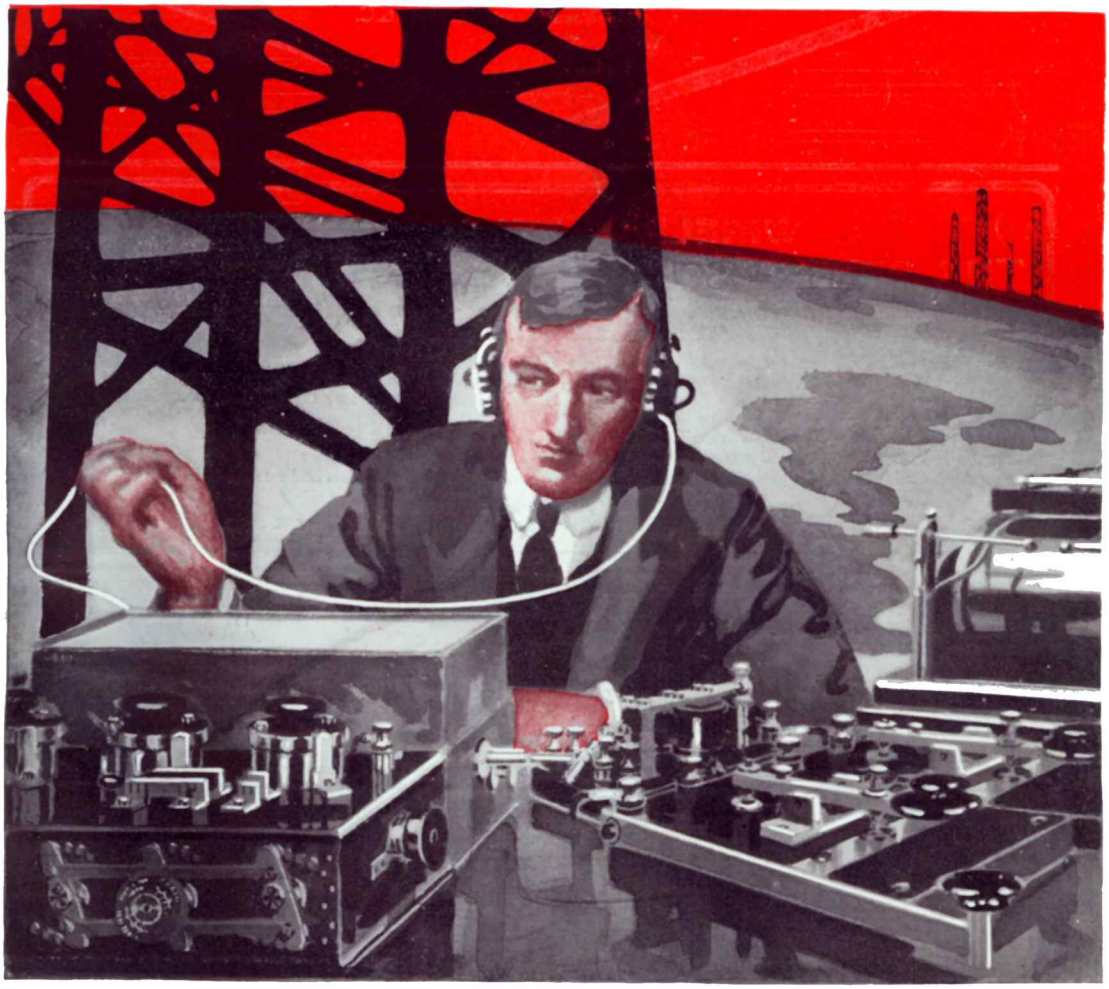
# THE MARCONIGRAPH

WIRELESS·TELEGRAPHY·ILLUSTRATED·MONTH·BY·MON

JULY 1911. PRICE 2



# THE MARCONIGRAPH

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## Wireless Telegraphy in the Field.

