Empire. This accomplished, the formidable Nineveh had to be reckoned with, and the Medes might well be broken against its powerful defences.

Nineveh itself was surrounded by a wall in the form of an irregular quadrilateral, no two sides of which were parallel, and lay on the left bank of the Tigris (opposite the modern Mosul). The river flowed close under the walls on the south-west, and the two main palace areas (now the mounds of Kouyunjik and Nabi Younis) were so skilfully fortified that a single wall connecting the two was sufficient to ward off any attack on the river side. A portion of this wall, with its stone foundations, can be seen to-day, laid bare near the Khasir Bridge.

The south wall, about 870 yards in length, was rendered difficult for Median battering rams by a muddy stream, while the blunted northern wall, 2,150 yards long, was protected by a wide moat filled from a distributary canal of the Khasir.

The Eastern front had for a long time, and during the more aggressive period of Assyria, depended for its security on a single wall and moat. Sennacherib, deeming it insufficiently protected against surprise attack from the mountains, piled up obstacles and outworks so that it now presented a truly formidable appearance. It was skirted throughout its whole length by a main rampart, 5,400 yards long, and 50 feet high, which described a gentle curve from north to south. Outworks protected the gates through this wall and a deep fosse 50 yards outside the rampart was dug, some 20 feet deep and 150 feet wide.

Three large sluice gates built on a level with the rampart allowed the Khasir to be dammed back so that its waters could be diverted into the fosse and thus keep it full in case of siege. In front of each segment of the fosse was an outwork in the form of a demi-lune; yet further, as though this were not precaution enough, two walls, each over 4,300 yards long, were built in front of the outworks, the ditch enclosed between the walls being connected to and filled by the Khasir.

The normal population and garrison of Nineveh was perhaps 300,000, and within the ramparts the city was divided into minor walled sections of defence; (for population *c.f.*, Jonah iv. 2, "more than six-score thousand innocents").

Cyaxares (Huvakshatara) the Mede, made a determined attack on Nineveh about 630 B.C. Undaunted by the natural strength of the Assyrian outworks he captured these and shut the remainder of the Assyrian field army within the walls of Nineveh.

The sluices were shut and the fosses filled. It is not known

whether Cyaxares assaulted the city in his first attempt. Probably not, as his army consisted mainly of archers and javelin-throwers, while his siege train was probably insufficient. We do know, however, that battering rams were in use at this time among the Assyrians, and that Cyaxares had re-modelled his army after the Assyrian pattern. Before starvation could reduce Nineveh, however, Cyaxares had to raise the siege and hurry back to his own kingdom to repel an invasion of the Scythian hordes.

The final overthrow of Nineveh in 606 B.C., was brought about by the allied kingdoms of Babylon and Media, under Nabopolassar and Cyaxares. The western tributaries of Assyria alone, including Judah, remained faithful. Sin-Shar-Ishkun, King of Assyria, received no actual help, however, and was gradually driven in behind the walls and moats of Nineveh, where, the Assyrians remaining stout-hearted to the last, he held out as long as possible and beat off all assaults. Then with all food gone and with all munitions spent, and the inhabitants all round dying of starvation, Sin-Shar-Ishkun collected all his wives and children, all his gold and treasures in his palace, and, setting it on fire, perished with them in the flames. (c.f. The prophecy of Nahum on the doom of Nineveh, ch. III.)

FROM THE AISNE TO YPRES, 1914.

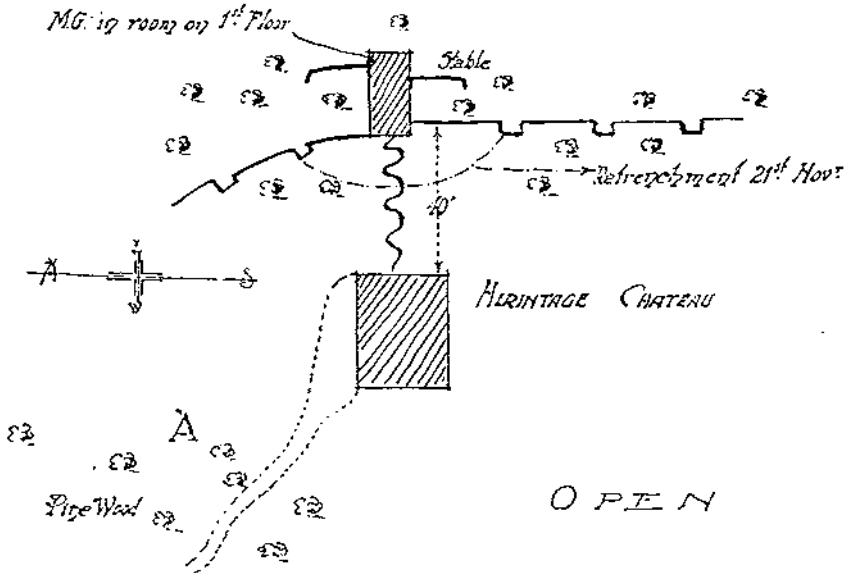
FURTHER INCIDENTS IN THE STORY OF THE 59TH  
FIELD COMPANY, R.E.

By BRIG.-GENERAL G. WALKER, D.S.O.

(Continued).

About the 11th November in beating off the German Guard attack we got pushed in a bit and our friend Gordon had to withdraw. We had a new line of trenches ready dug by this time about 300 yards in rear and just in front of Heritage Chateau. Just opposite the Chateau and actually in the trench line was the stable. It consisted of a couple of stalls and coach house on the ground floor and a groom's quarters and loft on top. Being of two storeys it dominated the trenches, and being hidden in the trees from view from the front it had not suffered much from shell fire. We and the Bosche both set a good deal of store by it.

In plan the situation was as shown below:—



The sketch shows the general idea of the defence.

We had much difficulty with the wing trenches as we had to sap them out from the building. One day the Bosche dropped a minenwerfer on the stable, cleared out our garrison and occupied it

themselves. We had no bomb guns at this time so the Brigadier arranged that the place was to be retaken that night with the help of an 18 pounder gun. The gun was to be brought up to within 80 yards of the stable to 'A.' It was to fire four rounds into the building and then the Infantry were to go in with the bayonet. All was to be ready by 4 a.m. so that the show would be over by daylight. I was much amused at the amount of discussion that took place and I thought we should never get going. I know one C.O. of a Battalion told me that he thought it was impossible and sheer waste of life to try it. However, the Brigadier was determined and the gun arrived. It was a horrid, cold, wet night and the gun had to be man-handled into position, which was done successfully. I went to see the Gunner Officer when all was ready, and found him sitting on the trail of his gun watch in hand. It was very late and dawn was breaking. He told me he was waiting for the word and I went off to get it for him if I could. Just after I left him, however, he let loose his four rounds in quick succession and the Infantry charged. A good many people had been brought up in support and we were all standing about under the trees as the gun fired. Then ensued the most appalling hubbub. The Bosche went mad I think—he simply filled the upper air with bullets. The waiting multitude on our side disappeared like magic—I could hardly have believed there were so many holes about. The fusillade went on for about four or five minutes and then stopped suddenly and we all emerged from our holes laughing. I was in one with a Lance Corporal and I met Johnston, V.C., as I was coming out, emerging from another. The operation was a complete success. The R.E. withdrew, not having been called on to let loose their bombing party, which had been prepared with jampot bombs to help if required. Next night we went into the stable and it was a shocking sight—the floor was carpeted with dead Germans. I thought they were sacks at first until I turned a torch on. The shrapnel bullets must have been going round that coach house like racket balls in an infernal racket court.

A word should be said about bombs. At this period there were none officially. The service hand grenade was available but could not be issued, because the army was not engaged in "trench warfare." I think that was the term. I know I got a friend to steal 16 hand grenades for me one night. I had them fuzed and brought them up to a Cavalry Regiment that was in the line at the time. They asked me what the damned things were and, when told, implored me to put them in a dug-out, out of harm's way. They were *never used* and I returned them to my friend the thief.

Jampot bombs were much in favour with the "high command" and in fact anyone who had not got to touch them. Most R.E. Companies had a "factory" then. The manufacture was simple:

Take a tin jam pot, fill it with shredded gun cotton and tenpenny nails mixed to taste, insert a No. 8 detonator with short length of Bickford's fuze, clay up the lid and you have a jam pot bomb. In action it was a difficult and dangerous weapon to work.

The procedure was to light the fuze with a match, if you had and could light one, and throw it for all you were worth. A pipe, cigarette or, for choice, a cigar, were the best lighters, as they were more certain and less conspicuous than a match. You needed a strong stomach and plenty of tobacco to be a successful operator by this method. I don't know that I ever knew anyone at this time who had actually thrown a jam pot. I do know, however, that we made some hundreds and gave them to the French when they relieved us. Later on a proper fuze lighter was introduced which eased matters considerably.

It is easy to speak lightly now of those days; it was not a light-hearted job to carry on at the time. We were at work for about 14 hours each night and had to prepare things during the day. I had to arrange at last that the half Companies went into the line night and night about as the men were knocking up and it was the only way to keep them going—the officers too needed rest. After coming in about 7 a.m., our first thing was a meal, then sleep. Most of them slept till 1 p.m. The senior out the night before, however, had to go to Divisional H.Q. to tell the night story, as our pitch in the line was a critical one. This individual got little rest that day. Then we had a meat tea at about 4 p.m. and on the road again at 5 or thereabout.

However, we were fit enough but dreadfully weary. During the first week of our stay at Ypres we billeted as stated before in the stables of the "White Chateau" on the Menin Road. We had to leave, however, on account of the shell fire. The first visitor arrived in the form of an 11 in. shell which dropped during the night in the middle of our horse lines. The horses were picketed all round the perimeter of the Chateau orchard and the shell fell plumb in the middle. The ground was soft so there were no casualties except that all the animals broke their bonds and fled—and all our windows were broken.

I was in the line that night and when I got back Johnston remarked on meeting me that he wished he had gone up to the trenches with me. He then showed me the hole to give point to his remarks. We started at once to dig shelter pits about the place and by after lunch had done a lot.

