THE MARCONIGRAPH

Vol. II.—No. 13. April, 1912.

Subscription, 3/6 per annum, post free.

Price 2d. Post Free 3½d.

Wireless Experiments on an Aeroplane

THE applications of wireless telegraphy are now so widespread that much progress has been made in directions which in the ordinary way receive but little recognition. One of these applications is in telegraphing from aeroplanes, airships, and balloons. The advantage of being able to communicate with land or other stations whilst in the air has been well exemplified in the case of the Wellman flight, as well as on other occasions, and although little has been published on this important subject, it is not to be supposed that things have been allowed to remain in a quiescent state; on the contrary, some important experiments are now being conducted by Marconi's Wireless Telegraph Company, although it is not yet possible to publish the results of these experiments. On March 16th, when some wireless experiments were being carried out on Mr. Howard Flanders' monoplane at Brooklands Aviation Grounds, near Weybridge, a curious accident accurred. On the previous evening a trial flight was made after the wireless apparatus had been fitted to the machine, and everything seemed in perfect working order. On the Saturday morning, as the weather was exceedingly favourable for flying, the machine was taken out again, but it was then that the mishap occurred. The aviator was flying very low at the time, and on landing his first skid apparently stuck in the ground owing to a too sudden descent and to the speed at which the aeroplane was moving at the time—approximately 60 miles per hour—the machine turning completely over. The aviator was thrown out of his seat, and when picked up was unconscious. The fusilage of the machine was smashed in two places, and the propeller was also damaged. The wings had apparently escaped unhurt, but had to be stripped of their fabric and thoroughly overhauled. The exhaust pipes, radiators, and lubricating pipes on the engine were also damaged, and the front skid of the aeroplane was smashed in half. Amidst the débris of damaged parts it would not have been surprising had the wireless apparatus been smashed, especially as the oil tank beside which the wireless apparatus was fitted had been severely battered in, and was leaking badly. After removing the sand and dirt with which everything was covered, it was found, however, that the wireless apparatus had escaped quite undamaged, and was in working order; even the aerial wire, which was attached to the broken fusilage, remained intact.

THE RIGHT HON.
HERBERT L. SAMUEL, M.P.

The Right Hon. Herbert Louis Samuel, M.P.

H.M. Postmaster-General

MR. HERBERT SAMUEL, who has successfully carried out the negotiations on behalf of the Government with Marconi's Wireless Telegraph Company of the scheme for the establishment of a chain of wireless telegraph stations throughout the Empire, was born in Liverpool on November 6th, 1870. He was educated at University College School and Balliol College, Oxford, where he won first-class honours. At the General Elections of 1895 and 1900 he contested South Oxfordshire, and on each occasion was defeated by a narrow majority. At a by-election in 1902 he was elected for the Cleveland Division of Yorkshire, which he still represents. On the formation of the Liberal Administration in 1906 he became Under-Secretary for the Home Department. In 1909 he was appointed Chancellor of the Duchy of Lancaster with a seat in the Cabinet, and a year later he was appointed to the arduous post of Postmaster-General, a position which he still retains and covers with great distinction.

When at the Home Office Mr. Samuel's faculty for mastering detail was revealed in the Children's Bill, which the Home Secretary of that day surrendered entirely to his hands. No more humane measure has ever been before Parliament, and certainly Parliament never saw a measure more ably handled, both in the House of Commons and in Committee. It was impossible to find a flaw in the workmanship, and Mr. Samuel's skill in Committee won the rare distinction of a dinner in honour of his success. It was the success of one who has in remarkable combination the *suaviter in modo* and the *forfiter in re*. He is thrice armed, for he adds to knowledge rare astuteness and blameless temper. It is impossible to trip him up, either in fact or in feeling. He has the enormous advantage of always knowing more about his subject than his opponent, and that is a great aid to cheerfulness of temper. "There are two ways of governing men," said Disraeli in one of his novels. "Either you must be superior to them, or despise them." Mr. Samuel has adopted the better way.

In a brilliant impressionist sketch of Mr. Samuel, written by Mr. A. G. Gardiner some years ago, his character is succinctly summarised in the following notable passage:

"He is the type of efficiency. There is no more industrious man in the Ministry, none whom you find more completely equipped in knowledge, or in clear-cut decisive opinion. No matter what subject you raise bearing on his department, you find that this undemonstrative, wise young man is prepared to crush you with blue books you have never heard of, and experiences of places where you have never been. When I met him at the Sweated Industries Exhibition, the impression left was that of a man who had nothing to learn on the subject. He had studied it in the East End; he had studied it on the Continent years before; he could tell you more than you could ever hope to know. You felt humble and cheap."

It has been said by one who was a comrade of Mr. Samuel's in his childhood that his favourite amusement was politics, and that when other boys were reading Ballantyne he was reading blue books. One can imagine him as a boy at University College School planning out his future with the quiet certitude of a mathematical mind engaged on an easily negotiable proposition, and, having planned it, working silently and unceasingly for its accomplishment. It is characteristic of his assured restraint that he has never sought to force the pace of his progress. No extravagance of speech or action is ever associated with his carefully considered career. He does not thrust himself into the limelight. He is content to be forgotten. He knows the power of discreet silence as the man of taste knows the value of the blank space on the wall.

Little wonder, therefore, that, to a man of his calibre, so great a subject as wireless telegraphy should become an inspiration, and that his enormous capacity for mastering details of a subject should enable him to appreciate the immense value of an Imperial scheme such as has been decided upon. Mr. Samuel conducts the great department of which he is the chief in a manner alike creditable to himself and to the nation which has entrusted the task to him.

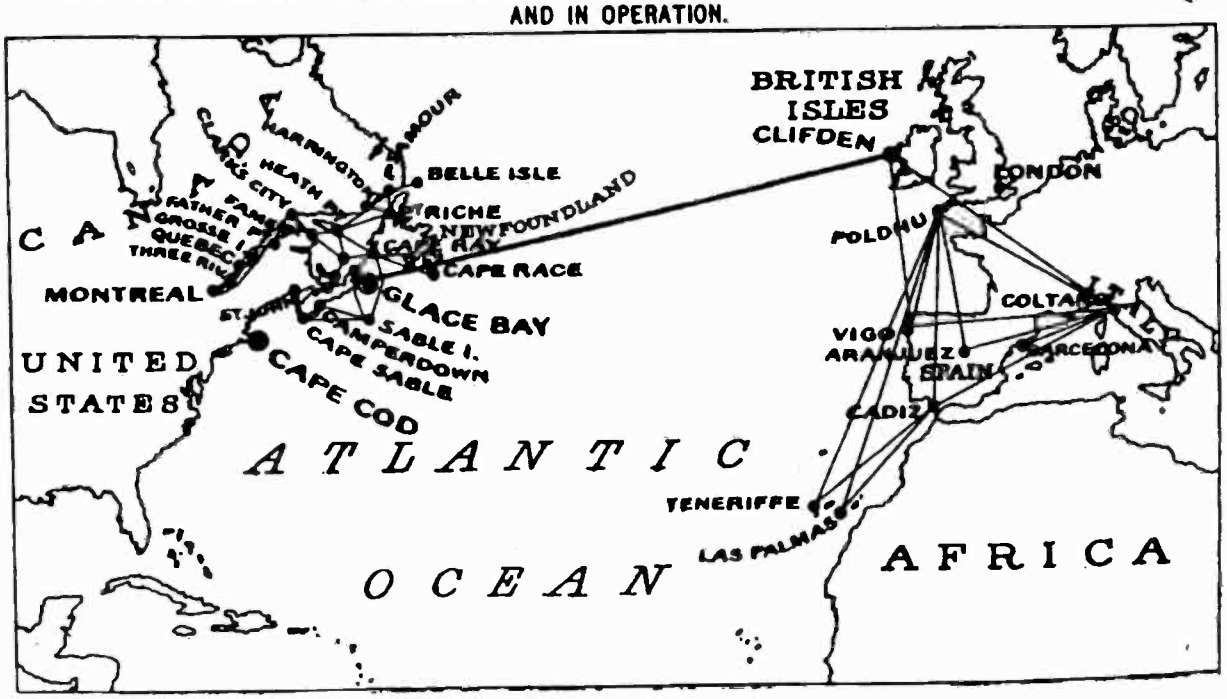
In Mr. Samuel's precise and profusely pigeon-holed mind there is no room for hesitation about conclusions, because there is no room for doubt about facts. Mr. Samuel is the author of a striking book, "Liberalism: Its Principles and Proposals," published ten years ago, and numerous political pamphlets and articles.

The Dawn of a New Era

Empire Scheme to be Commenced—The Details Considered

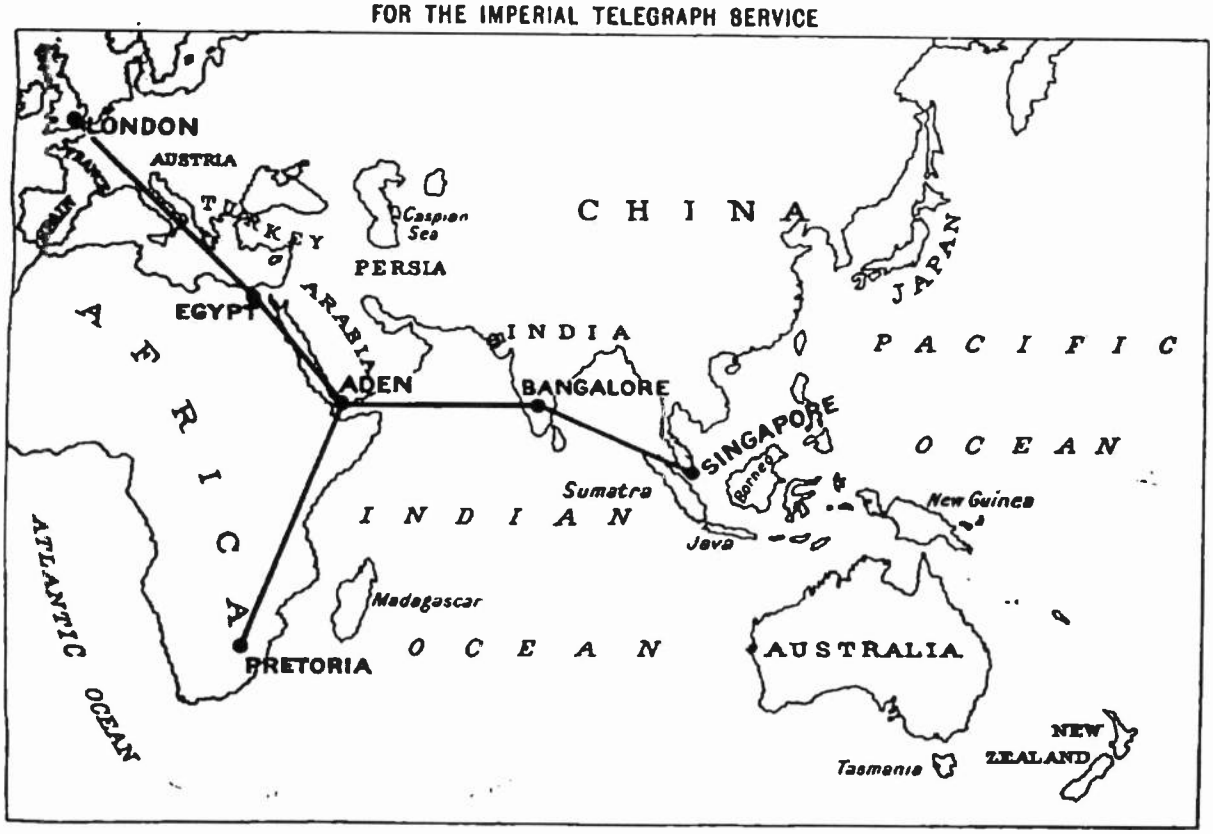
IN 1895 a young man living at Bologna, and who was barely 21 years of age, was immersed deeply in some abstruse experiments. He had been studying electricity under Professor Righi at the University of Bologna, and in the course of his studies had been fascinated with certain phenomena. He began to theorise, and in a short while endeavoured to apply what he had conceived to practice. He then commenced experimenting, and at once recognised that Hertzian waves could be used for telegraphing without wires. The man was Guglielmo Marconi. His first efforts were made at his father's villa in Pontecchio, near Bologna, across distances of only a few yards. The next step was to try longer distances in the garden, and after numerous experiments the inventor was able to receive signals the length of the garden. In 1896 Mr. Marconi came to England, took out his first patent for wireless telegraphy, and conducted several demonstrations under the supervision of the Post Office, War Office, and the Admiralty. Tests were first made successfully between St. Martins-le-Grand and the Thames Embankment, but the demonstrations which first roused the authorities and the public to the importance of the invention were those carried out on Salisbury Plain, when Mr. Marconi covered a distance of four miles. In May, 1897, a series of demonstrations were made across the Bristol Channel, communication being established between Penarth and Bream Down, a distance of nearly nine miles. Continuing, in July, 1897, Mr. Marconi, under the auspices of the Italian Government,

COMMERCIAL TELEGRAPH STATIONS CONSTRUCTED BY MARCONI'S WIRELESS TELEGRAPH CO. LTD., AND IN OPERATION.



transmitted messages between warships at Spezia, four miles apart. Shortly afterwards he erected stations at Alum Bay in the Isle of Wight and at Bournemouth (subsequently removed to Poole), fourteen miles distant from Alum Bay, over sea. By this time the system had reached the stage at which another link in the chain of development was required, and a company was formed to realise the commercial benefits of wireless telegraphy on a large scale—to manufacture the instruments and develop the business generally. In July, 1897, the Wireless Telegraph and Signal Co., Ltd., was registered, the name of the company being subsequently altered to Marconi's Wireless Telegraph Co., Ltd. For some time, of course, the company had to continue the laborious pioneering work undertaken by Mr. Marconi, and under their ægis a remarkable advance was made by Mr. Marconi. It would be impossible in our limited space to convey any adequate impression of the great achievements which have been made up to this date, and in the course of which the English Channel was bridged, naval and marine demonstrations successfully carried out, leading up eventually to the crossing of the Atlantic. About five years after he had made the first experiments in the garden at Pontecchio, Mr. Marconi had raised the range of transmission by wireless telegraphy to over two hundred miles. It was inevitable, therefore, that he should expect to increase the range still further, and to bridge the Atlantic as he had bridged the Channel. Pessimistic prophets were not slow to declare such an event to be impossible, but towards the end of 1901 Mr. Marconi had made arrangements for experiments in Transatlantic transmission. A temporary installation was used in Newfoundland for the purpose of testing how far arrangements in Cornwall had been conducted on the right lines. Mr. Marconi left for Newfoundland on November 27th, 1901, with two assistants, where Mr. Marconi carried out his experiments by means of receivers fixed to elevated wires supported by balloons or kites. His assistants at Poldhu had received instructions to send on and after December 11th, during certain hours every day, a series of "S's" followed by a short message. On December 12th the signals transmitted from Cornwall were clearly received at the prearranged times. The result obtained was sufficient to convince Mr. Marconi that by means

STATIONS TO BE IMMEDIATELY CONSTRUCTED BY MARCONI'S WIRELESS TELEGRAPH CO LTD. FOR THE IMPERIAL TELEGRAPH SERVICE



of permanent stations and the employment of more power in the transmitters it would be possible to send messages across the Atlantic Ocean with the same facility with which they were being sent over shorter distances. The Canadian Government granted a subsidy of $80,000 towards the equipment of a Trans-atlantic station at Glace Bay, and during the time that constructional work was in progress tests from the corresponding station at Poldhu, in Cornwall, were carried out over considerable distances, the Italian Government kindly placing the cruiser "Carlo Alberto" at Mr. Marconi's disposal for this purpose. In December, 1902, messages were for the first time exchanged at night between the stations at Poldhu and Glace Bay. In 1905 preparations were made for the construction of a Trans-atlantic station near Clifden, in Galway, and a limited public service was then opened, to be extended three years later to a general public service. This service, as the world now knows, is now employed to its fullest capacity.