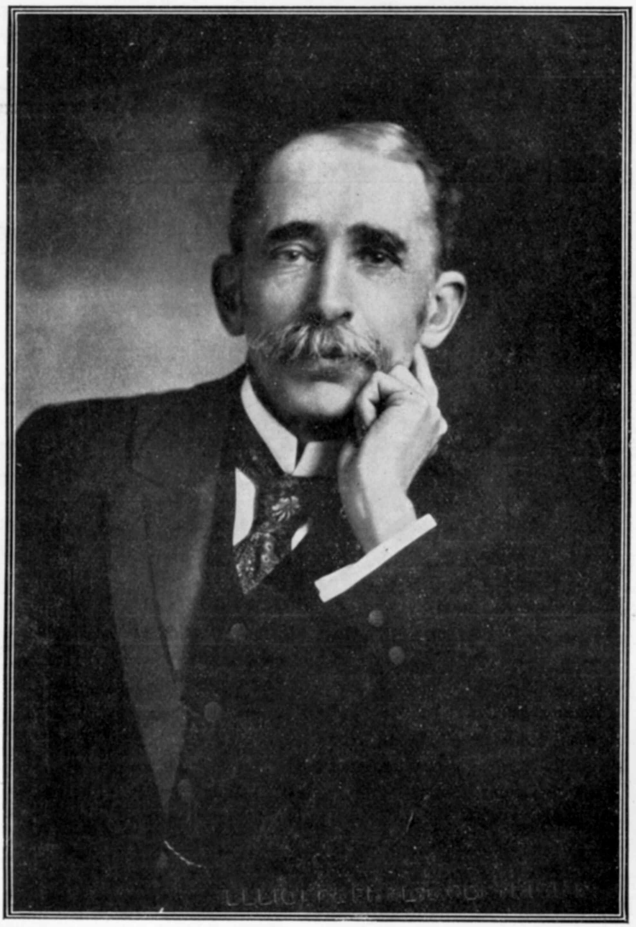
A SERIES of trials have recently been carried out before the Spanish Military Authorities with two Marconi Standard Cavalry Sets in the vicinity of Madrid. The trials which commenced about the middle of June consisted of a series of tests, the majority of which were conducted over mountainous country. On the first day communication was established by means of the two cavalry sets between Villalba and Madrid, a distance of 50 kilometres. On the second day the Madrid set was moved to Otero, and established communication over a range of mountains with Villalba, the distance between these two places amounting to some 35 kilometres. On the following day, the station at Otero was moved to La Granja, and communication was again established with Villalba, the intervening mountains in this case being considerably higher than on the previous day.

It is interesting to note that recently when similar trials were made with other portable apparatus, and between the same places, the results were not nearly so satisfactory, notwithstanding the fact that the masts employed then were more than double the height of those employed with Marconi cavalry sets. On the last day of the trials, June 17th, communication was finally established between Madrid and the Alpine Club, a large number of Royal Engineer Officers being present to inspect the stations, and we are very pleased to note from advices recently received from our Associated Company in Madrid that as a result of the trials the Spanish Military Officers had expressed themselves in terms of the greatest satisfaction as regards the design and construction of Marconi apparatus.

Although the ranges obtained in the above-mentioned tests are not considerable, it must be remembered that communication was carried on throughout over extremely mountainous country, and in view of this we think that the Company, and those responsible for the design and operation of the apparatus, have every reason to congratulate themselves on the eminently satisfactory results.

In continuation of the article which appeared in last month's *Marconigraph* regarding Turkish trials, we regret that no detailed reports are yet to hand regarding the trials which were then in progress. From telegraphic advices, however, we are pleased to state that the trials have now been concluded, and we have every reason to believe that they are regarded by the Turkish Authorities as a complete success.

As regards the portability of the stations, and the time required for erection, it is interesting to note that during the competition before the Turkish Military Authorities, the Marconi stations were erected in 20 minutes, whilst the installations of our competitors required respectively 55 minutes and 2 hours and 10 minutes. We hope in a later issue to give fuller details as to the final result of these tests.



DR. JOHN A. FLEMING.