A day or two later I was riding down from Hooge and as I approached our house I saw the fire beginning again. The Germans started "laddering" a line running through an abandoned 60 pounder battery position on the Zillebeke Road and the Chateau, in hopes of finding the battery. I saw the drop of the shells approaching our



house as I approached the level crossing. One fell just opposite the gate as I got to the crossing and upset and destroyed a G.S. wagon and team standing in the road. I galloped into the gate and gave up my horse and started getting the men underground. Two men were still in the billet and Johnston and I were standing at our door, when another shell came up and plumped down in front of us. We escaped untouched but both the men were hit. One, Sapper Chapman, was killed outright and the other had a splinter through his arm. They were within about 30 ft. of us and it was only a stroke of fate that saved us.

Chapman was a nice young fellow, a moulder by trade and a Belfast man by birth. He had done his colour service in the Company at the Curragh and joined as a reservist on mobilization. We buried him that night in the garden, after dark, just before we left for the line. I read the prayers of the burial service by the light of a lantern held by Sergeant Buckle, and Johnston prompted me as to how to shorten them as our time was limited. It was the only time I ever had to do this, so I suppose it impressed me. Johnston made a special point of my reading the commendatory prayer for a sick person, from the Order for the Visitation of the Sick. I had been to a good many funerals but did not remember ever having heard this prayer read before. It impressed me as being extraordinarily appropriate to the occasion, especially so as regards us who had survived: For our own condition was most truly "frail and uncertain."

The great struggle in the Ypres Salient was approaching a climax. The first crisis of October 30th had passed: the Germans were preparing for the second and last, which came on the 11th November. It is difficult to describe, except that everything was boiling up and the pressure daily became greater.

On the morning of the 11th I had been warned to be ready to act as Infantry but the day wore on and no orders came. At length, about 5 p.m., we were turned out. Three Companies of Sappers—17th (Singer), 56th (Nation), 59th (Self), I suppose we numbered 350 rifles all told. The C.R.E. 3rd Divn. Lieut.-Colonel C. S. Wilson, C.B. took command and we marched up as a three company Battalion with Wilson and poor Tubby Wells, his adjutant, leading. Wilson was mounted and so was I—quite an unnecessary trimming. It was raining like the devil and as dark as the same gentleman is reputed to be. My Company came first and I rode beside Wilson. The Germans were shelling the Menin Road but not hitting it. One shrapnel burst over our heads like a thunderclap. It was directly over us apparently and the flash in the dark was blinding. I turned round and shouted: "Anyone touched," and the men answered: "None, Sir." So through Hooge until we got to 9th Brigade H.Q. There I stayed with the men in some empty houses until about

midnight. I believe Singer actually got into a front line trench, Nation, I think, waited with us. At midnight I got the order to go to work and away we went to our old pitch in Herintage Wood. We knew absolutely nothing except that the R.E. had been wanted as infantry and we drew the obvious inference from that. Our work now consisted of improving communications, as the weather had become very bad and the ground was awful. We put down some corduroy road through the woods and this improved matters, but we had neither time, material nor labour to do much. We also worked on supporting points and second line trenches, the latter near Stirling Castle, and, as we had been pushed back a bit on the 11th, we had to readjust our front line. The incident of the stable, recounted above, really took place about this time when our front line actually went through it. There had been a great deal of argument as to the actual design of these supporting points, mainly as to whether they should be wired all round or not. I was discussing it with an officer one night and he was strongly in favour of an open gorge, and to give point to his argument he told me that during an attack on his sector the garrison of one of these points, which was completely and securely surrounded with wire entanglement, had levanted before ever being attacked, as they said the wire was so strong that they would never get away if they did not start at once. It is a fable no doubt but as a fable it is interesting.

I now decided to make my move from the White Chateau and took the Company to Potijze where we got good and quiet billets and horse lines and where, although we could hear the shells going over us, we were never hit. This very place was an inferno during the 2nd Battle of Ypres, but then the Germans were much closer to St. Julian than during 1914, and the shell fire we suffered from at the White Chateau came from the direction of Hollebeke.

The weather continued to get worse—rain, sleet and frost alternating and the filth was indescribable. One night just outside Potijze Chateau I was pushed off the pavé and I sunk to my knees in the mud at the side. How people lived in the trenches I don't know. No one who was not there knows the misery they suffered. However, the 3rd Division's trials were nearly over. They had suffered so severely that they had to be relieved somehow and cavalry were sent up to take a hand dismounted.

To show how depleted the Infantry Battalions were two of the Battalions in the 9th Brigade were down to 3 officers and 140 men between them:

Royal Fusiliers, 1 officer and 60 men.

Scots Fusiliers, 2 officers and 80 men.

The "7th" were commanded by a temporary Lieutenant of about 3 months' service and, far from being depressed about it, he

seemed to be as happy as a sandboy. I remember on the night I am thinking of, I condoled with him as to the hard lot of the Infantry officers and in reply he laughingly said that, on the other hand, he thought the Sapper Subaltern was much worse off and that he wouldn't have his job for anything.

The Cavalry came up by Brigades and these Brigades were relieved at very short intervals. They worked and fought most splendidly and seemed to take the digging as a sport. I was much impressed by the keenness they all displayed, both officers and men, over work that was not in their line at all really. We had our 3rd officer casualty on the 15th November. Bebb who had relieved Carr at Richebourg L'Avoué was hit on the back of the leg by a shrapnel bullet on his way back through Hooze that morning. I was on the road in front at the time and when he joined me he told me about it. He was limping a bit, but the bullet though it had, he said, rolled him over like a rabbit, had not penetrated his gaiter and he was able to walk home (about 2 miles). He did not go sick for some time though his leg was badly bruised but eventually he had to give in. I met him again in London in 1918 and he told me that he had been laid up for nearly 6 months.

About the 18th rumours were going about of a relief by the French of the British troops in the Salient and we heard definitely later that we were to go out of this line on the 21st. However, there was some delay and we were put off for a day. The British Cavalry had already replaced the 9th Brigade though we sappers were still in the line and the 3rd Cavalry Brigade—4th Hussars—5th Lancers and 16th Lancers were actually in the line on this date—21st.

Early that morning I got a call to Divisional H.Q. where I learnt that the Germans had again taken our stable and that orders had gone forth for it to be retaken that night before we handed over to the French, and finally that I was to go up and advise the Cavalry Brigadier (J. Vaughan) as I had been present at the last performance.

I was riding my old black mare. She was a fidgety old shrew and hated shell fire if possible more than her master did. However, off we started up the Menin Road, my trumpeter in attendance. This trumpeter was a dark taciturn youth, a very good rider and one who feared nothing. When we were out together he always insisted in putting his troop horse over everything that I jumped, going across country even though there happened to be an easy way round. It was a point of honour with him to follow my exact track. As we went up to Hooze along the pavé big black shells began to fall on either side of the road—well clear of it but near enough to be alarming. My mare was mad, the road was slippery and I thought between the gymnastics of the mare and the shells I probably would never reach my destination. However, we arrived at Hooze all

right and I sent the mare back and went in to see Vaughan. He was out but I saw his Brigade Major, who said the Brigadier was up at Herintage with the Regimental Commander. I started off on foot and found Vaughan and we then reconnoitred the place together—a risky performance and most uncomfortable as we had to do it on our stomachs and the ground was very wet.

It was found impossible to arrange an attack before the relief by the French, and I was told to get my men to work on strengthening the defences and sapping a switch to cut off the stable. I was to stick to this and come away when the French had relieved the last Cavalry Regiment (16th Lancers). About 10 p.m. the French General came in and began to take over. When the case was put to him he smiled, spread out his hands and said it did not matter. So the relief went on and we got away about midnight and back to billets to prepare for our departure. The Frenchman's nonchalance was quite justified. So stubborn had been the defence of the lines by the British Infantry that we got into the way of thinking that every bit of the line was an essential point. We hated to give ground anywhere and did not realise that bending back was quite different to giving way. The frame of mind or point of view was what won the first Battle of Ypres, but it could be hunted to death. When I got back to Ypres in April 1915 with the 27th Division we took over this bit of line from the French and we found that they had never attempted to retake the stable and were quietly holding the retrenchment I had sapped round it the night of 21st November, 1914.

(I notice my diary states the day to have been the 20th but I believe that was a mistake.)

Our next anxiety was to get out of Ypres safely—not an easy business. I ordered an early start, 5 a.m. (22nd). This gave time for food and a little sleep. Everything had been packed up the day before so there was nothing much to do. The weather had turned very cold and it had been freezing hard all night. Our wagons had been standing in liquid mud the day before, and when the teams hooked in about 4.30 a.m. it was found that the wheels were frozen into the ground. Here was a fine kettle of fish. I was anxious to get through Ypres before 7 at latest, as that was when the morning "hate" began, and the delay was annoying. However, we all turned to and hacked the wagons out and got away about 6 o'clock. Down the road to Menin Gate, through the Square and past the Cloth Hall, which then had its roof on, past the Cathedral and out on the Vlamertinge road past the Asylum—not a shell—then a halt. We were very lucky as the 3rd Divisional H.Q. had an exciting passage an hour later. I know I offered up a prayer that I might not have to go to Ypres again. I was there in 4 months for the second act of the tragedy.

We had great difficulty to get along, the road was covered with glass-like ice and the horses were unroughed and slipping about all over the place. We shoved on, however, and passed through Ouderdom to Locre where we got in about 11 a.m.

The hill on the road from Reniughelst to Locre was covered with vehicles that could not get up on account of the ice. We got through somehow and found rest at last in a smelly billet on the Locre Kemmel road near Locre Convent. Such a relief—we were told we were going to have a rest and we got a short one—before going into the 5th Division line East of Lindenhock.

I had nearly forgotten my last experience of Hooge. My orderly and I were passing back through the village the morning we left when the Germans began shelling the Cavalry horses that were waiting for their riders just West of the village on the Menin Road. There was a considerable mix up and I saw that the fire was concentrated on the road. There was another way for us across the fields but, as my orderly had a bicycle, I doubted if he could manage it. I said to him: "Do you think you could get the bike along if we took to the fields here," and his answer was: "Just see me try, sir," and try he did and most successfully.

Our total casualties during the 1st Battle of Ypres were:—

	<i>Killed.</i>	<i>Wounded.</i>
Officers ... ..	1	1
N.C.O.'s & Men ... ..	3	6

I lost one of my best N.C.O.'s (Corpl. Cornwall) on the night of 7th November, shot by a sniper through the body. He died of his wound later on in hospital. Towards the end there were many sick casualties due to the cold and wet.