Bridging the Atlantic

It is doubtful whether that ambiguous personality "the man in the street" realises the tremendous grip which Mr. Marconi's invention has effected upon the world at large. His instruments which flash messages through space are to be found within the Arctic Circle, while the great centres of civilisation can maintain communication with the frontiers of the Antarctic Circle as easily as they can converse with their suburbs barely five miles distant. Canada and the United States are linked as firmly with Europe by an invisible influence as if they were connected by dry land instead of a vast expanse of water. The general conception prevails that wireless telegraphy is confined to ocean liners, the opposite shores of vast expanses of water, such as the Atlantic and the Pacific, and warships. This is a great fallacy. As a matter of fact, wireless stations are dotted about in all parts of the world between the two Poles, and to-day one cannot circumvent the globe without being in touch with one or more of those outposts standing sentinel over some rocky sea-girt shore. The splendid isolation of the vessel in mid-ocean is a thing of the past; a passenger no longer can cut himself off from the turmoil of commerce by an ocean voyage.

To gain an estimate of the great importance which wireless telegraphy has now attained for social, commercial, and defensive purposes, it is necessary to appreciate the early experimental difficulties which Mr. Marconi has had to overcome. With a genius for enterprise and an attachment that was almost Hellenic in its ardour, those who have been associated with Mr. Marconi in the commercial development of his great work have raised wireless telegraphy to a unique position among the great enterprises, not merely of England, but of the world. They have demonstrated its great commercial importance in providing cheap and rapid communication over very long distances in a manner that was at one time undreamt of. Commencing with ship to shore communication, it was a short step to shore to shore communication; and then over long expanses of land; knitting together scattered countries into one continuous chain of communication in which messages can be ticked out at the rate of fifty words a minute almost simultaneously in cities as far apart as London and Aden or Singapore.

The Empire Scheme

The culminating point has now been reached in the decision of the British Government to proceed immediately with the establishment of a chain of wireless stations round the Empire. This is an event which is of supreme importance and which even in these stirring times has attracted world-wide attention. The Agreement giving effect to this decision was signed in London on March 7th, the contracting parties being the Imperial Government and Marconi's Wireless Telegraph Co., Ltd. It is unnecessary to be endowed with any abnormal degree of imaginative power to perceive the potentialities of this scheme. The imperial and strategic aspects have been lucidly presented by Sir John Barren, the Parliamentary Secretary to the Postmaster-General, in a speech before the Association of Chambers of Commerce in London. This speech showed a profound knowledge of the subject, coupled with a rare insight into the future prospects of the scheme as the extract given below will show. The Association deplored the absence of suitable cable communication throughout the Empire, and a resolution was proposed asking the Government to embark upon a scheme of State-owned cables.

Sir John Barren's View of Wireless

In asking the members not to commit the Government to the heavy expense involved in the laying of cables, Sir John made the following observations:

> "Wireless telegraphy . . . has got to this point, that it was decided at the Imperial Conference that a system should forthwith be embarked upon for connecting up this country with the other side of the world. The arrangements are already in progress; the contract is let for that system, and in due course a system will be started running from this country to Cyprus, from Cyprus to Aden, from Aden to Ceylon, from Ceylon to the Straits Settlements, from the Straits Settlements to Western Australia, and from Western Australia crossing Australia to New

Zealand, linking ourselves up in a series of six stations with the dominions on the other side of the world. (Cheers.) Now that system will be worked by an automatic process which will tick out fifty words a minute, and while those words are being ticked out in Great Britain they are simultaneously being ticked out in Cyprus, Aden and the other stations. So by this process—which, I suppose, to our remote ancestors would have seemed nothing but wizardry, and to our grandfathers too wonderful to contemplate—we are within a short distance of having a regular and permanent automatic flow of words entirely on British territory—entirely controlled by the self-governing Colonies concerned, and supported both between ourselves and the Pacific.

Scope of Extension

"It would be rash for me to say how far we may hope that such a system can be extended—what branches can be taken from it, how far it can be linked up in other parts of the world. The point I want to make is this, that your resolution here is concerned with the linking up of the Antipodes with ourselves by means of a Pacific cable with a land line in Canada and a Government Atlantic cable. We are within a very short distance of getting to the Antipodes as effectively by another route. How cheap that route may be, and how far wireless telegraphy may altogether drive out cable, is a matter which is so obscure that I would ask you to agree with certain of the Colonial Premiers who, after hearing all these matters at the Imperial Conference, took the view that this is not the moment at which we should commit ourselves absolutely to a cable on the old system. Sir Wilfred Laurier said that in view of the facts brought out, and speaking for Canada, he wished to reserve judgment on the necessity and final expediency of a State Atlantic cable and line across Canada. Sir David Graaff said it was impossible to say how far wireless telegraphy might develop in the future, and that he did not feel that, under all the circumstances of the moment, this was the best opportunity for involving ourselves in the spending of very big sums, possibly even millions if it came to a question of buying up the cables, in order to start a system of transmission which might conceivably be largely 'knocked out' within the next few years.

"I would venture to suggest that under all the circumstances, the facts being what they are, and the future promising what it does, it would certainly not be expedient for the British Post Office, and it might not be expedient even for a business body such as you, to commit yourselves formally and definitely to a heavy expenditure involving an almost certain annual loss in view of the present degree of security which we possess, of the increasing conveniences which we are enjoying, and possible developments of this alternative system in future years." (Loud cheers.)

After this pronouncement it remains but to give a bare outline of the scheme. It will be noticed from the map on page 5 that six stations are now about to be erected as follows: London, Egypt, Aden, Bangalore (India), Pretoria (South Africa), and Singapore.

Details of the Contract

The Marconi Company will receive a payment of £60,000 for each station, exclusive of site, foundations for machinery, and buildings, and the buildings themselves, while the terms further provide that the company shall receive 10 per cent. of the gross receipts of all the long-distance stations erected for the term of the Agreement, which is for twenty-eight years from the date of the completion of the first six stations. The stations will be worked during those six months by the company, and thereafter by the Government. The effect of the arrangement is to place the company in the position of a partner with the Government in the development of a world-wide service of wireless telegraphy, from which the company will draw a revenue which must inevitably reach a large sum, while the directors will be relieved of all responsibility in regard to the working of the system. Meanwhile, the existing business of the company will continue to be conducted as at present. A clause has been inserted in the Agreement enabling the authorities, if they so desire, to cancel the Agreement at the end of the first eighteen years, but in such an event they would cease to have the right of use of any of the company's patented processes or machinery.

Independence of Cables

The chain of stations at present decided upon represents only the beginning of a scheme which will be still further extended in the near future throughout the Empire, so as to enable the Empire to be, to a great extent, independent of submarine cables. The terminals will have a capacity of between 100 and 200 words per minute. The scale of charges will, of course, be fixed by the Government as the predominant partner in the working of the system, and it is anticipated that long-distance telegraphy will very soon be much cheaper than has ever been the case before. The indications are all in favour of a revolution

in the cost of communicating by wireless telegraphy between the five continents.

The Agreement now concluded with the British Government will be followed hereafter by others of a similar nature with other countries. The importance of the Imperial wireless scheme for public, commercial and strategic purposes will be appreciated by a glance at the maps on pages 4 and 5, one of which shows the position of the projected stations and the other the existing long-distance Marconi stations. There can be no doubt that stations will be established in the neighbouring countries to the Colonies for communication with them, in which case the Colonies will be in a position of being able to communicate cheaply and directly with any country they are doing business with within a range of two or three thousand miles. The erection of such stations should within a short time enormously reduce the rate charged to many of the colonies for telegraphic communication with other colonies and the home country.

Effect upon Telegraph Rates

As an instance of telegraph rates likely to be affected by the Imperial wireless scheme the following may be cited: The cable rate to British Guiana is at present 7s. per word; a wireless station erected in that colony would enable the inhabitants there to communicate directly with similar stations erected in Central America, Brazil, and the United States, also with other stations placed in the British Indies, and, through the stations in Spain, with the United Kingdom, at a rate probably not exceeding 1s. per word, and in every case with the greatest ease. This is a typical instance of the extreme flexibility of wireless communication, and illustrates some of the far-reaching advantages of the Imperial scheme. Under present conditions messages must be sent to some of those countries by very devious routes and at very high rates.

But there is another aspect of the question which must not be lost sight of, and that is the value to the Empire of a wireless chain. By this means the Home Government will not only secure cheaper and easier communication with the colonies, but much quicker communication with its fleet, and it will shortly be possible for the fleet travelling towards the east to be in regular communication with the Admiralty at any point on this side of Hong-Kong.

There is no need to enlarge on the possibilities thus opened out for naval and military purposes. The importance of this practical solution of the problem of independent electric wave telegraphy in which each wireless circuit is as private as one with a wire is obvious without comment. Wireless telegraphy is only in comparative infancy with a vast field to conquer. The constituents in the form of unconnected routes are there; the means for effecting this communication exist. In the plenitude of their power the Marconi Company are in possession not merely of the key to greatness, but of a means of powerful service to mankind and to the Empire.

Communication with the West Indies

IN the course of a despatch to the Acting Governor of British Guiana, the Secretary of State for the Colonies (Mr. L. Harcourt) states that he has had under consideration the proposals contained in the report of the Royal Commission on Trade Relations between Canada and the West Indies with regard to the improvement of the telegraph system with the West Indian Colonies and Bermuda. These proposals contemplated the acquisition by the State of the several cables owned by the cable companies working in the West Indies, the duplication of certain cables, and the provision of wireless stations to supplement the cable system in certain cases.

In face of the adverse report of his expert advisers Mr. Harcourt could not avoid the conclusion that the circumstances generally did not warrant the expenditure of the very considerable sums which would be involved in carrying out the suggestions of the Royal Commission. There was no ground for hoping that His Majesty's Government would consider themselves justified in asking Parliament to provide the necessary funds, and he was satisfied that the proposed expenditure would be beyond the resources of the Colonial Governments concerned and out of all proportion to the benefits which they might expect to derive from the scheme.

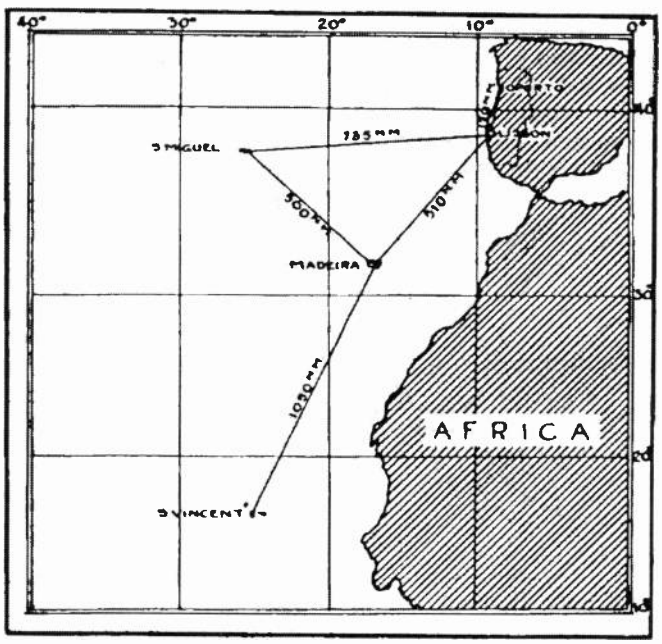
With regard to alternative measures, Mr. Harcourt states that he believes the gradual extension of communication by wireless telegraphy between adjacent colonies offers the best prospects for obtaining in the near future a cheaper service with the resources at the command of the Governments concerned.

Mr. Harcourt explains that the delay in dealing with the recommendations of the Royal Commission has been due to the necessity of considering the bearing on them of various proposals of wider application, including the scheme for connecting different parts of the Empire by wireless telegraphy. The decision to proceed with this scheme in a modified form will not affect the erection of wireless stations in the West Indies.

Mr. J. B. Mowat, from the Southern Wireless Telegraph Company (Royal Engineers), has been gazetted Second Lieutenant. Lieut. John W. Danielsen, Southern Airline Telegraph Company, has been promoted to the rank of Captain. Mr. Gerald Patrick W. Martin has been gazetted Second Lieutenant.

Wireless Telegraphy in Portugal

PORTUGAL is now to rank with other nations of the world enjoying the benefits of a wireless telegraph system. A provisional contract has just been entered into between the Government of the Republic and Marconi's Wireless Telegraph Co., Ltd., for the erection and installation of five radiotelegraph stations. One of these stations will be in the Azores Archipelago, which lies at an average distance of a thousand miles due west of the Portuguese coast, a third of the way across the Atlantic towards America. The beautiful island of Madeira, which lies to the south-west of the mainland, will be brought into radiotelegraphic communication. Much farther away, within the tropics, and also in the Atlantic Ocean, is the Cape Verde Archipelago, on one of whose small islands the Government have decided to erect a station also. Lisbon will become possessed of a station, and so will Oporto. Under the impetus given by Great Britain and other great nations, the Portuguese have awakened to the need for utilising the means of long-distance radiotelegraphic communication which has been made possible by the Marconi Company, and which must ultimately be of inestimable value to them.



Proposed Stations for the Portuguese Government.

The stations at Madeira, and St. Vincent, in the Cape Verde Archipelago, will each be equipped with 100-h.p. wireless plant of standard design, and will have a range by day of 2,500 kilometres. St. Vincent is described as being more English than Portuguese. Ships bound for South America frequently call there, and the new wireless station will make the island more familiar among travellers than was possible with the cable station.

The station at Lisbon and the other on the Azores will each be equipped with 40-h.p. plant, and will have a range by day of 1,600 kilometres. The Azores islands are famous for their oranges. Strategically, of course, they occupy an important position in regard to any naval war in the Atlantic. The station at Oporto will be a short distance one; it will be equipped with 12-h.p. standard wireless plant, and will have a range of 500 kilometres. The stations will be able to communicate with other coast stations and with ships. The construction of the buildings, as well as the foundations for the reception of the engines and masts, will be in charge of the Government, but the Marconi Company will supply all the plans of the buildings and of the respective foundations.

The Portuguese stations will complete the network in the South Atlantic for wireless communication between Europe and the West Coast of Africa. Their commercial and strategical importance, therefore, cannot be gainsaid.

Military Telegraphy.

In another part of this issue we give a brief account of some trials with portable wireless field station sets carried out in Belgium. The utility of these sets for military purposes has been demonstrated in many countries—notably Spain, Siam, Roumania, and Turkey, the demonstrations in the latter country having been carried out in May, 1911. The Belgian trials evinced a great deal of interest, and were successful in spite of the unfavourable climatic conditions under which they were carried out.

Mechanical Analogies Applied to Wireless Telegraphy*

By Captain H. Riall Sankey, R.E. (retired), M.I.M.E.