# Dr. John A. Fleming

**Scientific Adviser to Marconi's Wireless Telegraph Company.**

THE subject of our sketch this month, Dr. John Ambrose Fleming, has been connected with the Marconi's Wireless Telegraph Company, as scientific adviser, since 1899. He was born at Lancaster in 1849, and received his scientific training at University College, London, the Royal School of Mines, and St. John's College, Cambridge. At the Royal School of Mines he was assistant to the eminent chemist, Sir Edward Frankland, and at Cambridge was a student and worked under Professor James Clerk Maxwell, whose profound theories of electricity paved the way for the subsequent work of Hertz, and therefore for wireless telegraphy by electric waves. At Cambridge Dr. Fleming gained numerous distinctions, being made successively Exhibitioner in Physical Science, and then Foundation Scholar, Wright and Hughes Prizeman, and finally elected a Fellow of St. John's College. He came to London in 1882 to take a position as scientific adviser of the Edison Electric Light Company, subsequently remaining for nearly fifteen years in the same position with the Edison and Swan, Electric Light Company, Limited, and also acting as adviser to many other companies and corporations. For nearly twenty-five years he has been Professor of Electrical Engineering in University College, London, and during that time has contributed about seventy or eighty scientific papers to various learned societies, describing researches in Electricity, Magnetism, and General Physics. He is the author of numerous well-known text books, amongst which may be mentioned particularly his books on Wireless Telegraphy, *viz.*, his large book, "The Principles of Electric Wave Telegraphy and Telephony," and an elementary manual of "Radio-telegraphy and Radio-telephony." He has given many courses of lectures at the Royal Society of Arts and at the Royal Institution on Wireless Telegraphy and kindred subjects, and has taken out several patents for inventions connected with radio-telegraphy, such as his agmometer and oscillation valve or glow lamp wave detector. In 1892 Dr. Fleming was made a Fellow of the Royal Society, and in 1910 was awarded the Hughes Gold Medal by the Royal Society for his scientific work. In presenting the medal to Dr. Fleming, the President of the Royal Society, Sir Archibald Geikie, K.C.B., said :—

> "For thirty years he has been actively engaged in researches in Experimental Physics, chiefly in the technical applications of electricity. He was an early investigator of the properties of the glow lamp, and elucidated the unilateral conductivity presented in the partial vacuum between glowing carbon and adjacent metal, a phenomenon which has been linked up recently with the important subject of the specific discharges of electrons by different materials. He has published in the Scientific and Technical Press and in technical text-books many admirable experimental investigations and valuable expositions in the applications of electricity, as, for example, to electric transformers and wireless telegraphy. Of special interest and value for theory were the important results concerning the alterations in the physical properties of matter, such as the remarkable increase in the electric conductivity of metals when subjected to very low temperatures, which flowed from his early collaboration with Sir James Dewar in investigating this domain. In recent years he has taken a prominent part in the scientific development of telegraphy by electric waves."

# The Imperial Aspect of Wireless Telegraphy.

AMONG the many possibilities suggested by the Imperial Conference, which was held in London during the greater part of June, perhaps none is more striking than the unanimity with which the delegates acclaimed the practicability of wireless telegraphy. The subject was discussed on the motion of Sir Joseph Ward, the Prime Minister of New Zealand, who declared that the great importance of wireless telegraphy for social, commercial, and defensive purposes rendered it desirable that a scheme of wireless telegraphy approved at the Conference held at Melbourne in December, 1909, be extended as far as practicable throughout the Empire, so as to enable the Empire to be to a great extent independent of submarine cables. Sir Joseph pointed out that wireless telegraphy had advanced so considerably during the last five years that it offered a great inducement to have a world-wide Empire system established. In New Zealand they were having two high-power stations erected, by means of which their system would be guaranteed to carry 1,250 miles during the day and much further at night. In addition they would have four low-power stations, and all the ships in New Zealand waters would be equipped with the wireless system. It would be a splendid thing to have a girdle of wireless stations round the Empire, particularly in time of war, when the existing cables might be cut. Such a system might also be an advantage from the commercial point of view.