Another fairy tale—the first night we spent at Locre in our rest billet Johnston and I occupied the same room. I woke up in the middle of the night with the distinct impression that I had been called to turn out. I sat up in my flea bag and was just putting out my hand to wake Johnston when I realised where I was and lay down again. When I told Johnston next morning he replied that exactly the same thing had happened to him that night—so much for overstrained nerves.

Next day the 23rd, we were turned out to be inspected by the G.O.C. of our own Division, General Morland, who had never seen us before. Then it was a case of all hands to clean and badly we wanted it. We were told now that leave had opened and, as the C.R.E. did not want to go, I put my name in. I got it all right and started off on 7 days pass on the 25th November. The bus started from Bailleul at 4 a.m. and by strenuous efforts I managed to reach Kingstown by 5.30 a.m. next morning and was in my own home for breakfast. In my wildest dreams I had never hoped for such good

fortune. The people in England were kindness itself. One old lady asked me if I was wounded and then said: "Would you not have liked to have a little wound." Another absolute stranger in another hotel insisted on shaking hands and so on. The Canteen ladies seemed so disappointed that one was not dying of starvation. Little did I realise that never again was I to serve with the 59th Field Company R.E. The day after my arrival home I was down with fever and did not get back to France until the 14th December, the day the 3rd Division attacked Wyschaete unsuccessfully. I actually rejoined the Company but went down again and eventually gravitated to Boulogne to Hospital. I escaped going home and got back the first week in January but was kept at 2nd Corps H.Q. to organise the Corps roads, and there I stayed until I went to the 27th Division as C.R.E. in March 1915.

I often saw the Company however—They had moved to the old billet at Dranoutre on the 25th November and started work in the 13th Brigade line East of Lindenhoeck. They had a very heavy time and lost poor Flint—killed. He was shot by a stray bullet and died a few hours after. He indeed was a gallant soul—nothing that I can say can do justice to his merits. I went to his funeral in Dranoutre Churchyard and the Corps Commander was there also. The Army Commander, Sir H. Smith Dorrien, who knew him well, wrote to say that only the most pressing duty prevented him coming to pay the last tribute to "the gallant Flint." Sir Charles Fergusson read this letter out to the men and then spoke to them of Flint's example—a most impressive scene. All the old men holding up the example of this young subaltern to the admiration and emulation of the assembly. His grave was marked by a very handsome oaken cross made by the men of the Company. Pennycuik went to look for it this summer and wrote to tell me that the place was unrecognisable. However that matters little—the fact remains that the memory of Flint, as that of his bosom friend W. H. Johnston, will remain for ever with all those who had the honour of serving with him. If we can only follow the example of his short life we shall have done more than well. Before his death he had already won a D.S.O. and the Legion of Honour and was recommended for a V.C.

My story is finished. It may be scrappy and possibly I may have shown an unseemly levity in some places; however, we kept ourselves alive I think by trying to see the humorous side of things rather than the reverse.

What has impressed me most in looking back is not so much the memories of the incidents, exciting though they were, but the thought of how much our successes depended upon the old-fashioned training. First, the training of the officers at school and in the military colleges, a training, the essence of which was the suppression

of the individual for the benefit of his fellows and, secondly, the training of the men, first in the technicalities of soldiering and then in the belief in his officer, which was the hall-mark, so to speak, of all good regiments. I believe that nothing counts so much in the army as the old-fashioned relationship between officer and man. It was a real brotherhood. The men had a standard which they expected from their officer—knowledge, uprightness, justice, and leadership, and if that standard was attained they would follow him to death quite cheerfully. I believe that standard was attained and I believe that it was this that made our men so steadfast. I remember speaking to the men of the 59th Company on parade at the Curragh just before we marched off to the train on the 16th August. I said to them I had never been let down by a sapper in my life, and that I knew that whatever happened to us they would always behave like gentlemen. I was answered by a growl of "Hear, hear," from the ranks and I knew that I had those men behind me in good and evil times as long as they were alive. Nobly they kept their word. Nothing was too much for them, and never did they waver. I owe them a debt of gratitude that can never be repaid.

I had trained these men for 2 years before the war and had experienced with them my first baptism of fire. They were proud of themselves and I think justly so, for they earned the praise of many. Am I wrong to be proud of them? We went through much together and they never failed. Am I wrong to believe that the words that Shakespeare puts into the mouth of King Henry V on the morning of Agincourt, are not inapplicable in our case also?

We few, we happy few, we band of brothers,  
For he to-day that sheds his blood with me, shall be my brother.

I found the remnants of the old Company at the Curragh last summer reforming. There were only 3 men in the Company all old hands, Sergeant Richards D.C.M., Sergeant Barwick M.M., and Corporal Guinan D.C.M., all good men and true, who will I have not the slightest doubt, well and truly rub into the rising generation the lessons we learnt in the great war. Of them the principal I believe to be that, if you are to command men, in no matter how small a sphere, you must cultivate a soul. Not a soul that is constantly exercised as regards its own welfare, either here or in the hereafter, but one that is always endeavouring to hold up the hands of its less fortunate, but perhaps not always weaker, fellows and is constantly striving to help the lame dogs over stiles.

## SCHEDULE OF MARCHES.

	<i>Distance.</i>	
Landrecies to Bavai .. .. .	15 miles.	
Bavai to Hainin .. .. .	12 "	
Hainin to Dour .. .. .	3 "	
Dour to Bavai .. .. .	7 "	
Bavai to Reumont.. .. .	19 "	} *(22 hours) 17--marching  } Retreat from Mons.
Reumont to Ollezy .. .. .	33*	
Ollezy to Pontoise .. .. .	17 "	
Pontoise to Croutoy .. .. .	17 "	
Croutoy to Crepy en Valois .. .. .	14 "	
Crepy en Valois to Oignes .. .. .	14 "	
Oignes to Inverney .. .. .	8 "	
Inverney to Mont Pichet .. .. .	14 "	
Mont Pichet to Gagny .. .. .	16 "	
Gagny to La Celle .. .. .	17 "	
La Celle to Boissy .. .. .	7 "	
Boissy to Champortal .. .. .	8 "	
Champortal to Mery (Marne) .. .. .	4 "	
Mery to St. Quentin .. .. .	15 "	
St. Quentin to Billy sur Ourcq .. .. .	10 "	
Billy to Nampteuil .. .. .	9 "	
Nampteuil to Sermoise (Aisne) .. .. .	6 "	

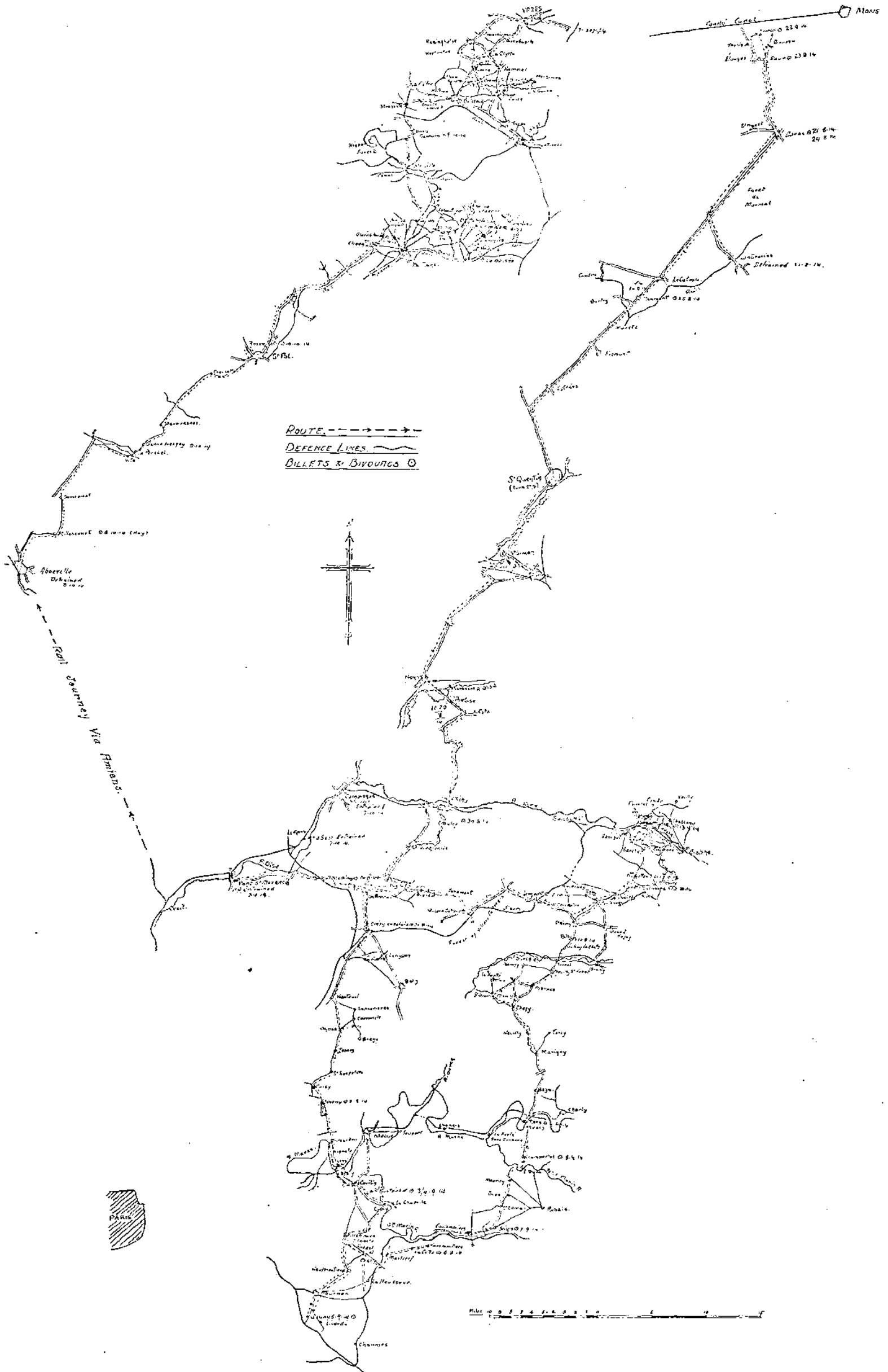
13. 9. 14 to 2. 10. 14.