THE broad principle on which wireless telegraphy acts is to produce, at the sending station, ether vibrations known as electro-magnetic waves, which are transmitted in all directions in a space of about 40 miles thick above the earth's surface, and to have at the receiving station an apparatus capable of detecting these waves. Electro-magnetic waves are not transmitted through an electric conductor, but they are transmitted in a dielectric. The earth itself is a conductor, and so is the attenuated air above the 40-mile limit, but between the two the pressure of the air is sufficient to make it a dielectric, and it is in this space, therefore, that the electro-magnetic waves are propagated. The existence of these electro-magnetic waves was proved

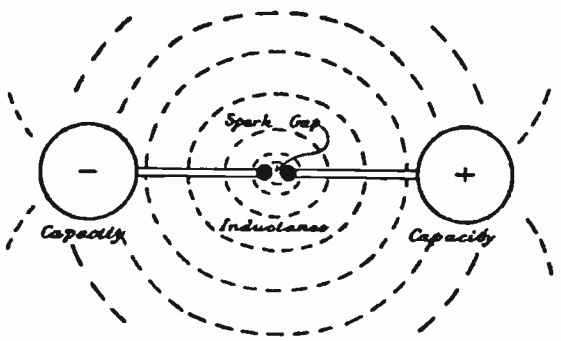


Fig. 1.

mathematically and the laws they obey were determined by Clerk Maxwell in 1864, but it was only in 1888 that Hertz exhibited them in a physical manner, and they are therefore also known as Hertzian waves. The apparatus used for this purpose is known as a Hertz oscillator, and it consists essentially of a "capacity," an "inductance," and a "spark-gap," as indicated diagrammatically in Fig. 1. The two circles represent the capacity or electric condenser, and when electrically charged, one with a positive charge and the other with a negative charge, lines of electric stress are produced in the surrounding medium or dielectric, as indicated by the dotted lines. The conductors from the plates to the spark-balls constitute the inductance. The means of charging is not shown, but if it is such that the charge can be increased, the electric stress will also increase and become greater and greater until its

Fig. 2.

intensity between the spark-balls is more than the dielectric (air) can sustain; then a spark will pass, and the condenser will be discharged through the inductance and the spark-gap. The effect of the spark is to make the air in the gap conducting for the time being, and if the relative values of the capacity and inductance are suitable, it can be shown that the discharge will be of an oscillatory character—that is to say, electricity will surge backwards and forwards from one plate to the other. To form a mental picture of the action the following mechanical analogy will be helpful.

In Fig. 2 are shown two glass vessels connected by a pipe in which is placed a diaphragm. The right-hand vessel (No. 1) can be gradually filled with water, because the diaphragm prevents the water finding its way into the left-hand vessel (No. 2). The pressure on the diaphragm will therefore increase until it is no longer able to bear the pressure, when it will burst, and the water in vessel No. 1 will rush through the pipe into vessel No. 2. In so doing the water will acquire velocity and kinetic energy will be produced. As the water rises in vessel No. 2 the velocity will be annulled and the kinetic energy will be reconverted into energy of head in vessel No. 2. If it is supposed that there is no friction, the level of the water in vessel No. 2 will finally reach the same height at which it stood in vessel No. 1 just before the diaphragm burst. The water now

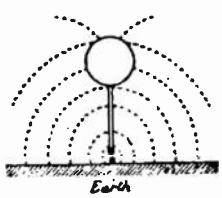


Fig. 3.

* Abstract of a lecture delivered before the Graduates of the Institution of Mechanical Engineers.

will flow back into vessel No. 1 and reach its original level, and obviously these oscillations of the water from one vessel to the other will be maintained continuously. It will be seen

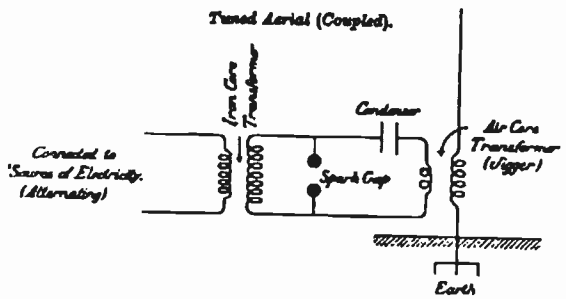


Fig. 4.

that the two vessels represent the capacity that the inertia of the water in the pipe represents the inductance, and the diaphragm the spark-gap. Actually, of course, there is friction in the pipe, so that the water will not rise to the same level in vessel No. 2 as it stood in No. 1; in other words, the amplitude of the oscillations will be gradually diminished, or, as it is otherwise expressed, they will be damped oscillations, and in time the water will settle down to equal levels in both vessels.

If it is supposed that the vessels, instead of being of glass, are made of india-rubber, then the vessels will expand each time they are filled, and they will contract each time they are emptied. A pulsating motion will be thus produced, causing pressure waves in the air, which will travel in all directions with the velocity of sound. The energy expended in thus producing air-waves will be radiated, and the damping of the amplitude of the water-level oscillations will thereby be increased, so that the water will come to rest more quickly than it did with the glass vessels.

If one of the plates in the Hertzian oscillator is increased in size, and the conductor from it to the spark-ball is correspondingly reduced in length, no alteration will take place in the lines of electric stress starting from the other plate. In fact, the lower plate may be practically infinite in size, or, in other words, may

Fig. 5.

become the earth. This is the modification of the Hertz oscillator conceived by Marconi, and was the initial invention of wireless telegraphy.

It is not necessary to have a plate on the top of the conductor, because the capacity can be obtained by means of a sufficient length of plain wire, which is technically known as the aerial.

It is, of course, necessary to provide means for charging the oscillating circuit or aerial as might be required to produce the telegraphic signs—namely, the dot and dash of the Morse alphabet, for example—by connecting the spark-gap of the aerial circuit to the secondary of an induction coil, whose function was to recharge the aerial after each discharge and oscillation.

A plain aerial such as above described radiates energy rapidly—that is to say, it is a good radiator. The consequence is that after each discharge there are only three or four rapidly damped oscillations, whereas a much greater number is necessary for long-distance work. Moreover, if the voltage of the charge is too great, the air breaks down at the top end of the aerial by what is known as a brush discharge, and thus a limit is fixed to the energy which can be imparted to the short train of electro-magnetic waves. The practical result was that the maximum range obtainable was about 70 miles.

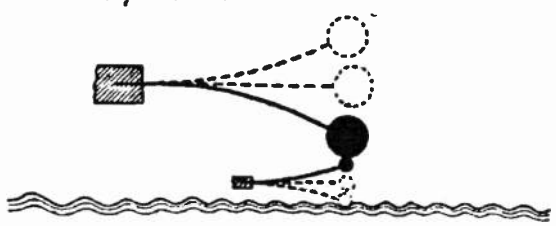


Fig. 6.

What is wanted for practical wireless telegraphy is some means of impressing a large amount of energy on the aerial without requiring too great a voltage, and at the same time producing a long series, or train of waves, with very little damping. To obtain this effect Marconi made his next important invention, which is shown diagrammatically in Fig. 4, and is the subject-matter of the celebrated 7777 Patent. The improvement described in this patent is the foundation of all the practical wireless telegraphy of to-day, and it immediately increased the range (over water) from 70 miles to 250 miles, and has enabled the commercial working at a range of 2,400 miles (Clifden, Galway, to Glace Bay, Nova Scotia) to be successfully carried out. In the immediate future much longer ranges will be possible, and already Marconi has received messages at Buenos Aires from Clifden and from Glace Bay at a range of over 6,000 miles. A mechanical analogy will explain the above in a simple manner.

If a weight is dropped into still water concentric wavelets will be formed. If the weight is too large or the height from which it is dropped is too great, not only will waves be

formed, but there will be splashing, and this splashing corresponds to the brush discharge already referred to. If the weight be fixed to a horizontal spring, as shown in Fig. 5, and a force is momentarily applied to the weight, it will oscillate in a well-known manner. It will hit the water, and each time it does so will produce waves in the manner already pointed out, and if the energy is too great there will be splashing as well as waves. A smaller weight placed underneath the big one, as shown in Fig. 6, held up by a horizontal spring, will also form an oscillatory system, and will be put into motion by the large weight first hitting the small weight, which, in its turn, will hit the water and produce the waves. Matters can be so arranged that the energy imparted to the small weight at each impact is sufficient to produce the maximum amount of wave without any splashing. A succession of waves will be produced, and gradually the whole of the energy originally imparted to the big weight will be converted into wave energy.

It is obvious that a necessary condition to carry out this effect is that the small weight shall always be just at the top of its path as

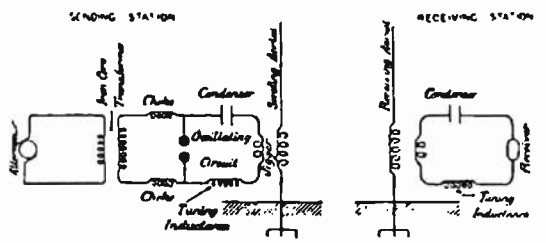


Fig. 7.

the big weight comes down to hit it, and it follows that the period of oscillation of both must be the same (or in harmonics)—that is to say, both oscillatory systems must have the same time-period, or, in other words, they must be tuned.

The electrical arrangement shown in Fig. 4 consists of an oscillatory circuit into which a large amount of energy can be put (corresponding to the large weight and spring in Fig. 6), and an aerial oscillatory circuit (corresponding to the small weight and spring) which receives energy from the oscillatory circuit and radiates it in the shape of electro-magnetic waves. These two circuits must have the same period—that is, must be tuned—and they are inductively connected by means of a transformer, the primary of which is in the oscillatory circuit and the secondary in the aerial circuit. This transformer is called a " jigger." The amount of coupling of a transformer depends on the relative position of the coils, and is represented by 100 per cent. at its maximum, and this degree of coupling occurs when the coils are absolutely concentric ; when they are at right angles to each other the coupling is zero. When the degree of coupling is 100 per cent. all the energy (apart from losses) is transferred from the primary to the secondary in half a cycle, but as it is desired to transfer only a small portion of the energy at each oscillation from the primary to the secondary, the degree of coupling must be small. In wireless telegraphy the coupling is about 6 per cent. or even less.

Another point has to be considered in this matter, because there is a mutual interaction between the two coils the effect of which is to produce two waves, one having a smaller frequency than the free or natural frequency of each circuit, and the other a greater frequency. The two waves thus produced interfere with other stations. If, however, the coupling is loose the two waves merge practically into one, and the accuracy of tuning is much increased.

It will be realised, therefore, that by means of the two loosely coupled circuits just described a large amount of energy can be imparted to the aerial, and a succession of electro-magnetic waves can be formed.

In considering the water analogy, it was tacitly assumed that the velocity of the waves was independent of their size. This is true of electro-magnetic waves, but not of water-waves. The analogy therefore only holds good up to a certain point.

These electro-magnetic waves are radiated in all directions in the dielectric envelope 40 miles thick surrounding the earth, and the next step to consider is the means of detecting them at the receiving station. If a wire, earthed at one end and insulated at the other, called the receiving aerial, is struck by electro-magnetic waves the effect is to produce an oscillatory current in it, and an instrument called a detector or a receiver is needed to detect this extremely minute current. Marconi first used a coherer for this purpose, which was based on an effect discovered as far back as 1835 by Munk, and rediscovered by Lodge, Branly, and others—namely, that metal filings are a non-conductor until acted upon by electro-magnetic waves produced by a spark, when they become conductive. A relay could thus be put into operation, which produced the telegraphic signs of the Morse Code in the usual way by means of a Morse inker. Marconi added a " tapping " arrangement to decohere the metal particles after the receipt of each train of electro-magnetic wave. This arrangement worked satisfactorily with the plain transmitting aerial then in use, which gave a few strong waves, but the range was short, not exceeding 70 to 80 miles.

With the long train of waves produced as just described by means of a loosely coupled transformer, a cumulative effect is obtained,

and then other classes of receivers are more sensitive; no relay is needed, and the signals are obtained in a telephone. Moreover, the receiving apparatus can be so arranged that it

Fig. 8.

will not respond to signals sent out with other wave-lengths to those to which it is tuned. In this way a receiving station can isolate itself from other wireless stations, and thus not be interfered with when receiving a message from its own station. Hence, by the arrangement shown diagrammatically in Fig. 7, two advantages of the highest importance are obtained—namely, greater energy distributed from the transmitting aerial and isolation.

Here, again, a mechanical analogy will be of assistance. In Fig. 8 the mechanical analogy adopted for explaining the action of a plain transmitting aerial is reproduced on the left, and on the right is a similar analogy representing the receiving aerial and coherer. The first large wave of a group hits the weight as it reaches the receiving station, and the smaller succeeding waves have an unimportant effect. The electrical equivalent is that the first electro-magnetic wave makes the coherer conducting and gives the signal, so that the succeeding waves have no useful effect and the energy in them is wasted. In Fig. 9 the mechanical analogy adopted for explaining the action of an inductively coupled aerial is reproduced on the left, and on the right is a similar analogy for an inductively coupled receiving aerial. The succession of small waves keeps the small weight system at the receiving station in a state of vibration during the whole time of their passage, and the repeated, properly-timed blows which this weight gives the large one puts the latter into motion, and thus the major portion of the wave energy is transferred to the large weight.

The electrical equivalent is that the train of electro-magnetic waves maintains oscillations in the receiving aerial, which are inductively transmitted to the oscillating circuit, and, being properly timed, the energy is accumulated therein and becomes sufficient in amount to actuate the receiver, and give signals in the telephone.

Fig. 9.

It will be noted that, in the mechanical analogy, unless the time-period of both the small and large weight systems is the same as that of the waves, there will be no accumulation of energy in the large weight system at the receiving station, and correspondingly in the electrical case the energy transmitted to the oscillating circuit will be insufficient to actuate the receiver. Clearly, therefore, the oscillating circuits and the aerials at the sending and at the receiving stations must be tuned to the same period, which must be the period adopted for the electro-magnetic waves.

The essence of the whole matter is that in wireless telegraphy everything must be tuned—that is to say, must be in resonance—and the apparatus must be designed for this purpose, as will be seen later.

Progress in Ceylon.

THE wireless station in Ceylon, some particulars of which were given in THE MARCONIGRAPH of September last, is almost an accomplished fact, and the work in connection with the erection of the masts s being steadily pushed on. The site selected for the station is about the highest available spot in Colombo; the advantages of the spot are many, one of them being that it commands a vast expanse of grass fields, an important factor in sound transmission. The ground has not yet been levelled, and it will not be done until the main apparatus has been fitted up.

Two masts of steel have to be erected, 600 ft. apart, on opposite sides of the ground. Each of these masts will be 270 ft. high, these being two of the highest erected by the Marconi's Wireless Telegraph Co., Ltd. One of these masts is nearly complete. It has been erected in sections of 10 ft. A representative of the Ceylon *Observer* who visited the spot recently was greatly impressed by the way in which the mast has been fitted up. The completed portion of it stands about 100 ft. above the ground, and the workmen who work at the top have to be pulled up with the help of pulleys. The absence of any shade and the scorching heat of the sun make the work doubly trying. A beginning has already been made with the construction of the operating room. The plant and machinery had not arrived at the time of writing. The Colombo Electric Lighting and Tramways Co., Ltd., will supply the main current, but if that supply should fail the standing set at the station would be requisitioned to generate a current at the spot. This will be a great help and economy.

Apart from the operating room, which will be a comparatively small building, accommodation will be provided on the spot for the operators and the officer in charge. Mr. McAlpine will be in charge of the station when it is completed.