### The Attitude of the Post Office.

Mr. Herbert Samuel, the Postmaster-General, said that the Home Government considered it very desirable that a chain of wireless stations should be speedily established throughout the Empire, partly for strategic and partly for commercial reasons. It was not thought advisable at the outset to establish the system in every direction simultaneously. Therefore the Government proposed that a beginning should be made with a chain of six stations, one each in England, Cyprus, Aden, Bombay, the Straits Settlements, and Western Australia, and from there it would be linked on to New Zealand. Later on South Africa would be connected *via* either East Africa or West Africa, or by both routes. The working of the system would be by the Post Office and the local administrations in India and the various Dominions. It was suggested that the United Kingdom should bear the cost of the stations in England, Cyprus, and Aden; that India should bear the cost of the station at Bombay; that New Zealand and Australia should bear the cost of the stations in their respective territories; and that the cost of the station at Singapore, that station being created almost exclusively as a link in the chain, should be equitably divided. With regard to the connection of the present proposals with the Melbourne Conference scheme, Mr. Samuel said he was advised that the cost of crossing the Pacific by a chain of stations would be very heavy, while the strategic value would be small and the commercial value negligible. Such a system could hardly be the beginning of an Imperial chain of wireless stations, and he suggested that it would be better to omit the reference to the Melbourne Conference and pass a resolution in general terms in favour of a system of Imperial wireless telegraphy.

Sir Joseph Ward consented to modify his motion in accordance with Mr. Samuel's suggestion, but Mr. Pearce expressed the hope that the Pacific would not be lost sight of. Other European countries possessed colonies in the Pacific, and it was possible that they would not throw away their opportunities in this matter. Moreover, a Western Australian station was being established, and now was the time

for the matter to be considered if there was any question of adapting their system to any new scheme. Mr. Harcourt replied that the question of the Pacific would not be lost sight of by the Colonial Office in the development of the system.

Sir D. de Villiers Graaff, in supporting the scheme on behalf of South Africa, said he was glad to hear that a high-power station would be placed at Aden. As soon as that station had been erected, the Union Government would be prepared to consider the advisability of erecting another high-power station to form a necessary link.

Mr. Herbert Samuel suggested that the working expenses and the receipts should be pooled, and any profit or loss divided in an equitable manner to be agreed upon.

**The Financial Aspect.**

Sir Joseph Ward thought it would be more satisfactory if Australia and New Zealand themselves carried out what they required for their local purposes and agreed to share with the other portions of the Empire the costs of Singapore as a link between the various parts. He supported the proposal generally, it being understood that they were not committing themselves to the details upon which they would later be consulted and upon which they would require their own experts to report.

Mr. Fisher said that no Dominion was more in favour of a British linking-up by a wireless system than Australia. But they in the Commonwealth had started their own scheme and intended to proceed with it. Therefore, they reserved to themselves the right to put up stations where and how they pleased. While supporting the proposed scheme for strategic, protective, and commercial purposes, he wished to make it clear that they were not committing themselves upon the financial side.

The resolution was unanimously agreed to. In addition to the above, there was a discussion on "Cable Rates," and every one of the speakers complained of the high rates charged by the Cable Companies, which were considered oppressive in spite of the concessions announced by Mr. Samuel. The latter, however, suggested that the increasing adoption of wireless telegraphy was having a most potent effect upon the Cable Companies.

# Diary of Events.

[*Under this heading we give a monthly record of the progress of Marconi Wireless Telegraphy. Appended are some notable events that have occurred in July of preceding years.*]

1896.

Mr. Marconi conducted experiments before the Officials of the Post Office, first over a distance of about 100 yards, and afterwards between the General Post Office and the Savings Bank Department in Queen Victoria Street. Communication successfully established over a distance of 1¾ miles on Salisbury Plain.

1897.

Trials made at Spezia for the Italian Government, between July 10th and 18th; on the 17th and 18th communication successfully made and maintained between the Arsenal of San Bartolomeo at Spezia and the Italian Cruiser "San Martin" at sea, at distances up to 18 K.M.

The Wireless Telegraph and Signal Company, Limited, incorporated July 20th. The name of the Company changed on February 23rd, 1900, to Marconi Wireless Telegraph Company, Limited.

1898.

On July 20th and 22nd the events of the Kingstown Regatta in Dublin reported by wireless telegraphy for the *Dublin Daily Express*, from the steamer "Flying Huntress," equipped with the Marconi system.

1899.

Three British warships equipped with Marconi apparatus, and messages correctly exchanged between at distances up to 74 nautical miles (about 85 land miles).

1902.

Messages received from Poldhu on Italian battleship "Carlo Alberto" at Cape Skagen, a distance of 800 miles, and at Kronstadt, a distance of 1,600 miles, on July 14th and 16th.