## BATTLE OF THE AISNE.

Couvrelles to Violanes .. .. .	5 miles.	
Violanes to Longpont .. .. .	12 "	
Longpont to Buy .. .. .	15 "	
Buy to Bethisy .. .. .	8 "	
Bethisy to Pont St. Maxence (entrained)	9 "	
Abbeville detrained to Millencourt .. .. .	5 "	
Millencourt to Genne Iverney .. .. .	16 "	
Genne Iverney to Rosemont (part by bus) .. .. .	15 "	
Rosemont to Oblingham .. .. .	20 "	
Oblingham to Le Touret .. .. .	5 "	
12. 10. 14 to 31. 10. 14 (fighting round Richebourg L'Avoué).		
Le Touret to Vieux Berquin .. .. .	13 miles.	
Vieux Berquin to Flêtre (Courte Croix)	4 "	
Flêtre to Dranoutre .. .. .	7 "	
1. 11. 14 to 7. 11. 14.		
Dranoutre to Ypres .. .. .	16 "	
7. 11. 14—22. 11. 14.		
Ypres to Locre .. .. .	10 "	
Locre to Dranoutre .. .. .	2 "	
Average No. of miles marched daily .. .. .	11'54	
"    (during retreat from Mons) .. .. .	16'9	



59TH FIELD COMPANY, R.E. 5TH DIVN.  
 ROUTE MAP, AUGUST-DECEMBER, 1914.





**Colonel H W Renny-Tailyour**

## MEMOIRS.

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### COLONEL H. W. RENNY-TAILYOUR, LATE R.E.

HENRY WAUGH RENNY-TAILYOUR, who was born on the 9th October, 1849, at Mussoorie, N.W.P., was the son of Colonel Thomas Renny-Tailyour, J.P. and D.L., Royal (late Bengal) Engineers, of Borrowfield, Forfarshire. Educated at Cheltenham College (August, 1859–December, 1867), he was in the cricket eleven of 1867, and the *Cheltonian* described him as “a tremendous hitter in his day, though rather uncertain; also frequently shows good defence; a magnificent out field, having plenty of dash; sometimes useful as a change bowler.” A very few years later there was no uncertainty about his batting! At the R.M.A. (January, 1868 to July, 1870) he was in the elevens of 1868, 1869 and 1870 (captain in 1870); in the football fifteen 1868 and 1869; in 1870 he won the mile and half-mile at the sports, and against Sandhurst was first in the half-mile. Before leaving the Shop he had given a striking example of what was to come afterwards by scoring 106 not out on Chatham Lines, for the R.M.A. against the Corps.

Gazetted lieutenant, R.E., on the 23rd August, 1870, he was at the S.M.E. until December, 1872, when he was posted to Portsmouth; but in May, 1873, he joined the 4th Company (Submarine Miners) then on board H.M.S. *Hood*, which was moored off Gillingham Pier in the Medway. In February, 1876, he went to Ireland as extra A.D.C. to the Lord Lieutenant, and the following January was ordered to Gibraltar; after a year there he returned to Chatham for three years, being Assistant Instructor in Telegraphy from May, 1878, to February, 1880. From April, 1881, to August, 1884, he held the appointment of Instructor in Fortifications at the R.M.A., after which he returned to Chatham, as Assistant Instructor in Field Fortification, for nearly four years; then followed three years at Gibraltar and three years at Sydney, in Colonial employment, as C.R.E. Defences, New South Wales.

The end of 1894 found him back again at Chatham, where he commanded the Training Battalion from August, 1895, to October, 1899, when he retired from the Army in order to take up the appointment of Assistant Managing Director in the Guinness Brewery at Dublin. He became Managing Director in 1913, and on resigning that position last year the following appreciation of his services was

recorded in the Annual Report to the Shareholders of the Company : " The Directors have to report, with regret, the retirement of Colonel Renny-Tailyour from the Board upon which he has so ably worked for the past twenty years." On leaving Dublin, he went to live at Newmanswalls, Montrose, a property which, with Borrowfield, has belonged to the family for several hundred years. There he spent his time fishing, golfing, and shooting, keenly interested in the garden, until he was quite unexpectedly taken ill and he passed away after a week's illness.

He married, in 1875, Emily, daughter of John Wingfield-Stratford, Esq., of Addington Park, Malling, Kent—she died in 1904. By her he had a family of four sons and six daughters. One son died in Africa and his youngest son, in the Sappers, was killed in action near Ypres in 1914 ; his eldest son commanded a battery of Horse Artillery in Mesopotamia, and was several times mentioned in dispatches.

The record of his life given above will suffice to show that he was a typical Sapper, well able to more than hold his own at any kind of work, but it is doubtless as a sportsman that " Renny " will be affectionately remembered by those who had the privilege of being associated with him in past years. Before he joined at Chatham in 1870, there were cricketers in the Corps who had made names for themselves among the amateurs of the day—Fleetwood Edwards, S. Reid, Waller, and Jim Fellowes, to mention only a few—but everyone will admit that to him was mainly due the raising of R.E. cricket to a position which it had never occupied previously and which has been so well maintained since. It was not merely by his own contributions to the score sheets, large as they were, but his keenness in the field was infectious, and made everyone play the game to the best of their ability. He filled the position of Captain of the Eleven, with a few brief intervals, over a period of 17 or 18 years. In the years 1871-75 inclusive, his average each season was never less than 40, and in 1875 he had an average of 50 ; there were at that time no boundaries, practically speaking, on the Lines, and every hit had to be run out. In 1873, he was at the head of the batting averages, 46 for 31 innings, and he took 62 wickets with an average of less than 13 runs per wicket. He played for the Gentlemen against the Players in 1873, and for Kent occasionally in 1873 and 1874, but he never accepted an invitation to play in outside matches if his presence was necessary in the R.E. team.

At football he had the almost, if not quite, unique experience of representing his native country, Scotland, under Association and Rugby rules ; for the Corps he took part in the Association Cup matches of 1872, 1873 and 1874 (two finals), playing centre forward.

He excelled, not only in athletic games, but he was also a good shot and fisherman--an all-round sportsman of the best type.

Although not given to making great friendships quickly, all who were his intimate friends found in him a cheery, high spirited companion, upon whose absolute loyalty they could count at all times and under all circumstances. It may interest some who read this very inadequate memoir to hear that he retained to the last his almost boyish spirits, on occasions.

A LIFELONG FRIEND.

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*COLONEL W. J. BYTHELL, C.B.E., LATE ROYAL  
ENGINEERS.*

WE regret to announce the death of Colonel William John Bythell, C.B.E., late of the Royal Engineers, which occurred at a nursing home at Southsea on the 30th of June last.

Colonel Bythell was the only son of the late Colonel Bythell, of the Bombay Staff Corps, and of Mrs. Bythell, Stoneycroft, Southsea, and was born on the 9th of September, 1862. He was educated at Newton Abbott and at the Royal Military Academy, into which he passed in 1880.

He was gazetted to the Royal Engineers on the 25th July, 1882, and after a short period of service at Chatham was selected, in 1884, for special duty with the Topographical and Intelligence Branch in Bechuanaland under Major-General Sir Charles Warren by whom he was honourably mentioned in dispatches.

He was posted to the Indian Establishment in October, 1886, and joined the Bombay Sappers and Miners, being transferred later to the State Railway Department, in which he served for nearly two years. In May, 1889, he was posted to the Survey of India, in which Department he served until his retirement in 1916. In the Survey of India he soon acquired a reputation as a Military Topographer of outstanding merit and whenever a Survey Officer was required for frontier work Bythell was always one of the first to be selected. He served in the Chin-Lushai Expedition of 1889-1890 under Colonel V. W. Tregear, in the Chitral Relief Force (1895) under Lieut.-General Sir Robert Low, in the Mohmand Field Force (1897) under Major-General E. R. Elles, and in the Tirah Expeditionary Force (1897-98) under Major-General W. P. Symons. He was mentioned in the dispatches of all these Commanders and for his services, was promoted brevet-major and received the two Indian Frontier Medals with clasps for Chin-Lushai, 1889-90; Relief of Chitral, North-West Frontier, 1897, and Tirah. After serving as Assistant Surveyor-General he was appointed Superintendent of the Northern Circle, which appointment he held until he finally left India.

On returning to England he was re-employed and served as Recruiting Officer in the Southern Command, and in the Chemical

Warfare Department under Major-General Thuillier, and was made a C.B.E. for his services. It was while employed in this department that he contracted the gas poisoning which laid the seeds of the disease from which he eventually died—a victim of the great war as surely as those who gave up their lives in Flanders.

Apart from his professional career, Colonel Bythell enjoyed a reputation as an artist of no mean order, and his landscapes and pictures of battleships were well known and admired, both in this country and in India. Shortly before his death he was awarded a medal by the Royal Institute of Water Colour Painters. He was a fine cricketer, and played for his Corps in the early eighties. Fond of shooting, perhaps fishing was his favourite recreation, and he had few equals either with the mahseer in India or the salmon in Scotland. At one time an enthusiastic Mason, he took high degrees in the Craft. Few officers had a larger circle of friends than "Willie Bythell," and by his untimely death the world is the poorer of a good sportsman, a loyal friend, and a most devoted son.

He was laid to rest in the pretty churchyard of Christchurch, Purbrook, on Portsdown Hill.

## CORRESPONDENCE.

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MAJOR A. H. GARRETT, O.B.E.

*To the Editor, R.E. JOURNAL.*

DEAR SIR,—I have read with great sorrow the account of the career of Major Garrett, and I should like to offer a sincere tribute to the memory of so admirable and distinguished an officer, and to state that, in my opinion, not only the Corps, but the scientific world, has lost in him one of its most rising men. He passed through my hands when I was Instructor in Construction at the S.M.E., about 25 years ago, and I regarded him as one of the very best of the many talented young men with whom I was then brought in contact. Later on, in India, he used to correspond with me about his remarkable researches into the theory of arched masonry dams, which he carried into practical effect with so much economy and success in Rajputana. He subsequently sent me his diagrams about the discharge of water in channels, in connection with which his name will be always associated, and which seemed to me to be an admirable embodiment of scientific skill and practical knowledge. Had he lived, he would have risen to the very highest rank among hydraulic engineers.