Berne Notes

England The March circular of the Bureau International de l'Union Télégraphique (International Radiotelegraph Convention), Berne, notifies that all call letters commencing with the letter " I " (that is to say, from I.A.A. to I.Z.Z.), have been reserved for the use of the Marconi International Marine Communication Co., Ltd., for vessels equipped with the Marconi system of wireless telegraphy, independent of the nationality of such vessels.

United States The United States Government proposed to establish in connection with the American stations a system of call letters in conformity with those prescribed by the Berlin Convention. This the Berne Bureau was unable to do, because the United States had not yet ratified the proceedings of the last International Radiotelegraph Convention. The Government thereupon asked that combinations of three letters commencing with the letter " N," should be reserved for the use of the American Navy, with the exception of those letters which are at present allotted to other countries, and the Bureau invites those countries which have ratified the convention to utilise as far as possible for their radiotelegraph stations call letters other than those indicated by the United States Government. It might be added that the United States had asked to be reserved for its Mercantile Marine letters which had already been reserved for another state, and the Bureau will notify later the letters definitely allotted to the United States for this purpose.

Egypt The Egyptian Government have applied to the coastal station at Port Said the call letters L.P.D., in place of those which were formerly used.

Holland The Netherlands Government have notified the equipment with apparatus for wireless telegraphy of the steamers " Vanoverstraten " and " Vancloon," belonging to the company Koninklijke Pakketvaart Maatschappy. To the first-named vessel the letters M.K.T. have been allotted, and to the second, the letters M.K.U. A rate of fr. 0.40 per word has been fixed, with a minimum of fr. 4 per radiotelegram.

Mexico It is announced that M. Maris Méndez has been appointed by the President of the Mexican Republic Director General of Telegraphs, and that he has commenced to exercise these functions.

Portugal The Portuguese Government has adhered to the International Radiotelegraph Convention, except for its colonies and possessions, for which it has reserved the right to exempt certain stations from the obligation imposed by Article 3 of the Convention. The Government have expressed the wish that the following colonies and possessions should be entered in the sixth class: Angola, Mozambique, Cap Vert, Guinea, the Isles of San Thomé, and Prince, Goa, Daman, Macao and Timor.

Argentine The Argentine Republic has decided to ratify the Berlin Convention of 1906, and the ratification is now under the consideration of the Ministry for Foreign Affairs.

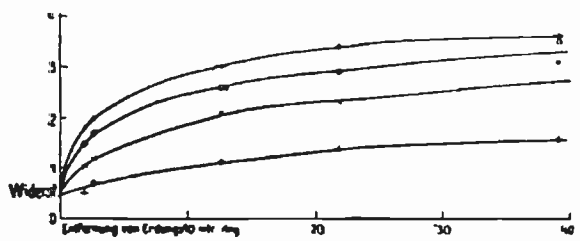
Canada The Department of Naval Service has fixed the following charges for wireless messages through the Port Arthur Station; for the first six words, fr. 2.50; for each additional word, fr. 0.25 In the aforenamed charges, the coastal rates are fr. 1.50 and fr. 0.15 respectively. No charge is made for the address and signature.

The Palmario station in Italy was reopened for public service on February 17th.

The *Bollittino Telegrafico Ufficiale* has unearthed from an old number of the *Osservatore Romano* of the year 1868 a remarkable letter signed by Canon Bobone, of San Remo, which appears to anticipate wireless telegraphy. The Canon stated that he had made a physical discovery hitherto unknown to any scientists; a link between separate bodies not connected by anything. He considered that telegraphy could be developed therefrom, so that communication by wire conduction would not be necessary, but he guarded himself against the charge of charlatanism by undertaking to convince all sceptics and scoffers by demonstrating trials. Whether he carried out his promised trials is not stated by the Italian paper; the principal discovery referred to has in any case not been realised.

Scientific Notes

Aerial Oscillations. In the *Jahrbuch der drahtlosen Telegraphie und Telephonie*, M. Reich describes some experiments made near Göttingen to ascertain the damping effect of earth currents on the aerial oscillations under various conditions, such as when the aerial was direct connected, when it was connected by capacity, the effect of altering the height of the capacity and of altering the height of the sending apparatus. The earth currents were measured by means of earth plates buried at different depths and at different distances from the foot of the aerial. Ground water was found at about 1·5 metres below the surface; the measurement of these currents is the subject of another article by H. True in

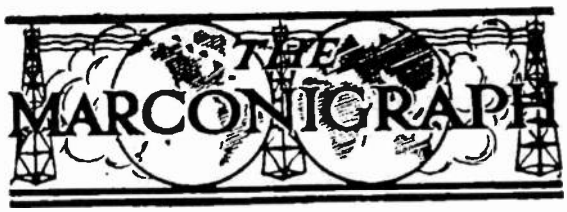


the same journal. The aerial was in the form of a horizontal equilateral triangular net, 75 metres each side, and was connected to three masts at the height of 80 metres above the ground. The capacity was formed of a similar net having a 4-metre hole in the middle of it to allow the aerial wire to pass through. The results of the measurements showed that the resistance diminished as the wavelength increased, for instance, at a distance of 39·1 metres from the foot of the aerial, the resistance was 3·6 ohms, with a wavelength of 1,030 metres, and was 1·6 ohms with a wavelength of 1,900 metres as shown in the table.

Wavelength, metres.	Resistance.				
	1	2	3	4	5
1,020	1·8	2·0	3·0	3·4	3·6
1,030	1·9	2·0	2·95	3·5	3·6
1,110	1·5	1·7	2·6	2·9	3·5
1,500	1·05	1·2	2·1	2·3	3·1
1,900	0·5	0·7	1·15	1·4	1·6

The accompanying illustration presents the results summarised in the table in graphic form. Both with direct connected and with capacity connected aerials it was found that the damping effect increased with the frequency of oscillations; it was also found that the greater the capacity the less the damping, and the higher the capacity was placed—*i.e.*, the nearer it was to the aerial net, the less was the damping.

Resonance. It is well known that when two tuning forks of the same pitch or frequency are placed near to one another, and one is made to vibrate, the other takes up immediately the vibrational motion of the former, and emits its note, even if the first one be removed. When the pair of tuning forks are vibrating in unison, the amplitude of the sound wave is reinforced, and in any oscillatory system the reinforcement, or rapid growth, of the amplitude, due to the synchronous impulses, is known as resonance. Resonance is, therefore, a natural phenomenon of all types of wave-motion, and, in the case of wireless telegraphy, resonance is the physical phenomenon which renders the transmission and reception of messages possible. In the case of alternating current working, the conditions for producing resonance imply a dangerous condition of working, for, should the frequency of the supply voltage coincide with the natural frequency of the system, there is every possibility of an abnormal rise of pressure being produced, which may amount to several times the magnitude of the supply voltage, in which case the insulation of the system will most probably be broken down, and serious damage will result. Fortunately, it is seldom that the frequency of the supply voltage is the same as that of the system, and if the wave of the resultant current be perfectly sinusoidal, there is very little possibility of the disastrous results attending resonance occurring. It is important that every attention should be paid to the design of appliances which are intended to work on a given system, so as to avoid the production of harmonics, and it is fortunate that resistance, like inter-molecular friction, has a damping effect upon oscillations and surges by frittering away the energy produced, and so hasten the rate at which the oscillations die down.



An Illustrated Magazine for all interested in WIRELESS TELEGRAPHY, published monthly by MARCONI'S WIRELESS TELEGRAPH COMPANY, LIMITED, Watergate House, York Buildings, Adelphi, London, W.C.

Telegraphic Address ....."Expanse, London."
Telephone No. .....City 8710-5 (Six Lines).
Codes used .....Marconi, A.B.C. (4th edition). Western Union.

Subscription rate.....3s. 6d. per annum, post free.
Single Copies.....2d. each, by post 3½d.

Subscription Rate in the United States and Canada..... $1 per annum, post free
Europe .....fr. 4.50 per annum, post free

All communications relating to Subscriptions, Advertisements and other business matters, to be addressed to "The Publisher, 'The Marconigraph,' Watergate House, York Buildings, Adelphi, London, W.C."

All Editorial communications to be addressed to "The Editor, 'The Marconigraph,' Watergate House, York Buildings, Adelphi, London, W.C."

The Editor will be pleased to receive contributions; and Illustrated Articles will be particularly welcomed. All such as are accepted will be paid for.

CONTENTS

Important Patent Decision in the United States

By Transatlantic Wireless viâ Glace Bay and Clifden.)

NEW YORK, *March 25th.*

THE Marconi Wireless Telegraph Company of America yesterday succeeded in their action against the United Wireless Telegraph Company and Clyde Steamship Company. In this action, which was brought for infringement of the Marconi Company's American patent corresponding to their well-known English patent No. 7777 of 1900, which is the master patent covering the principle of syntonisation and selectivity, and which was already part heard, both the defendants have acknowledged the validity and scope of the patent and admitted their infringement, and have submitted to judgment and a permanent injunction in favour of the Marconi Company. The 500 ship installations and the 70 land stations which had been erected and worked by the United Wireless Telegraph Company pass into the hands of the Marconi Company.

The parent company, Marconi's Wireless Telegraph Co., Ltd., also have an action pending in this country against the United Wireless Telegraph Company for infringement of Letters Patent Nos. 12326 of 1898 and 7777 of 1900, by the installation of their system on various British boats; and the defendants are about to consent to judgment in this action also, the ships carrying the British flag and fitted with the United Wireless system also passing into the possession of the Marconi Company. The effect of this decision is to confirm the famous judgment of Mr. Justice Parker, given last year in the action brought by Marconi's Wireless Telegraph Co., Ltd., against the British Radio-Telegraph and Telephone Co., Ltd., upholding Patent No. 7777 of 1900, and also to give the same value and importance to the corresponding American Marconi patent.

It is satisfactory to note that the Marconi Company have been able to legally establish the claims which they have always made for the priority of Mr. Marconi's invention in all the essential features of successful wireless telegraphy.

A New Record

MR. MARCONI, who is at present in America, was entertained to a banquet in a New York "skyscraper" on March 16th by the proprietors of the *New York Times*, in recognition of the splendid aid which his system of wireless telegraphy has rendered to American journals. The *New York Times* itself regularly receives from 25,000 to 30,000 words weekly by wireless telegraphy from Europe, and the success of this service is well testified by the article which appears on page 23 of this issue. The speed of the service is as much a revelation as is its cheapness, and the satisfactory way in which the exacting requirements of the Press are met is proof of the reliability of wireless. The banquet referred to was chiefly remarkable because of the ten minute wireless messages exchanged between London and New York. The time taken in getting messages through between London and New York averages about thirty minutes, the delay being due to the pressure of work upon the land lines between London and Clifden. Just to show what can be done, the Post Office authorities expedited the wires for a certain time on March 16th, and the result was, in the words of one of the newspaper correspondents in New York, "a remarkable series of new records for Marconigrams." Earl Grey "wirelessed" wishing Mr. Marconi

> "Success in the splendid endeavour to facilitate conversation between English-speaking peoples separated from each other by distance only."

Lord Blyth sent the following message:

> "Of all the wonderful discoveries the world has ever seen, surely none are to be compared with the miraculous invention of wireless telegraphy. All honour is, therefore, due to Marconi, to whom we are under a lifelong debt of gratitude.—(Signed) BLYTH."

Mr. Marconi despatched the following reply to Lord Blyth, stating the time in which the message had been received:

> "Have received your generous and too appreciative message sent through *New York Times*, which I greatly value. This message received New York from London in ten minutes.—(Signed) MARCONI."

Other messages of goodwill and appreciation reached Mr. Marconi from Lord Avebury, the Hon. Harry Lawson, and the Attorney-General (Sir Rufus Isaacs). The remarkable achievement of last week is symptomatic of the telegraph future which wireless is making possible.

A Norwegian Order in Council has been issued providing that wireless telegraph apparatus may be imported into Norway free of

The Home of Wireless

AN important change in the *locale* of Marconi's Wireless Telegraph Company is shortly to be made. The premises in the Strand, London, formerly known as the Gaiety Restaurant, have been acquired by the company on a ninety-nine years' lease, and the work of adapting the building to the requirements of a modern place of business is now under way. It is expected that within the next six weeks the whole of the staff will once more be centralised under one roof. The company's developments during the past year have been so great that they have quite overtaken the steady increase in available office accommodation, with the result that the present step has become inevitable. The building itself is one of the finest and most prominent in London, and it will serve as an imposing reminder to the multitudes that pass along London's leading thoroughfare of the magnitude to which wireless telegraphy has developed. Nor can its proximity to Fleet Street fail to impress the newspaper owner and busy journalist of the importance of the Marconi Transatlantic wireless telegraph system, with its cheap rates and rapid services. On the ground floor of the new premises will be housed the staff of the Transfer Department, and a large telegraph office for the receipt of messages for transmission by wireless telegraphy. The waiting-room for callers will also be situated on this floor. On the upper floors the whole of the staff will be housed in offices specially adapted to suit their requirements. It is hoped to have the premises complete and everything in working order by the middle of May.

THE NEW WORKS.

Rapid progress is being made with the new works which are being erected in New Street, Chelmsford. At these works employment will be found for several hundred additional workmen. The quantity of work in hand is a severe tax upon the present accommodation, and not only are larger premises required to cope with existing orders, but the company's expanding business renders the establishment of larger works of first-rate importance.