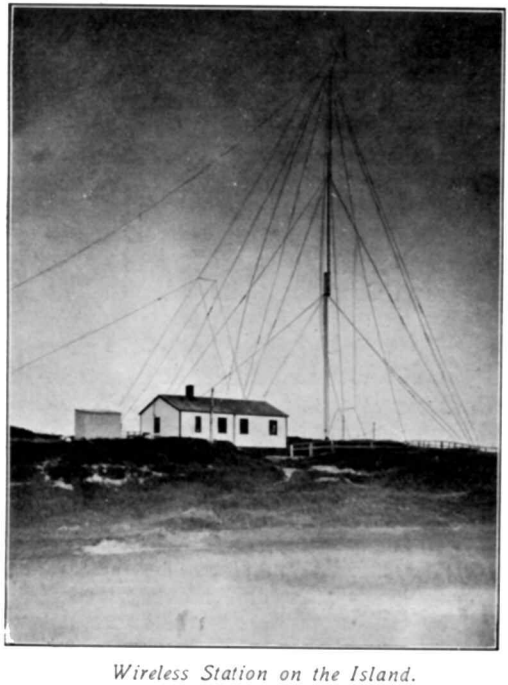
1903.

On July 10th, agreement made for the general use of the Marconi system by the British Admiralty.

# Life on Sable Island.

**By G. P. Reeves.**

SABLE Island is familiar to passengers on steamers passing in and out of New York Harbour. It is a stretch of land about twelve miles long, but only a quarter of a mile wide, and its highest point is about fifty feet above sea level. The inhabitants barely number a score. The size of the Island, the meagreness of life and



*Wireless Station on the Island.*

interest to be found there, and its severance from the mainland render it little attractiveness. But the erection thereon of a Marconi station has served to destroy the isolation of the inhabitants and to make the Island less dreaded by navigators. Before wireless was installed on the Island, communication with the mainland, some 160 miles distant, was only possible by the slow and uncertain means of a box kite addressed to the Marine and Fisheries Department, Halifax, N.S. But the new order of things has completely changed all that. News of the outside world is now rapidly obtainable, instead of, as formerly, being three months old; the government steamer is hastily summoned to bring medical aid in cases of sickness, and if any United States fishing boats are found to be within the "three mile limit" a message to Halifax soon brings the cruiser "Canada" to warn off the delinquents.

*"M.S.D." Lifeboat.*

There are about five hundred small wild ponies on the Island, and the inhabitants are required to assist in driving these ponies into a corral, when a certain number are secured, and sent by steamer to the mainland. Wild duck and small mackerel gulls are plentiful, and numerous seals are to be found in the neighbouring waters. The strong winds drive the sand along with such force that the window panes soon become obscured. Numerous wrecks abound the shore, but these are not of recent occurrence, dating back about twenty years or more.

The shifting sand of the Island will one day bury these wrecks beneath it, but on another day, when the direction of the wind has changed, many of the wrecks are fully exposed. The last wreck was that of the tramp steamer "Skidby," which is said to have met with disaster owing to the magnetic sand of the Island having affected the needle of the compass. But the cause of this disaster is doubtful, for although in some places black sand is found, it is not magnetic.

Food supplies are brought by a government steamer, which visits the Island every three months. Sometimes the surf is so bad that it is impossible to make any landing, and in the days before wireless telegraphy, it was not unusual for the ship to have to steam away without landing supplies, then return when the wind is dropped. Now, however, it is possible to send wireless messages to the ship advising it of the state of the wind and sea, and thus prevent useless journeys. The life of the wireless operator at M.S.D. is not altogether an enviable one. The spare hours of the day are passed either in shooting, fishing or riding, and at night the smash and crash of the "power" spark are not conducive to sound sleep. Still, even this life is not without its compensations, for wireless telegraphy enables the inhabitants to be kept informed of events in the outer world, and has stimulated new interests in Sable Island.