His life was given without stint to the service of his country, and while we mourn his loss, we look back with pride and admiration to his achievements.

I am, yours faithfully,

G. K. SCOTT-MONCRIEFF, *Major-General.*

## *REVIEWS.*

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### DICTIONARY OF EXPLOSIVES.

By ARTHUR MARSHALL, A.C.G.I., F.I.C., F.C.S., Chemical Inspector,  
Indian Ordnance Dept. (Messrs. J. and A. Churchill). 15s.

Its title sufficiently indicates the object of this book, which has been arranged as a handy work of reference for those dealing with explosives. It contains a very complete list of all explosives now in general use, giving the composition and a brief description of each. Lists of explosives are given, classified as coal mine, blasting, and propellant; these classes being further sub-divided according to country of manufacture. An index of constituents is also included, which shows at a glance all the explosives in which each particular constituent is used.

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### ELECTRIC WIRING—THEORY AND PRACTICE.

By W. S. IBBETSON. E. and F. N. Spon. Price 18/- net.

The second edition of this book, which has been published this year, is decidedly more comprehensive than the old edition and can be recommended to those employed on electrical installation work. Considerable trouble has been taken to present the matter from the practical point of view, and the new chapter on "Motor Circuits," detailing as it does the characteristics and applications of all classes of motors, will be found distinctly useful. Systems of wiring and methods of installing the wiring are well described, although the possibility of using connectors to save long loops has been but lightly touched upon. A special chapter is devoted to the problem of steep wiring, and there are a number of useful appendices. The book is specially adapted to the use of students taking the City and Guilds of London Institute examinations in installation work, and a number of questions from these examinations are given at the end.

G.T.

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HOW TO OBSERVE IN ARCHÆOLOGY. Printed by the  
Trustees of the British Museum. 2/6.

This little handbook should prove of the highest value to officers stationed in the Near or Middle East, both to those who are already interested in the study of archæology and also to those "who are not interested in the subject, but coming into possession of antiquities may unwittingly do incalculable harm by allowing them to be destroyed



or dispersed before any record has been made." In the introductory chapter it is stated that "most, if not all, of the countries with which we are concerned, have their Laws of Antiquities. It cannot be too strongly insisted that these laws, even if they might be better than they are, should be obeyed by the traveller." Individual objects may form whole pages of history, whether of politics, arts or civilization, and half or more than half of their scientific value is lost if the sources from which they are obtained are not intelligently recorded. The essential value of antiquities, apart from their purely artistic interest, lies in the circumstances in which they are found. "For the same reason anything like unauthorized excavation, especially by unskilled hands, is gravely to be deprecated. To dig an ancient site unskilfully or without keeping a proper record is to obliterate part of a manuscript which no one else will ever be able to read." The book is profusely illustrated, showing specimens of pottery, weapons and inscriptions.

F.E.G.S.

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#### IMPERIAL MILITARY GEOGRAPHY.

A Lecture by VAUGHAN CORNISH, D.SC. (Sifton, Praed & Co.) 1s.

This pamphlet may be safely recommended for the use of officers who are preparing lectures on the subject.

F.E.G.S.

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#### THE LAWS OF HIGH SPEED PUNCHING WITH PARTICULAR REFERENCE TO THE PERFORATION OF ARMOUR BY PROJECTILES. By Capt. T. J. TRESIDDER, C.M.G., late R.E.

In the case of slow moving punching presses such as are used for the perforation of plates, the following law obtains, viz., energy expended varies as  $Dt^2$  where  $D$  is the diameter of punch and  $t$  the thickness of the plate.

In the memoir under review Capt. Tresidder investigates whether the same law obtains in the case of the perforation of armour plates by projectiles, and he has shown that substantially it does.

The whole subject is very lucidly treated, as might be expected of such an authority on ballistics as Capt. Tresidder, and the memoir is not very difficult reading.

In the Appendix there is a summary of the long-fought-out duel of guns *versus* armour, and Capt. Tresidder points out that it is the projectile which is the weak point of attack, and that if this can hold together no armour of practicable thickness will resist penetration at any but extreme ranges. The reasons for this will be found by studying the memoir, which should be of considerable value to artillerymen.

J. M. WADE, *Lieut.-Colonel.*

## NOTICES OF MAGAZINES.

## THE MILITÄR-WOCHENBLATT.

No. 104.—*Infantry Equipment in the Light of War Experience.*—Capt. Stephanus compares the simple weapons with which the infantry began the war and the armoury with which it was equipped at its close. The infantry was not adequately prepared either technically or tactically at the beginning of the war, but every war brings surprises and the longer the preceding peace the more there are. After a successful war all lessons are quickly forgotten but not after an unsuccessful one. The old regulations called the infantry the "Queen of Battles," but did not train it properly or give it adequate support from artillery or machine guns. The attack was studied too much, and the defence neglected, with the result that faulty fire tactics were adopted. The victories at the beginning of the war were won through the overwhelming moral superiority of the Germans, and in spite of their fire tactics. When the trench war began the long neglected individual shot began to be recognized at its proper value, but the effects of faulty peace training were not easily eradicated, and every infantry officer knows how difficult it was to get men to seize fleeting opportunities and to shoot without waiting for the accustomed words of command when favourable targets presented themselves. Artillery and machine guns were multiplied enormously, and as trench war became more and more rigidified the absence of visible targets caused the rifle to be relegated more and more to the background, while grenades and trench engines of various sorts were increasingly used.

*The Plundering of German Brains.*—Capt. Gadow, of the German Navy, notes with great anxiety a tendency on the part of Germans to believe what the Entente tells them. This will never do, and he whips up their flagging hate by describing the action of the various Commissions of Control. These, not content with supervising the destruction of German war material, are actually collecting information regarding its construction and its use. He comforts himself by reflecting that the brains and hands which produced these inventions in the past can make better ones in the future and looks with contempt on the victors whom fear, jealousy and curiosity compel so to search through the ruins of German power.

A choice collection of extracts from various French papers is given in order to show that the Allies are quarrelling, that Alsace hates France, and that France wants to utilize the troubles in the Ruhr district as an excuse for the partition of Germany.

German officers of the Reserve domiciled in Alsace may, if they wish, enter the French Army as 2nd Lieutenants, but ex-active list officers can only come in as private soldiers with the chance of promotion if found deserving. This is justified by the French on the grounds that an active

list officer entered the German Army because he wanted to, but the reserve list one because he had to.

No. 105.—*Infantry Equipment in the Light of War Experience (continued)*.—The attacks of 1915 showed on both sides the same characteristics; artillery and machine-guns undertook the provision of covering fire and the peace-time spectacle of mutual support between infantry units was never seen. The expenditure of rifle ammunition fell very low, and to read the daily *communiqués* with their perpetual "attack was repulsed with artillery and machine-gun fire" one would imagine that no such weapon as a rifle existed. Yet it would be quite wrong not to consider the rifle as the chief weapon of infantry when its use is properly taught. It was here that the fault lay; no German had ever fired his rifle at a range under 200 to 300 metres, and so he left the fire-fight to the machine-gunners and replaced his rifle with a hand grenade. Attempts to alter this were made during the war, but too late. The light machine gun had to be introduced to do the work which the heavy one could not and the rifleman would not perform, but it could not do so properly. Its fire effect was far from equalling that of the heavy, and its weight, awkwardness and the size of its crew were further drawbacks. Hence came the machine pistol, which, however, was only effective up to 200 metres and of which the ammunition was at times faulty. Tanks in ever-increasing numbers next made the anti-tank weapon a necessity—one more "special" weapon. Last came infantry guns and very useful, in fact essential, they have proved themselves to be; an extended use of them is to be expected. The writer considers that the aim of future research should be to produce a simple grenade which can be projected either from the hand, or the rifle, and a weapon which shall combine the qualities of the machine gun, the rifle and the machine pistol. That is to say it must be a handy self-loading weapon with a useful range up to 1,000 metres; it must be as good for single shots as for bursts of fire; its ammunition must be light and simple. The bayonet cannot be left out; its moral effect, both on the enemy and on the man himself, is too valuable. He concludes that a thorough training in snap-shooting with fixed bayonet will be necessary in the future and emphasizes the necessity for simplifying the armament of the infantry man for training reasons, for, although with their present 12-year man this is not so important, with the masses of recruits which may one day confidently be expected, it will be a main consideration.

No. 105.—*The Intelligence Service, the Press and Public Opinion during the War*.—This book by Lieut.-Colonel Nicolai, who was head of the German Intelligence service at General Headquarters, is fully reviewed. It is stated that weakness of the German system lay in inadequate peace preparation, as against the lavish expenditure of the Entente. Counter-espionage met many difficulties, of which the lack of uniformity in the various German State police systems was one of the greatest, particularly when the Entente propaganda set to work in the political and economic life of the country. On the purely military side he claims complete success. Other chapters deal with censorship and *communiqués*, and discuss the difficulties which the politicians caused by making General Headquarters do the work which they themselves should have

undertaken. As Colonel Nicolai served under Moltke, Falkenhayn, and Ludendorff an adequate account of his activities should prove of considerable value.

*Yugo-Slavia.*—Even the *M.W.B.* cannot withhold its praise from the Serbian Army; the first to mobilize, it was the last to demobilize. Before mobilization it had undergone two severe campaigns, and at the very end of the war was allotted by the Entente the heaviest burden in the Macedonian operations. Its losses are variously estimated at from 500,000 to 900,000 out of a total population of barely four million souls. Typhus accounted for an immense number. After the great retreat, and when emigrants from America had filled the ranks, only six weak divisions and a half mounted cavalry division could be formed. In spite of this the new State is forming a large and essentially Serbian Army, for former Austrian elements are not encouraged, unless of definite Serbian sympathies and speaking a South-Slav language. It will eventually amount to 24 divisions and, in the infantry, service with the colours will be from 14 to 15 months.