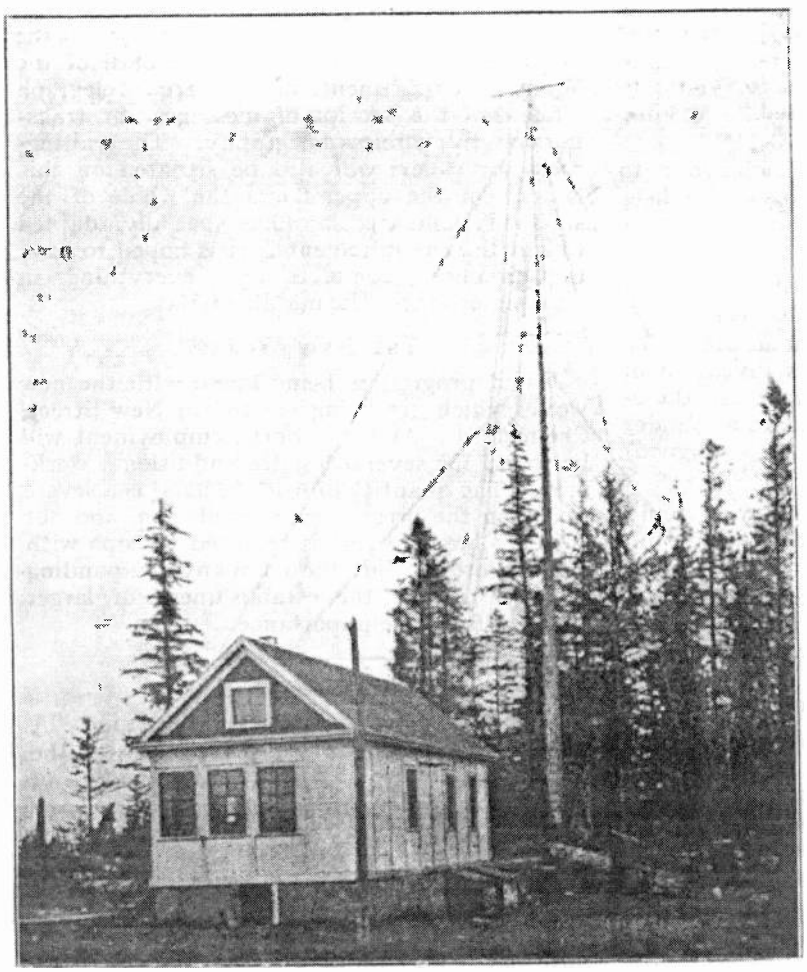
The Share Market

The last month has been a very busy one. A settlement has taken place in the shares of the Marconi Wireless Telegraph Company, of Canada, in which very large dealings have taken place since the issue of our last number. The market in all Marconi issues has been extremely active and consistently improving. The special settlement in the lately introduced Spanish Wireless Trust, Ltd., has been fixed for April 2nd. The ordinary shares have risen to $5\frac{1}{2}$–$\frac{5}{8}$, the Preference to $4\frac{3}{4}$–$\frac{5}{8}$, New to $3\frac{5}{8}$–$\frac{7}{8}$ (premium), Canadian 38s.–40s., Spanish [illegible]

The Canadian Naval Service

How Help is rendered by Wireless—Diminishing Trouble from Atmospherics

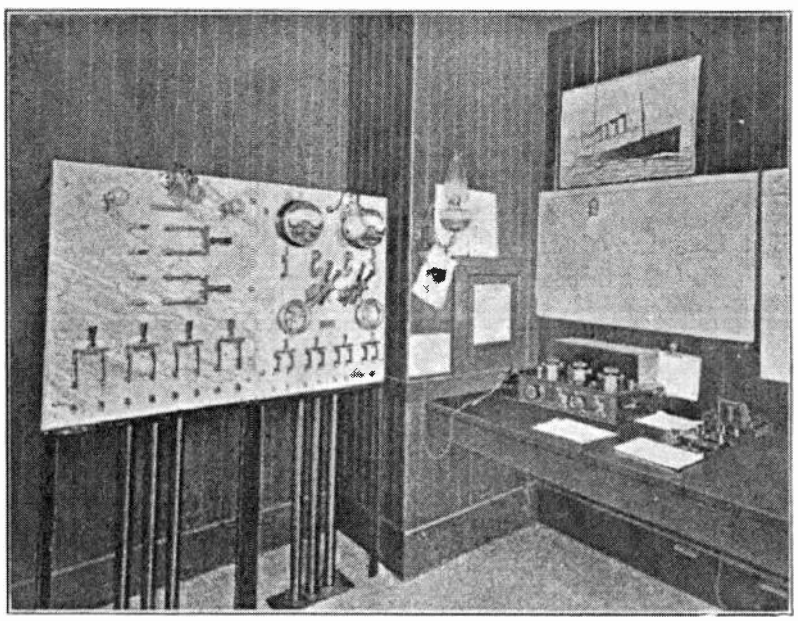
BY common consent the remarkable development which has taken place in the United States constituted the most striking historical fact connected with the progress of the nineteenth century, and the lesson has not been lost upon our Canadian kinsmen. They have, in their time, experienced the drastic effects of periods of severe depression, but they have emerged from the ordeal little the worse for their vicissitude. Now that this cloud of depression has been swept away, the Canadians have become alive to the potentialities of their country. In regard to wireless telegraphy, Canada presents an important and attractive future. So much is evident from the reports of the Department of the Naval Service for the year ending March 31st, 1911. This record contains a section devoted to wireless telegraphy, in which Mr. C. P. Edwards, the General Superintendent of Government Wireless, points out that the Government owns and operates nine wireless stations on the Pacific Coast, forming a complete chain from Victoria to Prince Rupert, the range of stations varying from 150 to 350 miles. Stations were completed during the last year at Triangle Island and Prince Rupert, and a new station was installed at Dead Tree Point at a cost of 7,233 dols. Improvements were also made at the following stations—viz.: Victoria, Point Grey, Cape Lazo, Pachena, Estevan Point, and Ikeda Head of a total cost of 29,461 dols. The power of the station at Victoria has been increased to enable communications to be established with Pechena. The number of messages handled by the coast stations was 48,074, containing 647,461 words, this showing a substantial increase over the previous year. The total cost of maintenance of these nine stations was 30.864·53 dols., and the revenue derived was 3,108·63 dols. On June 1st, 1910, a commercial service was inaugurated in connection with the wireless stations on the west coast. On the east coast the Government own thirteen stations which are operated by the Marconi Company under contract (MARCONIGRAPH, August, 1911, p. 1), the range of action varying from 150 to 400 miles. These stations handled 49,339 messages during the year containing 699,151 words. The cost of maintenance was 44,524·21 dols. Stations at North Sydney and Pictou range, 100 miles, are owned and operated by the Marconi Company under contract with the Government, and handled 1,847 messages, containing



Operating House at Cape Lazo Station

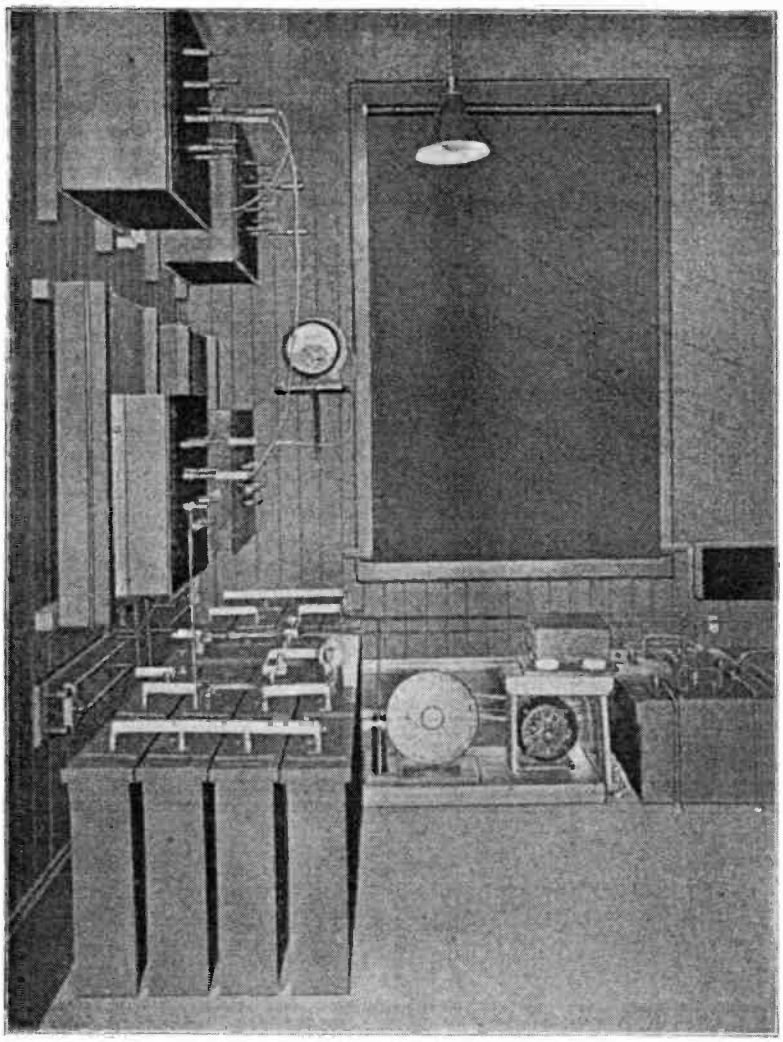
43,864 words. The cost of maintenance was 499·98 dols. Land stations are owned by the Government at Queensgate and Grosse Island, range 100 miles, and during the year a new station was installed at Magdalen Island, P.Q., having a range of 150 miles, the Marconi Company constructing the same. These stations are operated by the Marconi Company under contract, and during the year handled 5,088 messages, containing 108,623 words. The Marconi Company own and operate land stations at Montreal, 200 miles; Three Rivers, 150 miles; Camperdown, 250 miles; Sable Island, 300 miles; and handled at these stations 15,320 messages, containing 237,796 words.

During the year the wireless service has on several occasions proved of inestimable benefit to vessels in distress, communication by means of wireless having been instrumental in obtaining assistance. These figures display with remarkable force the great value of wireless telegraphy in Canada. By reference to several occurrences during the year we have the most eloquent testimony to the considerable value of wireless telegraphy in connection with casualities which occurred on the St. Lawrence route. The most important was the stranding of the "Prinz Oskar." This vessel of approximately 7,000 tons, with a large and valuable cargo sailed from Montreal on Saturday, June 18th, 1910, bound for Rotterdam, Bremen, and Hamburg. At 8.40 p.m. on Monday, June 20th, the vessel went ashore to the southwest of the Flower Ledges, Newfoundland, near the western entrance to the Straits of Belle Isle. At 8.45 p.m., the captain authorised a wireless CQD call, which was immediately answered by the Belle Isle Station, and the s.s. "Sicilian." The Belle Isle Station informed the "Prince Adelbert," which was 140 miles east of Belle Isle of the accident to her sister ship, and the captain of the "Prinz Oskar" was at once informed that the Belle Isle Station was in communication with the "Prince Adelbert." At 11.28 p.m. the "Corinthian" exchanged calls with the "Prinz Oskar" and asked if it could proceed to the assistance of that vessel. The captain, however, replied that he did not require any assistance. Continuous communication was held during the night of June 20th and the morning of June 21st with the Belle Isle, Point Amour, and Point Rich stations, also with the "Sicilian" and the "Montcalm," while messages were continually exchanged between the captain of the "Prinz Oskar" and "Prince Adelbert." In the meantime the news had been communicated to the owners, and a wreckage steamer "Strathcona" was despatched from Quebec. The people along the shore also received the news, and in consequence, the Newfoundland steamer left Blanc Sablom for Flower Ledges, anchoring near the "Prinz Oskar" at two o'clock in the afternoon of June 21st. While the position was extremely dangerous there were no passengers on board, and the captain naturally preferred to receive any assistance necessary from the "Prince Adelbert" of the same line. The latter vessel was in constant



Operating Station at Prince Rupert Station

wireless communication with the "Prinz Oskar" during Tuesday, arriving alongside the Prinz Oskar" at 6 a.m., Wednesday, June 22nd, and immediately attempted to refloat the latter steamer. At 9.5 p.m. on Wednesday he succeeded in refloating the stern of the "Prinz Oskar," the fore part of the ship, however, still remaining on the rocks. Further attempts to refloat the steamer were made on Thursday, January 23rd, until 6.30 p.m., when the position of the steamer became very dangerous—the captain ordered the crew to keep the boat in readiness as the ship might have to be abandoned at any time. On the following Friday the "Prince Adelbert" succeeded in refloating the "Prinz Oskar" which immediately anchored awaiting the arrival of the wreckage steamer despatched. As the position of the "Prinz Oskar" was



High Tension Room and Transmitting Apparatus, Victoria, B.C.

now comparatively saved, the "Prince Adelbert" proceeded on her way to Quebec. On Saturday afternoon, June 25th, the wreckage steamer "Strathcona" arrived from Quebec, and at 8.15 p.m. the steamer left her anchorage in company with the "Strathcona." In spite of the fact that the trip up the Gulf was a rough one, continuous heavy winds being met with, the vessel was safely escorted to Quebec, and entered the dry docks, where repairs were effected.

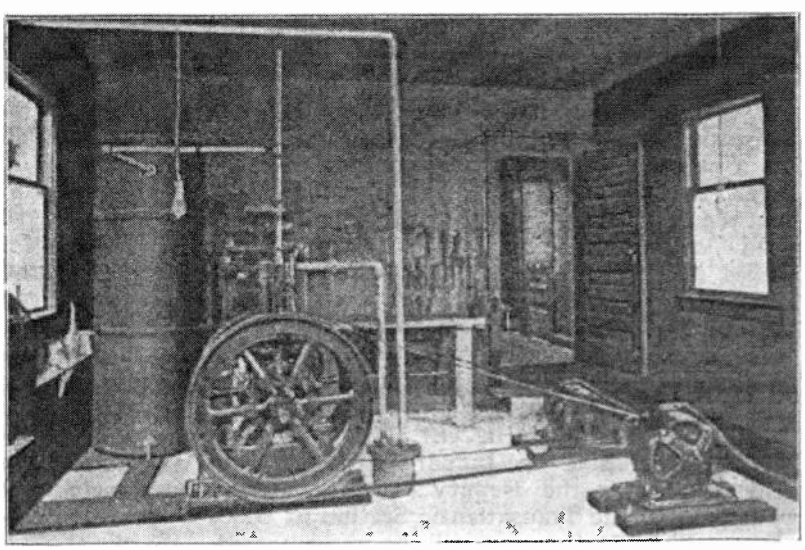
It is worthy of notice that immediately the steamer went aground she was in communication, not only with the stations at Belle Isle and Point Rich, but also with the steamer "Sicilian"; and that during the time she was aground she was in constant communication not only with the shore stations at Point Rich, Point Amour, and Belle Isle, but had within radius of communication at all times a minimum number of three steamers, any one of which would have proceeded to her assistance had it become necessary. There is little doubt that had the steamer remained another twenty-four hours on Flower Ledges she would have been a total wreck. The saving of the ship was therefore due to the fact that she was able to receive almost immediate assistance from another vessel which succeeded in refloating the stranded vessel within a comparatively short time, and also to the fact that notice of the mishap was given to the owners, enabling them to despatch immediately a wreckage steamer to the assistance of the stranded vessel.

The west coast stations continue to handle the weather reports of the meteorological branch of the Marine and Fisheries Department, and the service has proved very satisfactory. During the year special attention has been given to the signal service reports provided by the stations, and every effort has been made to protect the organisation in this connection. Each station prepares three times daily at 8 a.m., noon, and 6 p.m., a report containing the following information: Barometer reading, temperature, strength and direction of wind, general weather conditions, shipping sighted and time of same, and shipping spoken by wireless, location, and time of same. This report is forwarded by wireless to the Prince Rupert, Victoria, and Point Gray (Vancouver), and is kept on file at those offices. Ships equipped with wireless telegraph apparatus are practically always in touch with one or other of the stations, and the Government are thus enabled to keep a constant record of their movement. The three stations mentioned above are connected with the local telephone exchange, and all information contained in the signal service report is given to the public free of charge upon request. It is of much value to ship owners and agents, who are thus enabled to keep informed of the positions of their vessels. Advantage is also taken of same by several western newspapers which publish the reports in full in connection with their shipping intelligence. On June 1st, 1911, a commercial service was inaugurated

in connection with the stations on the Pacific coast. The stations now handle all business offering to and from ships, also local business between stations. The rates charged are 1·20 dols. for the first ten words of text, 12 cents for each additional word of text on all messages to and from ships, with the exception of messages to and from ships and the ship's business, on which a reduced rate of 50 cents and 3 cents is given, and on messages to and from ships on the ferry between Vancouver, Victoria, and Seattle, on which a rate of 25 cents and 1 cent is given. A twenty-four hour watch is kept on all the above stations with the exception of Ikeda Head 8 a.m. to 12 p.m., and at Three Points, 8 a.m. to 6 p.m., and the stations are instantly available in case of casualties to steamers. The wireless service has proved its usefulness in several of the latter which has occurred on the coast during the past year, of which the following are amongst the most important.