# The Practical Development of Radiotelegraphy.

**By Commendatore G. Marconi, LL.D., D.Sc. M.R.I.**

*(A Lecture delivered before the Royal Institution of Great Britain on Friday, June 2nd.)*

THE practical application of electric waves to the purposes of wireless telegraphic transmission over long distances has continued to extend to a remarkable degree during the last few years, and many of the difficulties which at the outset appeared almost insurmountable have been gradually overcome—chiefly through the improved knowledge which we have obtained in regard to the subject generally and to the principles involved. The experiments which I have been fortunate enough to be able to carry out on a much larger scale than can be done in ordinary laboratories have made possible the investigation of phenomena often novel and certainly unexpected. Although we have—or believe we have—all the data necessary for the satisfactory production and reception of electric waves, we are yet far from possessing any very exact knowledge concerning the conditions governing the transmission of these waves through space—especially over what may be termed long distances. Although it is now easy to design, construct and operate stations capable of satisfactory commercial working over distances up to 2,500 miles, no clear explanation has yet been given of many absolutely authenticated facts concerning these waves. Some of these hitherto apparent anomalies I shall mention briefly in passing.

### Night and Day.

Why is it that when using short waves the distances covered at night are usually enormously greater than those traversed in the day time, whilst when using much longer waves the range of transmission by day and night is about equal and sometimes even greater by day? What explanation has been given of the fact that the night distances obtainable in a north-southerly direction are so much greater than those which can be effected in an east-westerly one? Why is it that mountains and land generally should greatly obstruct the propagation of short waves when sunlight is present, and not during the hours of darkness? The general principles on which practical radiotelegraphy is based are now

so well known that I need only refer to them in the briefest possible manner.

Wireless telegraphy, which was made possible by the fields of research thrown open by the work of Faraday, Maxwell and Hertz, is operated by electric waves which are created by alternating currents of very high frequency, induced in suitably placed elevated wires or capacity areas. These waves are received or picked up at a distant station on other elevated conductors tuned to the period of the waves, and the latter are revealed to our senses by means of appropriate detectors. My original system as used in 1896 consisted of the arrangement shown diagrammatically in Fig. 1 where an elevated or vertical wire was employed. This wire sometimes terminated in a capacity or was connected to earth through a spark gap.

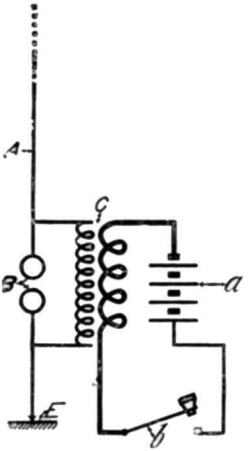



Fig. 1.

By using an induction coil or other source of sufficiently high tension electricity sparks were made to jump across the gap; this gave rise to oscillations of high frequency in the elevated conductor and earth, with the result that energy in the form of electric waves was radiated through space. At the receiving station (Fig. 2) these waves induced oscillatory currents in a conductor containing a detector, in the form of a coherer, which was usually placed between the elevated conductor and earth.

Although this arrangement was extraordinarily efficient in regard to the radiation of electrical energy it had numerous drawbacks. The electrical capacity of the system was very small, with the result that the small amount of energy in the aerial was thrown into space in an exceedingly short period of time. In other words the energy, instead of giving rise to a train of waves, was all dissipated after only a few oscillations and, consequently, anything approaching good tuning between the transmitter and receiver was found to be unobtainable in practice.

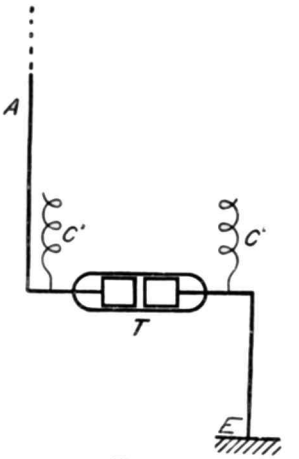



Fig. 2.

Many mechanical analogies could be quoted which show that in order to obtain syntony the operating energy must be supplied in the form of a sufficient number of small oscillations or impulses properly timed. Acoustics furnish numerous examples of this fact—such as the resonance produced by the well-known tuning fork experiment. Other illustrations of this principle may be given, *e.g.*, if a heavy pendulum is set in motion by means of small thrusts or impulses, the latter must be timed to the period of the pendulum, as otherwise its oscillations would not acquire any appreciable amplitude.

In 1900 I first adopted the arrangement which is now in general use and which consists (as shown in Fig. 3) of the inductive association of the elevated radiating wire with a condenser circuit which may be used to store up a considerable amount of electrical energy and impart it at a slow rate to the radiating wire.