No. 106.—*The French Army and Disarmament.*—The writer does not think the contemplated establishments of the French Army show many signs of disarmament. The figures aimed at for 1st November, 1920, are 550,000 white and 195,000 coloured troops. It is thought probable that the first figure will not be attained, in which case more coloured troops will have to "bring their skins to France for sale." France feels she cannot rely on England, Italy or even America for help, and is determined once and for all time to be in a position to beat Germany single-handed. The French say "Disarmament is absurd, no one but the credulous German Michael would be so foolish as to imagine such a thing. Let us prepare, so as to be ready at all times not only to push forward our imperialistic plans in Africa and Asia Minor, but also to keep Germany down in the dust."

*Regimental Associations.*—Major Steuer, president of the Officers' Union, advocates the adherence of regimental associations to a central organization which should be built up as soon as possible.

*Officers' Pensions.*—A demand is made that the pensions of officers of the old army should be paid in gold marks, which are estimated at 10 times the value of paper marks. The claim is based on the fact that pensions are really deferred pay and that, as the pay, of which payment was deferred, was in gold marks it is sheer betrayal to issue it now in an equal number of paper marks. One seems to have heard very similar arguments in this country. Another appeal on the same subject points out that a recruit now receives more in pay than a Lieut.-Colonel, retired, after 35 years' service, does in pension, and a young lieutenant more than a pensioned divisional commander. The result is that the son has now to make his father an allowance. Changes are said to be under consideration, but the writer does not hope for any great improvement; it appears that the usual giving with one hand and taking with another is likely to result.

No. 107.—A brief summary of British Army and Navy estimates receives the comment that they, too, show very little sign of disarmament.

*Official Notices.*—Government employees are to receive pay during the great general strike, provided they reported for work on Monday, 22nd March. Any Government employee who joined the "Einwohnerwehr" or "Zeitfreiwilliger" or other emergency organizations for maintenance of order, is not to be dismissed for that reason. His absence is to count as absence on leave.

*Reviews of Books.*—"Four Years War in German East Africa," by Arning and "The Austro-Hungarian Share in the War," by General von Auffenberg-Komarow are both well reviewed.

"Bestiality in the World War" is another of the "hate" books now being published, probably as a counterblast of the Leipsic trials. British and French are accused of the most terrible cruelty to all who fell into their hands.

*Roll of Honour.*—Reichswehr Rifle Regiment No. 61.—9 officers and 28 other ranks killed during the March troubles.

No. 108.—A farewell order announces the disbandment of the German Army Reserve and thanks all who served in it for their great deeds during the war.

*Germany Must Disarm!*—The leading article protests against this ruling. After enumerating the progress made in destruction and surrender of material, the writer expresses the view that an army which is not built on universal liability to service contradicts every principle of democracy. He thinks that the British Army only manages to exist by reason of the opportunities it has for employment overseas, and that it is illogical and wrong in every way to impose the British system on a State which has to exist under entirely different conditions. The fear of a repetition of the Scharnhorst methods of building up a reserve, if a conscript army is allowed, is declared to be groundless, owing to modern conditions. No reason is, however, given to show how these conditions affect the case. The existence of secret stores of arms is denied, and it is declared that Germany is loyally trying to carry out the terms of the treaty and that no one is more desirous than the German Government to collect the weapons now held, without authority, by the populace. Rumours of secret arsenals are started by profiteers and radical elements who wish to see Germany even more powerless than at present.

*The Roumanian Army.*—Roumania as now constituted has a population of 15½ millions, and can therefore maintain double the army she could before the war. At present she has 35 divisions, an increase of 13 on the number with which she entered the war. These are not yet demobilized but are maintained on a low establishment, liberal leave being granted. Arms and equipment are good, but not quite sufficient as yet, though much has been got from Hungary. Roumania appears to have treated ex-enemy officers in an exemplary manner. Loyalty to Austria and Hungary during the war is rewarded and traitors to their country are not welcomed by their new compatriots. Ex-enemy officers are freely posted to the new Roumanian Army which, in consequence of this liberal policy, is rapidly settling into shape.

No. 109.—General von Freytag-Loringhoven's book "Heerfuhrung im Weltkriege" is reviewed. The sound doctrine which Germany brought into the war is to be attributed to a great extent to the teachings

of the author during his 25 years' service on the General Staff. He knew how to read history, and understands in this book how to give events their proper historical consideration and to draw correct conclusions from them. The book appears to be one which will repay study.

The subordinate *personnel* of the German navy appears to be in a very rotten condition. During the March disturbances the under-officers got quite out of hand and threw many of their superiors into prison for several days. The forces which are working for Bolshevism found willing tools in many of the sailors, who do not appear to understand that, by their action, they are not only destroying their own profession, but by quenching all hopes of a modest navy ever being reconstructed, are doing England's evil work for her.

NO. 110.—*Mounted Attacks by Cavalry in the War.*—Major-General von Poseck quotes a number of instances to disprove the allegations that German cavalry were shy of attacking when opportunity offered. The actions, or inactions, which he mentions prove nothing, one way or the other, but the following description is curious: "1. 9. 14. Fight at Néry. Mounted attack of the 18th Cavalry Brigade in several waves on English infantry, which threatened the left flank of the 4th Cavalry Division. The enemy was over-ridden and his attack brought to a standstill."

*The Belgian Army in 1920.*—The Flemish-speaking Belgians are getting more consideration than formerly and at several military training establishments Flemish is the official language. The *M.W.B.* notes this as indicating a weakening of French influence. Elsenborn, the former great German training camp near Malmédy, has been taken over by the Belgians for musketry and artillery training.

*The Dutch Army in 1920.*—The danger of Bolshevism penetrating through Germany to Holland is remarked, and Holland has strengthened her frontier troops accordingly.

NO. 111.—In "The State, the Army and the People," an anonymous author contributes a carefully considered article on the present situation. "Before the 13th March, Germany was beginning to recover, at any rate so far as the peace terms permitted. Work was improving and a fair output of coal being obtained. The publication of Keynes's book had also raised some small hopes of a revision of the treaty. With the events of March everything stopped dead; France began again to speak of fulfilling the treaty to the letter, and the one pillar of the State, the army, began to crack. The participation of a small portion of it in the 'putsch' was arranged, and then suspicion was thrown on all the rest, until the minds even of the middle classes were turned against the army and particularly against the officers. The Communists and Spartacists very nearly came into that inheritance of ruins which they have so long sought. The grounds on which they could have based their hopes were the effects on the army, first of the revolution and, secondly, of the treaty. The Government, except for Noske and the President, treated the army and particularly the officers with the utmost folly and the basest ingratitude. Then, having got it into a thoroughly discontented condition, they exposed it to the influence of every politician in giving it free voting rights. Communists tried to spread into the barracks the idea of further

revolution. While the reactionaries worked for the re-establishment of the old *régime* the middle party did practically nothing. These political strivings succeeded in widening the gulf between the officers and the men and, by destroying any mutual confidence which the disastrous Soldiers' Councils *régime* had left, in cutting away the foundations of strength in the army as a whole. Under these conditions, what wonder that some officers arrived at the conclusion that they must work out their own salvation, and that if they didn't help themselves, no one else was likely to do so? The other factor which made the Kapp 'putsch' possible was the peace treaty, with the reduction of the army to 100,000 professional soldiers, with no colonial service to look forward to and nothing but politics to offer any change during their 12 years' service. This, together with the uncertainty hanging over everything, brought about the Kapp affair, and now the first thing that is required is the restoration of the sanctity of the oath of allegiance and fidelity to the Constitution."

*Officers' Unions.*—The organization of officers' unions and their co-ordination with each other is not going quite smoothly, but the fact that this is so, is more a sign of lively interest in the question than of any inherent defects in the movement. Several rival schemes, some of them partly matured, are in the field, but though their methods and organizations may vary, their objectives all lie, at a greater or less distance, in the same direction. A solid and powerful combine may be expected in the course of a year or so.

NO. 112.—*The State, the Army and the People* (continued from No. 111).—The question as to whether an officer or soldier favours a republic or a monarchy should have no more effect, on his position in the army, than his religion, and he should not have to declare his feelings on the subject. If he is obliged to do so then the most valuable elements of the army will be lost to it, since no man can reasonably be expected suddenly to change his opinions regarding a *régime*, which he has been brought up from his earliest days to reverence. If the officers' corps is destroyed then the whole army is destroyed, for the non-commissioned officers can no more replace it than the workmen can take the place of the management in a business. By all means let competent non-commissioned officers aspire to commissions, but let it not be assumed that the work of an officer can be learnt over-night. The pretensions of the workers to the sole right to control the army can by no means be justified; the peasants and bourgeois have just as much claim to a voice in the matter, but no one in authority except Noske and the President seems to recognize that the Reichswehr is the mainstay of the State. Reforms are certainly necessary and a closer touch between the officers and modern conditions must be brought about; the most valuable officers will be the first to perceive that new methods must be adopted to make the army a true expression of the national instinct. The force of public opinion, and with it, the public Press, must be considered. Such consideration does not imply that the officer should not form his own opinions and act up to them, but that he should in forming them, recollect that other people have opinions and points of view as well as himself. The soldierly virtues of honour, obedience, comradeship and discipline can never be dispensed with, and the soldiers' trade and life,

at any rate up to a certain rank, must necessarily be a rough one, but the attacks on the army are based, not on these facts, but on the isolation and separation of the army from all sympathy with other forms of national life. The civil war of March only served to accentuate this isolation and much time will be required to heal the wounds then inflicted. Many circumstances combined at that time to make the task of the officer a difficult one, but it is admitted that his conduct was not faultless. The war had left so many officers who lacked the disciplinary training of pre-war days that this was only to be expected. But if Germany is not to be totally destroyed—and another Kapp affair would finish her—the army and the people must build up a mutual confidence and trust in each other. Only thus can the German State continue to exist.

*Officers and the Press.*—Lieut.-General von Winterfeldt asks why the Press and particularly the *Vorwärts*, which is a Government organ, is permitted to publish so much "hate" against the officers. Two prominent members of the Government, presumably with the concurrence of their colleagues, officially thanked the Reichswehr for their services during March and thereby justly honoured those who fell, of whom the number of officers was out of all proportion large. He can only conclude that these incitements against the officers are published with the connivance of the Socialists, since these have always prided themselves on their party discipline, and that the *Vorwärts* knows that the articles suit the book of the Government very well, though it would not do for them to admit this openly, owing to the effect on the Reichswehr.