On December 2nd, 1910, the s.s. "North-Western," owned by the Alaska Steamship Company, ran ashore on Pile Point, San Juan Island, Washington. She sent out wireless distress calls which were responded to by the Government Victoria Station and the Canadian Pacific Railway steamer "Kent." The B.T. Salvage Company were communicated with, and the wreckage steamer "Starboard" sent to her assistance. January 27th, 1911, the steamer "Cottage City," owned by the Pacific Coast Steamship Company ran ashore on Cape Madge in a blinding snow storm. She sent out distress signals and her owners were communicated with by the Government Cape Lazo Station. The vessel was abandoned half an hour after striking. On the same day the steamer "Kent," owned by the Canadian Pacific Railway Company, grounded on Berkeley Sound; communication was established with Pachena, and twenty minutes after the stranding the owners were notified that assistance was despatched from Victoria, and the United States Life Saving Station at Capoosh. The vessel was floated next morning. On January 2nd, 1911, the steamer "Princess Adelaide," owned by the Canadian Pacific Railway Company, grounded on Apple Cove Point; communication was immediately established with the Victoria Station, the vessel was floated the next morning. On the following day the "Victoria," owned by the Alaska Steamship Company, ran ashore on Cape Madge. Communication was immediately established with Cape Blanco Station, and the vessel was floated without damage. Later in the day the steamer "Titania" ran ashore on Stewart Island. This steamer was not equipped with wireless, but sent a boat to the nearest wireless station to convey the news to Victoria, and the desired assistance was obtained.

The scheme laid down to duplicate the apparatus on all the stations and to keep the standard of same up-to-date with all new developments to be had has been steadily adhered to, and the following construction work has been undertaken during the year. The power of the Victoria Station has been increased to enable communication to be established direct with Pachena. One and a half acres of land adjoining the present site were purchased, and a separate 200 ft. mast erected on the same to provide at the port for an aerial large enough to work the desired business. A gasolene engine driven emergency set (6 h.p.) was installed in case of accident to the local power company's transmission lines, also a complete duplicate set of transmitting and receiving apparatus. Three acres of land adjoining the present site were purchased at Cape Lazo, and a top mast was erected on the top of a tree located on the same to provide at the port an aerial large enough to establish communication in Cape Lazo and Pachena. A type No. 3 operating house, with concrete engine bed was also installed on the new land, with a complete new 6-h.-p. plant, the old 3-h.-p. plant which was installed in the dwelling-house being dismantled and shipped to Point Grey. The work of the erection of



Engine and Generators, Ikeda Head, O.C.I.

Triangle Island Station, which was commenced during the preceding year was carried to completion, including the installation of a complete duplicate plant, comprising a 6-h.-p. engine, machinery, and the necessary apparatus. The mast, which was damaged in a hurricane, was repaired. The work of the erection of Prince Rupert Station, which was commenced during the preceding year, was also carried to completion. A cable to the mainland was laid, and a line erected along the grand front pole to the City of Prince Rupert. A complete duplicate plant consisting of a 6-h.-p. engine, machines, and the necessary apparatus was installed.

The peculiar phenomena affecting the range of wireless telegraph stations on the west coast have been very marked during the past year. It has been observed that between sunset and sunrise during the fall, winter, and spring months the range of the stations both for transmitting and receiving is increased from 300 to 500 per cent. The phenomena is somewhat erratic. On some nights it is continuous, and constant communication can be maintained with another station within the same zone, but on other nights it is intermittent, and communication may be excellent for an hour, when the signal will suddenly fade away, and then after a short period come on again. It may occur several times during the transmission of one message. The greatest distance over which communication has been established under these conditions is between Triangle Island and Honolulu, a distance of approximately 2,500 miles. The daylight range of the Triangle equipment is 400 miles. Another peculiar feature in connection with the above is that while the Victoria Station is in communication practically every night with Ikeda Head, 400 miles north, 250 of which are over high land, and with the stations along the west coast of the United States so far down as San Diego, 1,000 miles south of Victoria, all of which is over high land, including the Cascade Range and the Sierra Nevada, rising to a height of 15,000 ft., no improvement has ever been noticed in the communication between Pachena Point, British Columbia, and Pretoria Point, British Columbia, 75 miles apart. No reasonable explanation for the same has yet been discovered, but a systematic observation of the phenomena is being made, and when more precise information is available there is no doubt that some satisfactory explanation will be forthcoming.

Reference is made in THE MARCONIGRAPH to the fact that on January 4th, 1911, in company with the Deputy Minister, a visit was paid to the Transatlantic Station at Glace Bay. This station, as will be remembered, is owned and operated by Marconi's Wireless Telegraph Company. The station was subsidised by the Canadian Government in 1902, and an agreement was entered into between the Government and the Company, whereby they agreed to charge not more than 10 cents per word for private messages, and 5 cents per word for Press messages transmitted between Glace Bay and a station similar on the coast of Britain. The Deputy Minister reported as follows: The signals from the Clifden Station came in about as strong as those received from the average ships stations when 150 miles distant from the coast stations, and where easily readable. A message was sent to Mr. Marconi in London, to which a reply was received an hour later. The message by which the high power is handled and the numerous automatic devices for safe guarding the apparatus, etc., reflect much credit on the designers of the station. The weak spell at dawn and sunset which were encountered when the old apparatus was in operation has been overcome, and the signals with the new apparatus are found to maintain their strength throughout the twenty-four hours. The trouble encountered with atmospherics has been very much reduced.

The Marconi Company have opened a receiving office in Montreal where messages are accepted for transmission to England at 15 cents per word. A station was erected by the Marconi Wireless Telegraph Company of Canada at Port Arthur, Ontario, in November, 1910. The company erected this station at their own expense, but under an agreement with the Department, whereby the latter may take over the station should they wish to do so. The Port Arthur Station proved its value immediately after being placed in commission.

In concluding our extract from the report of the Department of Naval Service, we can only refer briefly to the scheme that has been drawn up for the establishment of a wireless telegraph system on the Great Lake, which will include a chain of stations, approximately 180 miles apart from Port Arthur to Kingstown, with a station at Kingstown of sufficient range to communicate with Montreal, thus linking up the proposed system between each coast system, and giving frequent communication between Belle, Isle or Cape Race and Port Arthur. This scheme as contemplated would include stations at or in the neighbourhood of the following points: Kingstown (Ontario), Toronto (Ontario), Port Colborne (Ontario), Port Stanley (Ontario), Sarnia (Ontario), Tobermory (Ontario), Midland (Ontario), Sault Ste Marie (Ontario), Port Arthur (Ontario). A preliminary survey of the point has been made and sites have been secured at Port Arthur, Sarnia, Tobermory, Midland and Point Edward, Sarnia,

Wireless Messages to American Newspapers

THE German Cable Company (Deutsche-Atlantische Telegraphien Gesellschaft) is distressed over the successful employment of wireless telegraphy for the transmission of German news to the *New York Times*.

In an official communication reporting the apparent failure of the negotiations with the German Government for a reduced Press cable rate to the United States, "which," the company states, "is hardly to be expected for some time to come," Herr Moll, the managing director, says :

> "We were aware that the *New York Times* was intimately allied with the Marconi Company, so we do not wonder at your statement that the wireless system is cheaper for you than to use the German-American cable between Berlin and New York. We would, however, call attention to the following remarks made to us by a well-known newspaper man regarding a certain New York paper :
>
> "'The —— is a member of the Associated Press, and, of course, gets all its live news through that organisation. Without any disparagement of wireless telegraphy, for which I have great respect, it is apparent that the wireless dispatches transmitted in competition with the cable are of a class which may be published whenever received. Age neither improves nor hurts them.'"

The Berlin correspondent of the *New York Times* has taken occasion to inform the German Cable Company, in reply to its left-handed compliment to "wireless," that all the news, "live" and otherwise, which was formerly transmitted by the German cable, has been going by wireless, without delay of any sort, uninterruptedly for many weeks.

The *New York Times*, in its issue of February 27th, published the following in refutation of Herr Moll's criticism :

"It may interest Herr Moll and others to know the exact facts about the transmission of news from London to the *New York Times* by wireless telegraph. Take yesterday's *Times* (February 26th), for example. It contained 2,450 words of wireless, comprised, as sent from London, in nine separate messages, some of these messages including two or more dispatches from different places in Europe.

"The appended table records the time when each of these messages was filed in London, the time when it was received in the *Times* office, and the entire time occupied in transmission. It is to be remembered that London time is five hours faster than New York time. Thus a message starting from London for the *Times* at 4 o'clock Monday morning, London time, starts at 11 o'clock Sunday night, New York time. Considering that each message must be telegraphed over land lines from London to Clifden, Ireland, thence by wireless to Glacé Bay, Nova Scotia, and thence telegraphed over land lines to the *Times*, it will be seen that the average time of transmission, one hour and fifty-six minutes, as shown by the table, is remarkably good. It may be added that it is quite as good as the average time made by the cables so far as the *Times'* experience goes.

"Here is the record of the *Times'* wireless dispatches received between 7 p.m., February 25th, and 2 a.m., February 26th :

No.	Filed in London.	Received by *Times*.	Time of transmission.
			H. M.
1	11.40 p.m.	7.52 p.m.	1 12
2	12.00 p.m.	8.02 p.m.	1 02
3	12.20 a.m.	8.58 p.m.	1 38
4	12.20 a.m.	9.10 p.m.	1 50
5	12.40 a.m.	9.36 p.m.	1 56
6	2.00 a.m.	11.40 p.m.	2 40
7	2.50 a.m.	12.05 a.m.	2 15
8	3.35 a.m.	1.00 a.m.	2 25
9	4.00 a.m.	1.30 a.m.	2 30

Average time of transmission, 1.56.

"As for Herr Moll's intimation that only such matter is sent by wireless as would be as good one day as another, implying that a long time is occupied in transmission, any *Times* reader who sees not only the events of the day before told in the wireless dispatches, but quotations from the London papers of the same morning, knows that Herr Moll has been sadly misinformed by his 'well-known newspaper man.'"

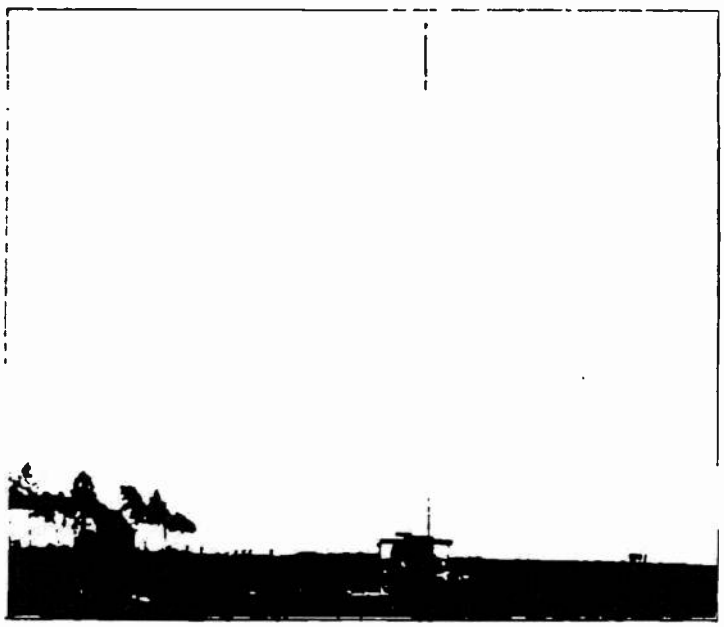
The *New York Times*, which from the start has made use of wireless telegraphy in its Sunday foreign service, has adopted wireless telegraphy of late with ever-increasing frequency and fullness.

The best time established so far for the transmission of its wireless messages from London to New York has been an hour and fifteen minutes ; but the average speed of transmission of its wireless messages has been so good in comparison with the transmission of messages by cable under the Atlantic that the *Times* has made more and more use of the wireless ; in fact, for some time not a single cable message was sent to it from London, direct wireless service being substituted.

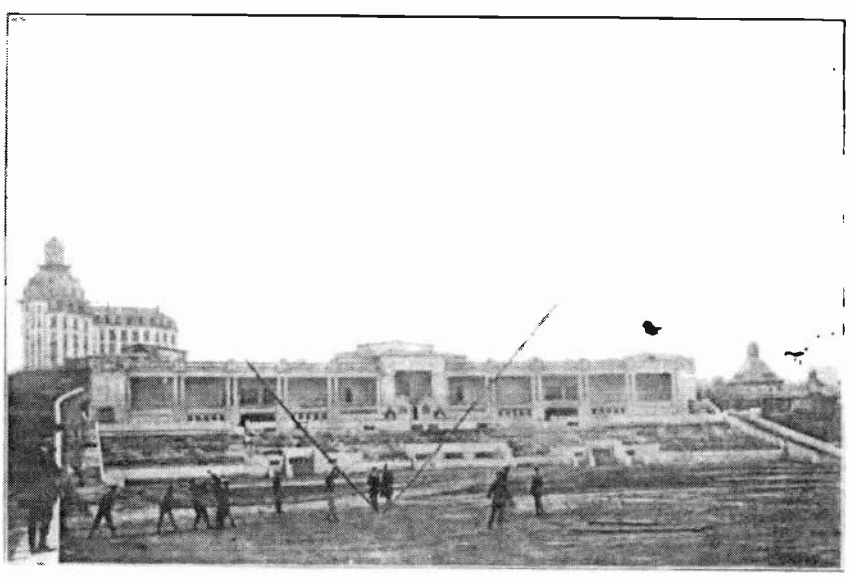
In addition to the wireless news from London, the *Times'* news from Paris and Berlin is sent by its correspondents in those cities by long-distance telephone to London, and thence relayed by wireless to New York. The wireless messages thus forwarded to the *Times* from Europe have often comprised more than 2,000 words daily, and 8,000 or more for Sunday, and the wireless service it has thus obtained has approximated some 25,000 words a week.

Demonstrations of Portable Wireless Sets in Belgium

AN important series of demonstrations with portable wireless telegraph sets was conducted in Belgium during the last week in February. These demonstrations were carried out under the supervision of Major J. E. Cochrane, D.S.O., of the Marconi Co. and M. Paul de Bremaecker, of La Companie de Télégraphie sans Fil, and Lieut. Poliet, of the Telegraph Engineers Corps, in the presence, at Brussels, of General Jungbluth, Chief of the General Staff of the Belgian Army; General Dufour, and Generals Van Sprang and Georges. There were also present Majors Baltia and Cabra, and Commanders Semet and Seligman. The trials were conducted with 1½ kw. cart and car stations. On arrival at Antwerp on February 21st, a cart station was erected on a site adjoining the barracks, which had been selected by the military authorities. A car station was despatched to Brussels, and a demonstration was given to the Cadets at the military school. On February 23rd a car station was erected on a very difficult piece of land, consisting of a stonemason's yard as a site for one mast, and a ploughed field for the other, with a garden and fence between. By using wooden posts in place of pegs for the field, the station was satisfactorily erected, and communication established with Antwerp, a distance of about 45 kilometres. The signals were very strong, and the musical note gave great satisfaction. The fact that it was possible to read messages from Brussels in spite of interference from the station fixed on the barracks 500 yards away, was an advantage which impressed those who witnessed the demonstration, as it would have been impossible to read the message had not the note been distinctly musical. The station was mounted and dismounted by six Belgian soldiers in charge of Lieutenant Poliet. On Saturday, February 24th, the station was erected on a site at Namur; good signals passed to and from Antwerp, whilst

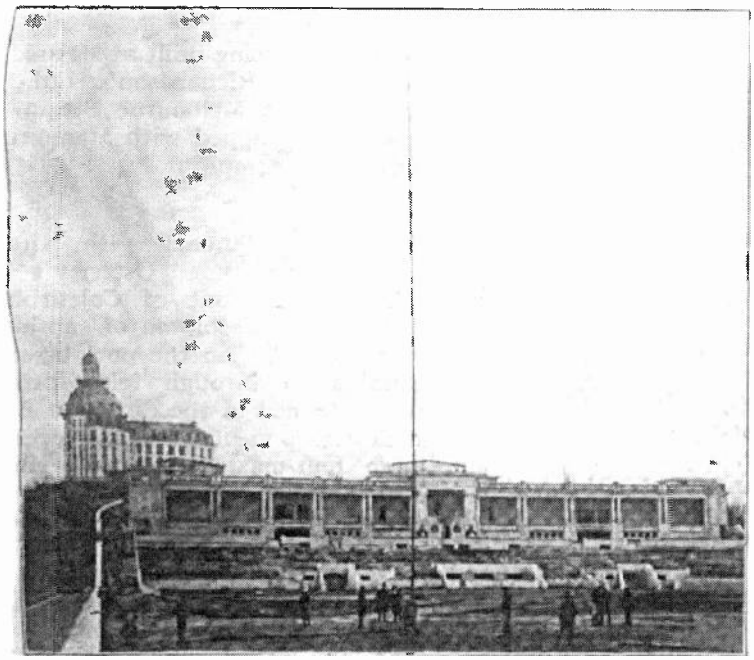


Station Working at St. Hubert



Getting up the Mast at Citadel, Namur

the military operators were able to interchange messages with ease. At noon the Namur station called the Broomfield station in England. On February 26th communication was established between Antwerp and St. Hubert, a distance of 150 kilometers. The signals were good and clear. Belgian operators again carried out a successful interchange of messages. The apparatus consisted of the usual 1½ kw. field station set, the generating plant comprising engine, alternator, and disc discharger mounted on a common bedplate. The simplicity of the type of mast used in the demonstrations was much appreciated. The type of mast employed was a wooden sectional one, the total height being 70 ft., divided into six equal and interchangeable sections. Two such masts were employed for each station to support an aerial consisting of two wires. The adoption of this type of mast is the result of numerous experiments, and the determination to employ for military purposes only the most robust type possible.