*Heligoland.*—The programme of demolition which is to make Heligoland into a seaside resort and nothing else is outlined. Some 500 men are employed on the work, which began in April last, with the destruction of the airship sheds and batteries and will continue till April, 1923, when the English mission will be able to report to London that the island is of no use even to such a diminutive navy as Germany's. The harbour, etc., cost 80 million marks to construct, and it would be interesting for the tax-payer to know whether its destruction will come to very much less.

*Official Notices.*—The wearing of party colours in any form by the Reichswehr during the forthcoming elections is forbidden. Anyone painting them on his steel helmet will be dealt with for damaging Government property!

A list of Regimental Unions is given, bringing the total up to 100.

L. CHENEVIX-TRENCH, *Major, R.E.*

REVUE MILITAIRE SUISSE.

No. 4.—April, 1920.

THE NEW HUNGARIAN ARMY.

Capt. Cuno Hofer, the author of the original article, points out that Hungary now possesses on Magyar soil its first national army since the days of the Turkish conquest. It was in February, 1919, that a handful of officers of the old Hungarian Army succeeded in organizing a Society



the main object of which was to prevent their country from going to ruin through disintegration. The President of this Society was Gyula de Gömbös, an extremely energetic officer of the General Staff; he laid in this Society, named the Magyar Országos Véderő Egyesület (Society for the Protection of the Homeland), or shortly the "Move" (from the initial letters of the full title), the seeds from which has sprung the new Hungarian Army. Böhm, the Minister for War, attempted to dissolve the "Move"; however, it managed to survive the persecutions of the Károlyi clique, until the unhappy adventurers forming this clique, finding themselves powerless under the then prevailing circumstances, surrendered themselves into the power of Bela Kun and his party. With the advent of the "Red Terror" (March 21st, 1919), the leading spirits of the "Move" escaped to Vienna and formed the anti-Bolshevik Corps of Hungarian officers; for their Chief they chose a man whose name was familiar to all in connection with the distinguished part he had played in the War, namely, Admiral Horthy. It is Admiral Horthy who has saved his country from falling under the domination of the Bolsheviks and who has, at the same time, organized the new army which has come into existence in Hungary, since the power of the Central Empires crumbled away in 1918.

#### NOTES AND NEWS.

*France.*—A special correspondent contributes notes relating to some of the more important matters affecting the French Army. He points out that the fighting value of an army depends on three essential elements:—The preparation of the troops both as regards their material as well as their morale; the range of knowledge possessed by its General Staff; the personalities of its leaders and superior officers. It is because the last of these elements is the most important of the three that the French Government has begun its re-organization of the army by dealing with matters affecting its Higher Command. On January 24th last, a decree was signed relating to the organization of the *Conseil supérieur de la guerre* and the General Staff. The effect of this decree is to continue in force during peace time, under the authority of the War Minister, an organization practically identical to that which was in force during the final phase of the war. It is pointed out that there can be little wrong in a system which, under a democratic régime, has produced such men as Joffre, Nivelle, Pétain and Foch in the ranks of the Generals; and such men as Messimy, Millerand, Gallieni, Painlevé and Clemenceau as holders of the portfolio in the Ministry of War. Under the new organization the Commander-in-Chief of the French Army will, in peace time, take the title of Vice-President of the *Conseil supérieur de la guerre*. The *Conseil supérieur* will be under the presidency of the War Minister and will consist of the Marshals of France and not more than ten Divisional Generals, including the Chief of the General Staff; all the military members have full voting power. The members of the *Conseil supérieur* are appointed for one year at a time only. For 1920, the *Conseil supérieur* will consist of Marshal Pétain, as Vice-President, Marshals Joffre and Foch and Generals Humbert, Maistre, Berthelot, Guillaumat, Nivelle, Mangin, Debency, de Boissoudy, Degoutte and

Buat—the last named has been appointed Chief of the General Staff. Of these 13 members, three belonged originally to the artillery, one to the Engineers and the remaining nine are all ex-infantrymen.

No. 5.—May, 1920.

#### RE-ORGANIZATION OF THE INFANTRY ARM.

Major Schmidt, the author of the original article, opens his contribution with the observation *piscem natam doces*, but points out that he has no desire to adopt the rôle of a preceptor. He devotes his attention to the views expressed in some of the literature, published since the outbreak of the Great War, in which the subject of the infantry combat has been dealt with. In the part of the article contained in the number of the *Revue* under notice, he deals with the influence of the weapons in the hands of the soldier and with the infantry combat. He directs attention to the fact that in every war new tactical formations have been introduced, and that, in every case, such changes as have, in the past, taken place in battle formations have been dictated by the progressive developments which have taken place contemporaneously in the arms with which the opposing armies have been equipped. Major Schmidt points out that the organization of the infantry company, which at the outbreak of the Great War in 1914 was based on the assumption that the chief requirement in the battle would be a line of skirmishers to produce an effective development of rifle-fire, was considerably modified by 1917, mainly in order to enable the infantry to make the most efficacious use of the new weapons placed in its hands. An outline of the organization of a French infantry company in 1917 is given in the original article, and also that of a German infantry company about the same period. In both cases, by this date, a part of the infantry company had been converted into machine-gunners, whilst another part had become bombers, flame-throwers, moppers-up, etc. Full-page diagrams are given showing the normal attack formation of a French infantry company (on a front of 200 metres), and also that of a German infantry company after the new organizations had been introduced. Major Schmidt draws the following deductions from the developments in the armament of the troops during the Great War:—

1. The machine-gun has become the principal weapon of the infantry.
2. The rifle and the hand-grenade are the indispensable accompaniments of the machine-gun.
3. The rifle can no longer play the lone hand on the battle-field, but must co-operate in the completest unison with long-range and trench artillery.
4. Defensive weapons (*i.e.*, the bayonet, the steel-helmet, the gas-mask, the spade and shovel, etc.) have justified their existence.

The subject of the infantry combat is introduced by a reference to certain remarks made by an officer at one of the Schools of Instruction for American officers in France; this officer pointed out that the soldier had, since the beginning of the Great War, so completely acquired the habits of the mole, that the old type of attack practised in field warfare

could no longer be reckoned among the practical methods of present-day tactics. Major Schmidt is not to be numbered among those who have come to the conclusion that in the wars of the future, belligerents will resort almost exclusively, or mainly, to trench war; he is a firm believer in Marshal Foch's doctrine that *the law of strategy is movement*. He sums up his views on the subject in the following terms:—

1. Developments in the armament of troops impose corresponding developments in the tactical domain.
2. Developments in the armament of troops have resulted in the machine-gun becoming the chief weapon of the infantry.
3. Manœuvre is still the essential element in the decisive action.
4. The closest co-operation of every type of projectile-throwing weapon has once more proved to be the most important requisite in the tactical handling of the combined arms.
5. Infantry remains the queen of the battlefield, but must increase its mobility. (*To be Continued*).

#### THE RÔLE OF ENGINEER TROOPS IN THE WORLD WAR.

Colonel Lecomte's article on the above subject begun in the *Revue* for March, 1920 (*vide R.E.J.* for July, 1920), is concluded in the number under notice. He states that he is not prepared to put forward definitive proposals relating to the organization, etc., of the Engineer arm as a whole. There are certain matters, however, which, in his opinion, should receive early attention. Colonel Lecomte advocates the formation of a "Signal Corps," which should be responsible for the services connected with every type of electric telegraphy, and should include flag signalling within its domain. He considers that the organization of a national army should be framed from the point of view of defence, and not that of offensive warfare. The mission of the Engineer arm should be to prepare defensive zones; the works to be carried out by them being:—(1) The organization of the frontier defences; (2) the destruction of the communications in front of the prepared positions; and (3) the improvement of the communications in rear of the prepared positions. He recommends that there should in future be five categories of Engineer troops in the Swiss Army, in place of three as at present, viz.:—(1) Infantry pioneers, one company per brigade; (2) Field Companies of Engineers, one battalion of two to four companies per division; (3) Mountain Companies of Engineers, one company per brigade; (4) Mining Companies, one company per division; and (5) Bridging Companies. Colonel Lecomte urges that Engineer officers should be employed in the higher positions of the General Staff. He points out that Engineer officers are not necessarily specialists with a narrow outlook; indeed, the Engineer arm furnished during the Great War, at least, two notable leaders, men of broad views: Kitchener and Joffre.

#### NOTES AND NEWS.

*France.*—A special correspondent deals with the military situation in France. The principal difficulty at the present time seems to be to find the men for the French Army on a peace footing. It is felt that without

men in the ranks in sufficient numbers, it is impossible to train capable generals to command in the field. At the present time three classes of men are serving with the colours: those of the 1918 class—these men having taken part in the last phase of the Great War, the class has been abnormally reduced by the casualties suffered; those of the 1919 class—these men were embodied by a process of selection before the termination of the war; and about two-thirds of the 1920 class, embodied in March last. Out of a total of 794,000 fully trained men, in the peace time army, some 330,000 should, in ordinary circumstances, have been demobilized during the first six months of this year; however, in view of the situation, the French Government decided to retain the 1918 class with the colours until June 15th of this year. Attention is called to the important discussions which have been taking place in the French Press on the subject of France's future army. The subject is also occupying the attention of the Chamber of Deputies; a Bill dealing with the re-organization of the Army was presented to the Chamber at its sitting of February 5th last, by certain members of the Socialist Party. Those who expected that the measure would contain revolutionary proposals are agreeably surprised at the moderation shown by the members of a Party which holds extreme views on army matters. It is proposed to retain conscription as the basis of recruitment for the French Army, but to limit the obligation for military service to 28 years in all.

*Italy.*—A special correspondent writes that Deputy Ivanoe Bonomi, who has taken over the Portfolio of the War Department from General Albricci, belongs to Bissolati's party and is a Socialist of the reformist group. A civilian has, it is stated, been appointed Minister for War in the hope that he will be able to take a strong line in reducing military establishments and, in consequence, the military budget. The new Minister has certainly been exceedingly active in promulgating measures affecting the Army since he took over the reins of office. He has reduced the establishment of Italy's peace time Army from 225,000 men to 175,000; corresponding reductions have been effected in the establishments of officers, horses, etc. The number of army corps is now 10 in place of 12—each of three divisions, total 27 Infantry Divisions and three Alpine Divisions. On the other hand, he has created a new Air Force.