Mast erected at Namur

IN THE WEST INDIES.—In reply to a question in the House of Commons, Mr. L. Harcourt, the Secretary for the Colonies, stated that there were wireless stations in Jamaica, Trinidad, Tobago, and British Guiana, and the erection of stations in Barbados, the Bahamas, and British Honduras was under discussion.

News from Westminster

THE ADMIRALTY AND WIRELESS.—Questioned by Mr. Peto whether, in the case of the wreck of the steamer "Delhi," owing to the wireless apparatus being calculated to send messages with a wave-length of 300 or 600, and the Admiralty stations being tuned to wave-lengths varying from 600 to 1,600, the "Delhi" was unable to communicate with Gibraltar, and communication was only made through the new (Marconi) wireless station at Cadiz, opened only a fortnight before the wreck; and what steps would be taken to make Admiralty wire less stations of use in similar cases; Mr. Churchill said the wireless messages from the "Delhi" were taken by his Majesty ships at Gibraltar, and it was not the fact that the news of the wreck was first received by the naval authorities through the wireless station at Cadiz. The International Wireless Convention provided for the differentiation between commercial and naval wave-lengths mentioned by Mr. Peto. Whenever a sufficient number of men-of-war were in company a look-out was kept by one of them on a commercial wave-length. Naval shore stations, however, had to look out on naval wave-lengths, and consequently commercial ship or shore stations would not ordinarily be able to communicate with them. That differentiation was necessary, and he did not propose to alter it. It would be possible to have an additional receiver or some additional plant at the Admiralty station so that they might be able to take messages from commercial vessels. This was only a question of money.

FOR FISHING VESSELS.—Sir E. H. Carlile asked the President of the Board of Agriculture whether he would consider the advisability of granting a subvention for the encouragement of the use of wireless telegraphy on fishing boats, and thus follow the example which had been set by the German and French Governments in dealing with boats belonging to men of their own nationalities. Mr. Runciman replied that he had no doubt there were many cases in which fishing vessels might be provided with wireless apparatus with advantage. He had, however, received no representations from those concerned in the industry.

"Eaglehurst," Fawley, one of the most beautiful places on the Hampshire coast, has just been let on lease to Mr. Marconi, who is now in residence there.

Maritime Wireless Telegraphy

AMONG the ships fitted during the past month by the Marconi International Marine Communication Co., Ltd., with 1½-kw. and emergency plant are the following engaged in the Australian trade: The "Irishman," owned by the White Star Line; the "Narrung" and "Wakool," for the Peninsular and Oriental Steam Navigation Company. The s.s. "Ramos," equipped for the Amazon Cable Company, will be engaged in cable laying. The "Normannia" and "Hantonio," equipped for the London & South Western Railway Company, will be engaged in the Southampton Harbour traffic. Another vessel, equipped for the Peninsular and Oriental Steam Navigation Company, is the "Beltana," which will be engaged in trading between London and Australia; while the "Inkosi," for Messrs. J. & T. Houston, Ltd., will be engaged on the London and Beira route. Two vessels have been equipped for the Anglo-American Oil Company—namely, the "Delaware" and "Appalachee." The s.s. "Titanic," for the White Star Line, will be equipped with a 5 kw. disc set. Orders have been received from the Shaw Savill and Albion Line for the equipment of the following six vessels: "Wiamana," "Pakeha," "Rangatira," "Kia Ora," "Mamari," and "Matatua." The s.s. "Hesperides" is now being equipped with a 1½-kw. set for the Houston Line, from which company orders have since been received for the equipment of the "Hyacinthus," "Hyapathia," "Hydaspes," "Honorius," and "Hermoine." The "Ben-my-chree," "Viking," and "Empress Queen" are to be equipped for the Isle of Man Steam Packet Company. The "Wilcannia" is being equipped for the Peninsular and Oriental Steam Navigation Company, while a notable installation is that of the convict ship "Success" for the Australian Government. The "El Argentino" is being equipped for the Argentine Cargo Line, Ltd., from which company an order has since been received for the equipment of the "El Blancho." An order has also been received from the White Star Line for the equipment of the "Adriatic."

La Companie de Télégraphie sans Fil of Brussels have received instructions from the Trasatlantica Espanol to fit three of the vessels belonging to the last-named company—namely, the s.s. "Villaverde," "Cataluna," and "Cuidad de Cadiz" with ½-k.w. sets.

The Adelaide Steamship Company of Australia have instructed the Marconi International Marine Communication Co., Ltd., to equip their s.s. "Willoctira," "Warilda," and "Wandilla."

The "Dimboola," now being built at Messrs. Swan Hunter & Wigham Richardson's, Ltd., Wallsend-on-Tyne, for the Melbourne Steamship Company, will be equipped with Marconi apparatus for wireless telegraphy.

About 12.30 p.m. on January 13th, the officer of the watch on the "Osterley's" bridge (then thirty hours out of Colombo homeward bound) noticed a column of smoke hanging low over the water on the port bow. After close examination through telescopes, the ship's head was turned in the direction of the smoke, and at 1.50 p.m. it was discovered that a fine large four-masted steamer, the "Spondilous," of London, was badly on fire aft, abandoned and drifting along with the current directly in the steam lane from the Red Sea to Colombo, now a blazing beacon; but when the fire had burned itself out, to become a partially submerged derelict—a deadly menace to ships on a dark night. Her position was noted. At 7 p.m. that night, by means of a wireless service message from the Captain of "Rindjani," it was ascertained that the crew of the derelict had been rescued by the French ship "Admiral Macon," and a message giving full details was transmitted that night by the "Osterley" to Lloyd's agents at Bombay, via the station at Jask, a distance of 1,160 miles. Lloyd's were thus enabled to warn the shipping world of the existence of this danger, and at the same time the friends and relatives of the unfortunate crew were assured that all was well. If the "Spondilous" had been fitted with a small wireless set, the mail boat would have known of her condition at least 12 hours before she did, and passing the news back via her sister ship "Oksova," due in Colombo at 6 a.m. on January 12th, help might have been forthcoming from Colombo in time to save a ship worth many thousands of pounds, to say nothing of her cargo. In reality the time saved would have been more like 24 hours than 12 hours. That same night the news of the test match, with scores, played in Australia on the same afternoon, was received from Bombay, a distance of over 900 miles.

The Discovery of Ancient Vases at the Athens Marconi Station

By Harold Watterson

UNDOUBTEDLY the credit of the discovery of treasure trove in the land of Homer is due to the chief of the technical staff, who, from his office in London, had decided that the earth-wire system of the recently erected naval Marconi station, far away in historic Athens, must be extended.

So the plans and the letter of instruction were dropped into the box at the West Strand post office; and a week later the chattering American tourists at Athens, who come up through the pepper groves and olive gardens to take snapshots of the 2,400 years old Temple of Theseus, glanced casually at the two hot and dusty wireless engineers who were endeavouring to translate the ideals of the London drawing-office experts to the languid Greek labourers at the wireless telegraph station which stretches its shining tentacles to the azure sky between the hill of the Observatory and the hill of Philappopos.

Greece is a peculiar country. It is a land where the dreamer of easy jobs is speedily disillusioned.

Thus, on September 16th, 1911, when we had

Some of the vessels found

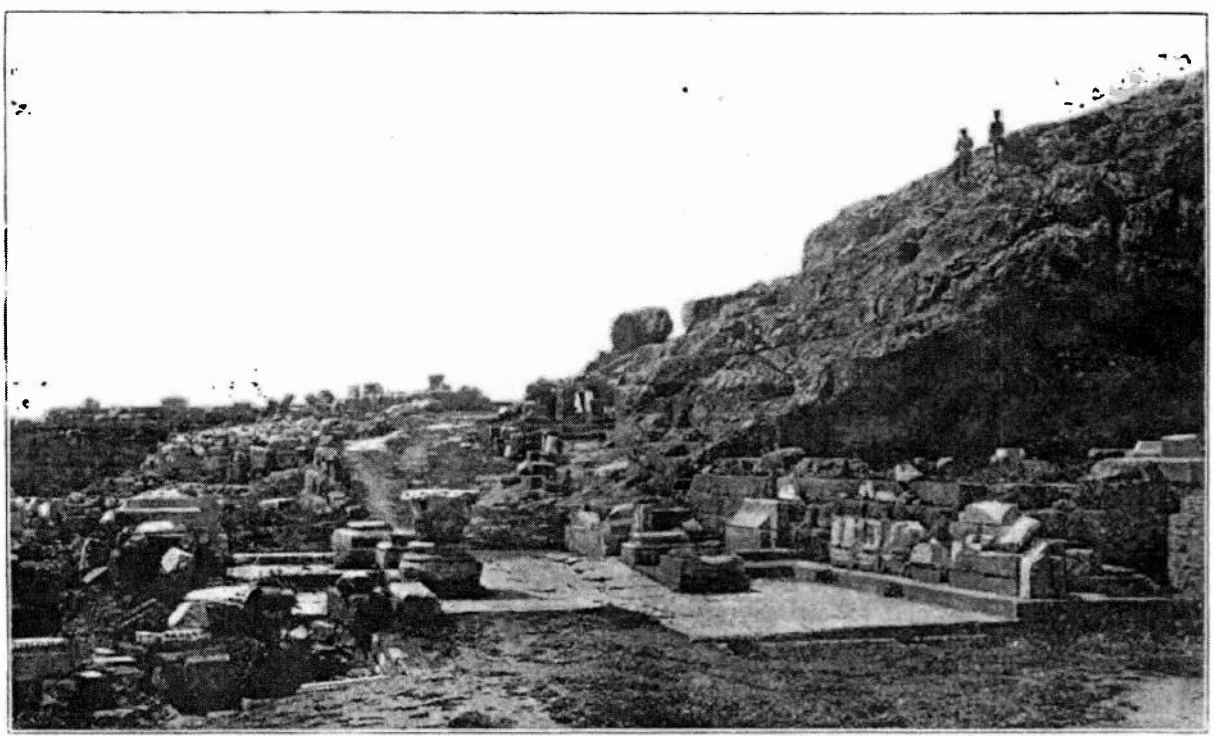
been engaged in drilling and blasting out the crystalline limestone on which the Athens station is built, we came unexpectedly upon an ancient rock-hewn grave which contained the remains of a human skeleton and eleven beautiful specimens of the potter's art in a nearly perfect state of preservation.

To the west and south-west of the Areopagus and the Acropolis at Athens rises a rocky

ridge, divided by two depressions into three summits. It is in one of these depressions that the naval wireless telegraph station is situated, in the neighbourhood of which the grave was discovered. This part of the ancient city of Athens is unoccupied, and the whole of the rocky ridge bears innumerable vestiges of ancient settlements. Regular cuttings in the rock, flights of stone steps, terraces, wells, cisterns and channels, together with remains of houses and pieces of stucco, testify indubitably to human habitation, and in some places the lines of ancient streets can easily be followed. The root-like ramifications of the earth-wire system of the Marconi station extend far out amid these silent reminders of a forgotten and ward over his resting-place, and day by day as the sunlight waned have cast their long shadows upon him.

The grave itself, cut in the solid rock, is 6 feet 4 inches in length, 2 feet 6 inches in breadth, and a little over 2 feet deep. The appearance of the sides would seem to indicate that they had at one time received a layer of stucco. So far as can be ascertained, there was nothing to indicate the site : all inscriptions must long ago have been erased, and the workmanship of the stones covering the opening was so perfect as to render them indistinguishable from the living rock.

The firing of a dynamite cartridge for the purpose of removing an obstruction accidentally



Silent Reminders of a Past Civilisation

civilisation, and terminate at the ruined wall which once extended from Athens to the Piræus.

The position of the newly-discovered tomb is quite near to the famous sloping rock near the little Byzantine church of the *Hagia Marina*. The surface of the rock is worn smooth at the south-east angle, as a result of an extraordinary superstition that sliding down it brings good luck.

Those who have travelled in Italy and the East are familiar with the ancient custom of burying the dead outside the city walls by the roadsides, and this was doubtless the case with the forgotten Greek who has lain in his rocky tomb for so many centuries, whilst the statues of the maidens on the Acropolis have kept watch revealed the presence of the tomb, happily without injuring seriously its contents. It is evident that outside air must have had access to the tomb, for of the skeleton itself little save the skull remains, and that is in a most fragile condition.

The skull is that of an old man—probably over eighty years of age at the time of death. All the teeth in the upper jaw are missing with the exception of four, and those that remain are in a much worn state. The lower jaw likewise has but four teeth, which also have seen much service.

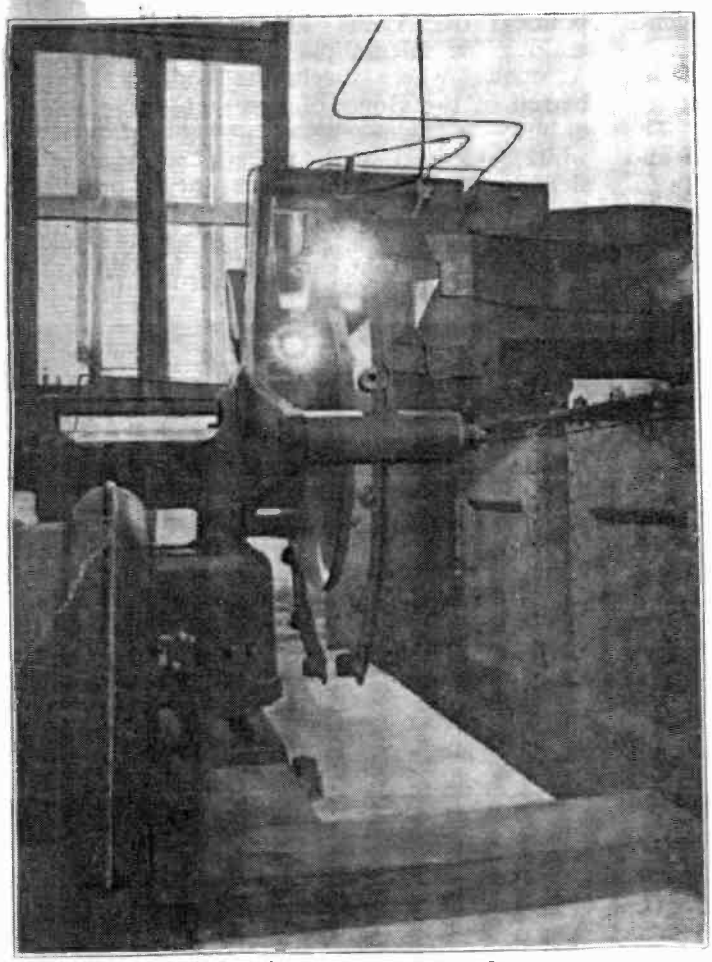
But the chief interest, of course, centres round the funeral vases which had been interred with the corpse. On either side of the head was a beautiful and massive flat-topped terra-

cotta oil vase or *amphora*, fitted with a lid. The bodies of these *amphoræ* are coated with a hard black composition, and the tops are ornamented in conventional patterns, the colours of which are as fresh as on the day when they issued from the painstaking hand of the artist. The material is a fine, hard and very heavy terra-cotta. The insides of the vases are very curious: a thin circular division extending from the rim almost to the bottom of the receptacle, thus forming a double interior chamber.

The Skull and Vases found in the Grave

Close to the *amphoræ* were found two small Ionic funeral vases of Tanagra ware and most beautiful workmanship, covered with elaborate designs in line, showing a high degree of artistic skill, one being a profile representation of the head of Medusa—a perfect and lovely face. Some pigment has been mingled with the fine clay, giving to the cheek of the subject a warm, red tint which suggests in a remarkable manner the soft, rounded contours of youth.

On the left side of the corpse was a slender red terra-cotta perfume jar, ornamented with the figure of Sappho, who leans against a slender column. This jar collapsed into fragments when touched, but has since been reconstructed.



The Double Spark at Athens Station

At the right-hand side of the dead man a larger painted vase and a black glazed pitcher had been placed. This vase, which is 8 inches in height, is a veritable treasure of archaic ceramic art. Upon one side is a representation of a goddess playing on the lute, and accompanied by two satyrs. On the other side are the figures of two maidens.

The painting of the goddess is peculiarly charming. The face is seen in profile, and the lips have a pleasant expression, whilst the coiffure is most elaborate. The bodily form is very successfully suggested beneath the drapery, which is white, as is also that of the maidens on the opposite side of the vase. The two nude satyrs are shown capering beside the aristocratic figure of the goddess, who advances with short and dignified steps.

The remaining five vessels are small tearvases of various sizes, and had been laid at the feet of the departed. They are of yellow terra-cotta, embellished with representations of birds and animals, some in colours. One is remarkable for a lifelike picture of a charging boar.

An examination of the accounts of the development of early Greek vase painting, and a comparison

of the vases found in the grave at the Marconi station with the specimens in the museum at Athens, leaves no doubt that the vessels brought to light so strangely belong to the middle of the sixth century before Christ, and are products of the school founded by *Epiktetos*, which prepared the way for the younger group usually named after *Euphronios*, the activity of which extended down to the beginning of the fifth century before Christ. The vases, although possessing great interest from the point of view of the student of archæology, were not of the most expensive type. The portion of the ancient city of Athens near which the grave was discovered was given up to the trading and artisan classes of the community, and this leads us to deduce that the tomb was that of a well-to-do man of the middle classes.

It is difficult adequately to describe one's sensations on stumbling upon these gems of ceramic art, which have remained undisturbed in their rocky hiding-place for two thousand five hundred years. A visit to a museum, with its methodically-arranged rows of vases and classified cases of objects, does not bring before one's mind the circumstances and scenes with which the objects were associated, but to make such a discovery as that which has fallen to our lot is different. It brought before one a tremendous sense of the reality of history. The thought occurred on looking at the skull and the funeral ruins, "This old man really lived. Lived and died under the shadow of the Parthenon, ages ago, before the Christian era, and before the British Empire was thought of." And the long vista of the centuries fades, and one finds oneself picturing quite easily the life and surroundings of that long-forgotten Athenian citizen.

The deep blue sky and sparkling sea and Homer's rocks and sun are the same, and the Acropolis towers above us, not, as now, in ruined magnificence, but glittering in all the glory of dazzling white Pentelic marble and carven tracery. But our Greek never lived to see the colossal statue of Athena Parthenos which in later years dominated the sacred enclosure of the Acropolis, her golden helmet forming a land-mark for lonely mariners far out at sea.

The silent ruins change to busy streets thronged with hurrying artisans; criers shout their wares, and the charcoal fumes from the brass-workers' forges mingle with the appetising aroma from the cook-shops.

Solon is despot at Athens, and under his beneficent rule the young Greek pursues his studies with the same avidity for learning which characterises the Greek scholar of to-day. His studies include rhetoric music and dancing, and the works of *Alcman*, the Spartan slave poet, would be amongst the earliest things that he was taught. He would know by heart such stanzas as:

"Now o'er the drowsy earth still Night prevails,
Calm sleep the mountain tops and shady vales,
The rugged cliffs and hollow glens;
The wild beasts slumber in their dens;
The cattle on the hill. Deep in the sea
The countless finny race and monster brood
Tranquil repose. Even the busy bee
Forgets her daily toil. The silent wood
No more with noisy hum of insect rings;
And all the feather'd tribes, by gentle sleep subdued,
Roost in the glade, and hang their drooping wings."

As well as the writings of *Arion* and *Stesichorus*. Later one sees him taking his part in the political discussions in the *Syntagma*, and making his solemn pilgrimages to the sacred Acropolis, where dwelt the goddess Athena herself in the House of Erectheus; the holiest of holies in pagan religion, a temple of dazzling white, adorned with statues supported on slender columns; wonderfully beautiful, projected against the deep blue of southern skies—a work in which the deity was to rejoice as she rejoiced in the maidens that came to her festivals.

The Skull found at the 2,500 years old Sepulchre

One pictures our Greek again, married and with a growing family, engrossed in the cares and occupation of a trader's life, and as time passes, in middle age, prosperous, bald-headed, and already showing traces of the corpulency which the climatic conditions of Greece render inevitable, the while his country becomes the centre of the intellectual activity of the world.

The moving finger writes; the years flicker past; his sons conduct the old man's business, and as he takes his evening walk upon the hill of Philappopos we see that his steps are grown feeble, and that he leans upon his staff. And so we come to the saddest of all domestic scenes, and stand with the grief-stricken relations and friends round the open grave upon the sun-soaked hillside, whilst the priests chant their solemn prayers and commend the soul of the departed man to Hercules the Conductor and Jove the Protector of the Dead, and perform the ritual of placing in position the funeral vases.

So, his race well run, our Greek sleeps secure through the Persian invasion and the thirty-eight years of the Pelopponnesian war. Now his children are white-headed—grandparents . . . he himself is forgotten; kingdoms rise and fall; Athens reaches her glorious zenith and declines, the Roman conqueror holds her in a grip of steel, and Greece becomes a Roman province.

The mighty Roman empire, that empire which collected within the walls of her imperial capital all the elements of ancient culture, and has preserved them for posterity, totters and collapses; and the fair land of Hellas is ravaged by the barbarians, the Avars, the Slavs, the Norwegians and the Varangians. Then come the Crusaders, with holy zeal and lust for loot. A thousand years of slavery under Venetian and Turk follow, and, behold, Greece arises from amid the imperishable remains of her thousand temples, and a new Athens shines white and splendid upon the plain of Attica, with merchant vessels trading to distant lands, and stately ships of war guarding her sunlit shores.

The Ruined Grandeur of the Acropolis.

. . . . . .

Two men, engineers from the north, heirs to the knowledge of the ages, and descendants of those savages that peered in amazement over the cliffs of Kent at the advent of the armada of the Roman general Julius Cæsar, when the glory of Greece had faded to a legend, these men come by chance upon that old Greek grave cut in the hillside, and gaze and marvel at the evidences of the mystery of Time and Life.

A booming, crashing sound fills the air: the ground vibrates. It is the organ-note of the great spark at the wireless station sending out the noonday hour to the cruiser squadron somewhere out there amid the vine-clad Ionian isles set in the sapphire sea. Sixty-four thousand every minute—the sparks stream out in unbearable brilliance, and we come back with a click to the year of grace *anno domini* nineteen hundred and eleven.

"Good tone to-day," says my colleague, putting down the vase he has been examining, and listening intently. "I think we might shift that phase position a little though. Come on!"

Personal

The Postmaster General has appointed Major O'Meara C.M.G., R.E., to be Engineering Special Commissioner to examine and report upon the telegraph and telephone systems of Europe.

Mr. W. Slingo, one of the two Assistant Engineers-in-Chief, has been appointed Engineer-in-Chief in succession to Major O'Meara.

Mr. J. Lindsay, the chief officer at the Lizard wireless telegraph station, has been transferred to a similar post at Cullercoats, Northumberland. He was appointed to the Lizard Station, under the Marconi Company, ten years ago, and at the end of three years was promoted to his present rank. For some time Mr. Lindsay was a Parish Councillor, whilst he was one of those who were instrumental in obtaining a recreation ground from Viscount Clifden. Before he left the Lizard friends presented him with a dressing case. Mr. Close, one of his assistants, is accompanying him to Cullercoats, and Mr. Price will act as chief officer at the Lizard, to which station also Mr. John Reynolds has been transferred from the Bolt Head station.

Athletics

A meeting of the members of the Marconi Athletic Club was held on March 18th, when the following committee was elected: Messrs. H. W. Allen, W. W. Bradfield, C. F. Burden, A. Cappelaere, A. G. Cutts, A. Flood-Page, A. Gray, T. E. Hobbs, C. J. Ketteridge, F. J. Menier, and —. —. Richardson. Mr. W. R. Cross was elected Treasurer, with Mr. W. H. Smith and W. Collup, Secretary and Assistant Secretary respectively. The matches arranged to take place by the football section are, on April 6th, against Bessborough United on the home ground at Lower Sydenham, on April 13th the return match will be played at the Boston Road ground, Ealing, W., whilst on April 27th, a match will be played against Baynards F.C. A swimming section has been formed, and intending members are requested to hand in their names to the Secretary. Mr. W. W. Bradfield and Mr. C. J. Ketteridge are respectively Captain and Vice-Captain of the cricket team.

Movements of Engineers

F. A. Hart, from Head Office to Laboratory.

J. A. Proctor resigned.

H. J. Round, C. C. Chapman, and H. E. Watterson have arrived at Manaos.

E. J. Watts has arrived at Shanghai.

F. E. Burrowes is in charge of the erection of a new station at Stanley, in the Falkland Islands.

H. Dobell has gone to Vigo to conduct special tests.

F. Post is on his way home from Tarakan.

O. Trost has gone to Copenhagen to fit the Danish cruiser "Absalon."

E. G. Tyler is in charge of the alterations to the post office wireless station at Niton, Isle of Wight.

R. K. Rice has finished the station at Colombo, and will shortly return home.

J. J. Leary is in charge of the reconstruction of Poldhu station, assisted by C. H. Keith, R. H. Strickland, and H. Nicholls.

J. G. Robb is in charge of the directional apparatus which is now being tried on board s.s. "Mauretania."

R. V. Ridges and F. C. Lunnon have gone to Clifden.

S. L. Dashwood and S. R. Grover will return from India by s.s. "Mombasa," sailing on April 11th.

G. S. Wood and W. F. Fielding, having completed their course of instruction at Broomfield, are now on the ship-fitting staff.

Movements of Operators

The following transfers of operators in the employ of the Marconi International Marine Communication Co., Ltd., have taken place during the past month:

G. Balding, from the "Walmer Castle" to the "Minnehaha."

J. H. Golding, from the "Arawa" to the "Wakool."

G. Thomson, from the "Oceanic" to the "China."

J. G. Phillips, from the "Oceanic" to the "Titanic."

E. Ogilvie, from the "Minnewaska" to the "Mantua."

W. Haywood, from the "Galician" to the "German."

F. R. Yeo, from the "Oronsa" to the "Moravian."

J. A. Craigie, from the "Afric" to the "Canada."

C. M. Allnutt, from the "Antony" to the "Augustine."

J. Moody, from the "Belgic" to Clifden Wireless Station.

H. J. Belcher, from the "Campania" to the "Galician."

S. C. Howes, from the "Denis" to the "Saxonia."

J. Connell, from the "Empress of Britain" to the "Mauretania."

G. Hake, from the "Empress of Britain" to the "Orita."

A. J. Osborn, from the "Gloucestershire" to the "Denis."

S. Stansbridge, from the "Orita" to the "Bohemian."

A. C. Arnold, from the "Baltic" to the "Winifredian."

A. C. Baker, from the "Winifredian" to the "Corinthic."

T. Knox, from the "Dominion" to the "Athenia."

G. F. Pepper, from the "Devonian" to the "Pretorian."

H. Hayes, from the "Montfort" to the "Irishman."

J. Starkey, from the "Mendi" to the "Virginian."

H. Sturdy, from the "Oravia" to the "Montreal."

E. E. Learnian, from the "Pancras" to the "Royal Edward."

W. J. Cotter, from the Marconi School to the "Virginian."

H. J. Lightfoot, from the "Ambrose" to the "Antony."

J. T. Griffith, from the "Megantic" to the "Afric."

A. C. Lund, from the "Pannonia" to the "Akabo."

F. A. Bradley, from the "Canadian" to the "Inkosi."

A. L. Henri, from the Marconi School to the "Cymric."

T. J. Chapman, from the "Derbyshire" to the "Gloucestershire."

S. H. Devereux, from the Marconi School to the "Devonian."

A. Crofts, from the "Empress of Ireland" to the "Appalachee."

J. L. Lambert, from the Marconi School to the "Empress of Ireland."

H. E. Solway, from the "Teutonic" to the "Hesperian."

H. A. Flick, from the "Hesperian" to the "Ivernia."

K. S. Cowley, from the "Rewa" to the "Lusitania."

H. Kirby, from the Marconi School to the "Megantic."

G. McCormack, from the "Munster" to the "Ulster."

J. R. Thomson, from the "Cymric" to the "Oravia."

American Company

G. H. Rabbitts, from "Sagaponack" to the s.s. "Rosalind."

H. Williams, from the "Olinda" to Wanamakers' New York station.

Roland T. Crane, from "Sagaponack" to s.y. "Warrior."

R. M. Fennell, from the s.s. "Curityba" to s.s. "Rosalind."

Fred. E. Heiser, from So. Wellfleet to Sea Gate.

Jos. H. Hughes, from "Sagaponack" to Wanamakers, New York.

Harry E. Kent, appointed to s.s. "Olinda."

F. A. Nelson, appointed to Cape May.

T. E. Nivison, from Cape May to So. Wellfleet.

M. H. Payne, from Sea Gate to Head Office (New York).

G. B. Rabbitts, from s.s. "Rosalind" to to s.s. "Curityba."

H. Williams, from Wanamakers (New York) to Sea Gate.

Walter Zipfel, appointed to "Sagaponack."