W. A. J. O'MEARA.

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RIVISTA DI ARTIGLIERIA E GENIO.

April-May, 1920.

APPARATUS FOR SEARCHING FOR UNEXPLODED PROJECTILES AND OTHER BURIED METALLIC OBJECTS.

*La Vie Technique et Industrielle*, in its number for February, 1920, referring to the importance of searching for buried projectiles, so as to render possible the cultivation of the battlefields, relates that in 1914 Professor Gutton, of the Faculty of Science of Nancy, together with M. Thiry, of the School of Agriculture Mathieu de Dombasle, had

invented an electrical apparatus, based on the principle of the balance of induction of Hughes, to discover unexploded projectiles buried in the earth at a certain depth of the soil. Now, Engineer Chanoit, on the same principle, has constructed a more practical apparatus, and one more easily employed and requiring the work of only one operator while that of Gutton required two. This apparatus, which is attached to a telephone, is so regulated that when placed on the ground where projectiles are supposed to lie buried it reveals the presence of a metallic body. The apparatus can be carried on the shoulder by a strap. It can reveal the presence of a metallic object of 10 kg. weight at a depth of '40 to '50 m. and its action can be felt at a radius of about 1'50 m. The sensibility of the apparatus is such as to signal the presence of a copper disc of '30 m. diameter and 1 mm. in thickness buried at a depth of about '60 metre. This gives a means of determining with marked approximation (about 5 cm.) the point where the object is situated. According to the editor of the *Vie Technique* the apparatus Alpha is easily regulated and maintained, and would be of great service in searching for buried projectiles. Up to the present time the use of the apparatus is stated to be limited in France to the search for metallic objects, water and gas pipes, etc., and the results are favourable.

Latterly at Châtillon-sur-Seine, in the presence of the engineers of the Compagnie Générale des Eaux, small keys which had been lost and buried in the ground for about fifteen years were discovered in a few minutes. It was verified on this occasion that five minutes were sufficient to explore 50 square metres of ground.

E. T. THACKERAY.

## CURIOSA MATHEMATICA.

No. 1.

SOLUTION.

THE following numbers are written by the use of no numeral other than 2 (not even 0).

$$69 = \frac{\sqrt{(2^3)}}{\frac{C_2}{2^2}} \quad 91 = \int_{\frac{2}{2}+2}^{\frac{2}{2}} 2x dx \quad 93 = \int_{\sqrt{\frac{2}{2}}}^{\left[\frac{(2^2)}{2}+2\right]} x dx$$

$$133 = \frac{2^2 2}{2} + 22, \text{ but not using } 222 = \int_2^{\sqrt{\frac{\sqrt{\frac{2^2 2}{2}}}{\sqrt{2}}}} x dx \quad \text{!!!!}$$

$$137 = \frac{\sqrt{(2^3)}}{\frac{C_2}{2}} - \frac{2}{2} \text{ or } \int_{\sqrt{\frac{2}{2}}}^{\frac{\sqrt{(2^3)}}{\sqrt{2}}} x dx - 2$$

$$147 = \int_{C_2}^{22} \sqrt{\frac{2 \times 2}{2}} x dx \quad 149 = \int_{\sqrt{2}}^{\sqrt{\frac{\sqrt{(2^2)}}{2 \times (2)^2}}} x dx \quad 483 = \frac{\sqrt{(2^3)}}{22}$$

C. R. SATTERTHWAIT.

No. 2.

Proposed by Major Sir M. A. Cameron, K.C.M.G.

(Propounded by Dr. J. B. Emmerson of Biggleswade, in the *Spectator* of 31st December, 1901).

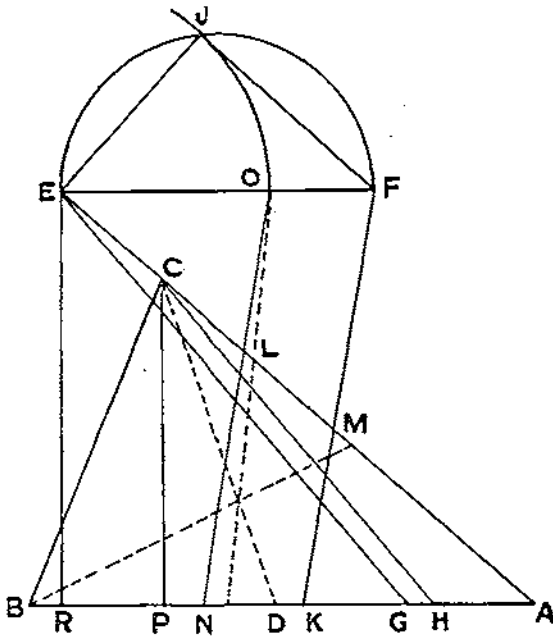
Write every number from 1 to 100 inclusive, using 4 fours, neither more nor less, the use of any digit other than 4 is forbidden; any recognized mathematical symbol may be used.

Examples—  $\frac{4+4}{4+4} = 1$      $\frac{4 \times 4}{4+4} = 2.$

## PROBLEMS.

## PROBLEM II (Solution by XYZ).

To bisect a triangle by a line drawn from any point, O, within or without it.



Bisect, in D, that side on which a line from O, through the centre of the triangle, falls.

Call the opposite angle C. Mark, by A, that angle which lies on the same side of CD as O, and the third angle by B.

Draw EOF parallel to BA, cutting AC, or AC produced, in E.

Bisect DA in G. Draw CH parallel to EG.

Lay off, in the direction BA, OF = HA.

Describe a semicircle on EF. Make EJ = EO, and AK = FJ.

Then a line through O parallel to FK will bisect the triangle ABC.

Draw CP and ER  $\perp$  to BA.

Since EO = EJ and AK = FJ, and since  $\Delta$ 's EMF, EOL, AMK are similar

$$\Delta EMF = \Delta EOL + \Delta AKM \text{ (Euclid VI. 31)}$$

$$\therefore \text{trapezium FL} = \Delta AKM.$$

$$\text{Consequently} \quad \parallel^{\text{m}} \text{NF} = \Delta ANL.$$

Now by similar  $\Delta$ 's

$$ER:CP = EC:CA = GA:HA.$$

$$\therefore ER \cdot HA = CP \cdot GA.$$

Now  $HA = OF$  by construction  $= NK,$

and  $GA = \frac{1}{2} AD$  by construction  $= \frac{AB}{4}.$

$$\therefore ER \cdot NK = CP \times \frac{AB}{4}.$$

That is  $\square^{m}NF = \frac{1}{2} \Delta ABC.$

$$\therefore \Delta ANL = \frac{1}{2} \Delta ABC.$$

#### PROBLEM 12 (SOLUTION).

Find the remainder  $47^{7385}$  when divided by 17.

By Fermat's theorem  $a^{m-1} - 1$  is divisible by  $(m)$  if  $(m)$  is a prime and  $(a)$  be prime to  $(m).$

$$\therefore 47^{16} = 17 \times \text{some factor} + 1 = 17a \text{ say} + 1$$

$$7385 = 461 \times 16 + 9.$$

$$\therefore 47^{7385} = 47^{461 \times 16} \times 47^9 = 47^9 \times (17a + 1)^{461}$$

$$= 47^9 (1 + 17 \times \text{some factor}) = 47^9 + 17b.$$

Hence problem is reduced to finding remainder of  $47^9$  when divided by 17

$$47^9 = (2 \times 17 + 13)^9 = 13^9 + 17c$$

$$13^9 = (129 \times 17 + 4).$$

$$\therefore 13^9 = 4^9 + 17d$$

$$4^9 = 64 = 3 \times 17 + 13.$$

Hence 13 is the remainder.

#### PROBLEM 13 (Major Satterthwaite, O.B.E.).

Is it possible to construct a triangle other than an isosceles triangle such that (i) All the sides are rational, and (ii) The perpendiculars from each vertex on the opposite sides are also rational?

#### PROBLEM 14 (Colonel C. L. Young).

Each player plays once with and twice against each other player; devise an arrangement satisfying these conditions. How many such arrangements are there?

J. M. WADE, Lt.-Col.



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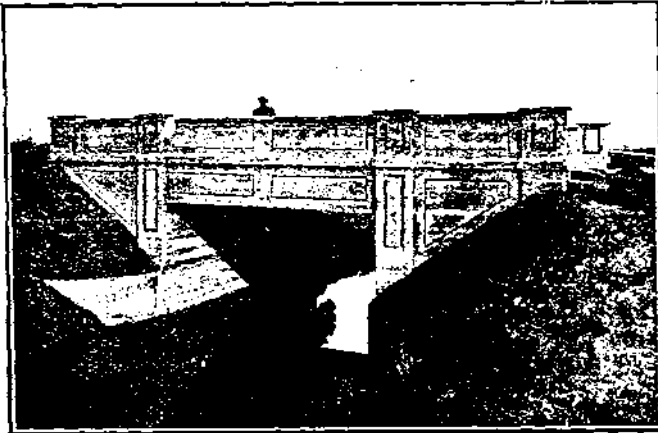
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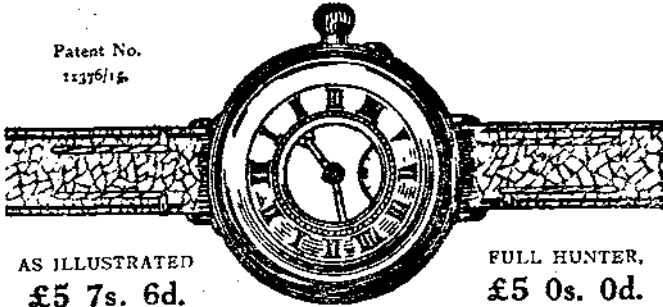
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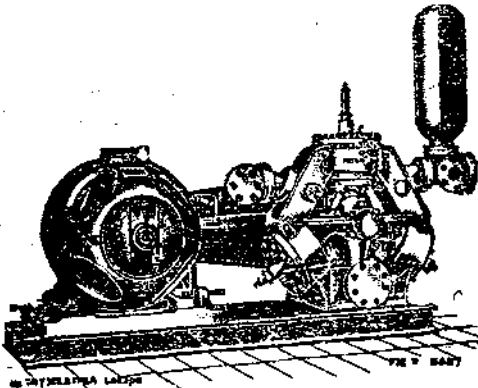
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