As is now well known the oscillations in a condenser circuit can be made to persist for what is electrically a long period of time, and it can be arranged moreover that by means of suitable aerials or antennæ these oscil-

lations are radiated into space in the form of a series of waves which through their cumulative effect are eminently suitable for enabling good tuning or syntony to be obtained between the transmitter and receiver.

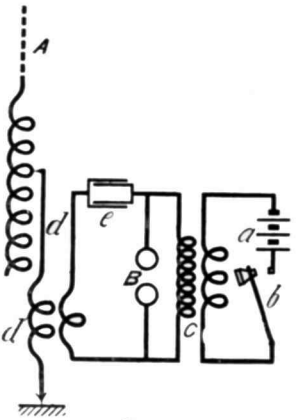



Fig. 3.

The circuits, consisting of the condenser circuit and the elevated aerial or radiating circuit, were more or less closely coupled to each other. By adjusting the inductance in the elevated conductor, and by the employment of the right value of capacity or inductance required in the condenser circuit, the two circuits were brought into electrical resonance, a condition which I first pointed out as being essential in order to obtain efficient radiation and good tuning. The receiver (as shown in Fig. 4) also consists of an elevated conductor or aerial connected to earth or capacity through an oscillating transformer. The latter also contains the condenser and detector, the circuits being made to have approximately the same electrical time period as that of the transmitter circuits.

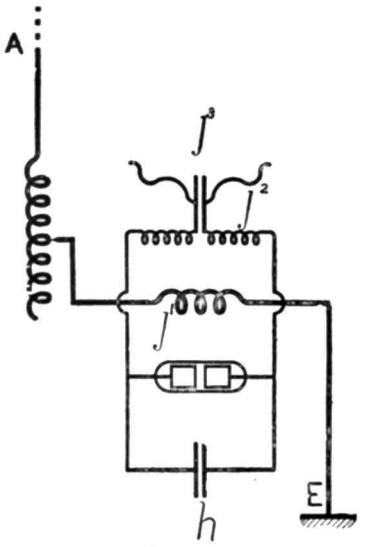



Fig. 4.

**Long Distance Stations.**

At the long distance station situated at Clifden in Ireland, the arrangement which has given the best results is based substantially upon my syntonic system of 1900, to which have been added numerous improvements. An important innovation from a practical point of view was the adoption at Clifden and Glace Bay of air condensers composed of insulated metallic plates suspended in air at ordinary pressure. In this manner we greatly reduce the loss of energy which would take place in consequence of dielectric hysteresis were a glass or solid dielectric employed. A very considerable economy in working also results from the absence of dielectric breakages, for, should the potential be so raised as to even produce a discharge from plate to plate across the condenser, this does not permanently affect the value of the dielectric, as air is self-healing, and one of the few commodities which can be replaced at a minimum of cost.

**Trains of Waves.**

Various arrangements have been tried and tested for obtaining continous or very prolonged trains of waves, but it has been my experience that, when utilising the best receivers at present available, it is neither economical nor efficient to attempt to make the waves too continuous. Much better results are obtained when groups of waves are emitted at regular intervals in such manner that their cumulative effect produces a clear musical note in the receiver which is tuned not only to the periodicity of the electric waves transmitted, but also to their group frequency. In this manner the receiver may be doubly tuned with the result that a far greater selectivity can be obtained than by the employment of wave-tuning alone. In fact, it is quite easy to pick up simultaneously different messages transmitted on the same wave length, but syntonised to different group frequencies.

### Wave Tuning.

As far as wave tuning goes, very good results—almost as good as are obtainable by means of continuous oscillations—can be achieved with groups of waves, the decrement of which is in each group ·03 or ·04, which means that about 30 or 40 useful oscillations are radiated before their amplitude has become too small to perceptibly affect the receiver. The condenser circuit at Clifden has a decrement of from ·015 to ·03 for fairly long waves.

This persistency of the oscillations has been obtained by the employment of the system shown in Fig. 5, which I first described in a patent taken out in September, 1907. This method eliminates almost completely the spark gap and its consequent resistance which, as is well known, is the principal cause of the damping or decay of the waves in the usual transmitting circuit.

The apparatus shown in Fig. 5 consists of a metal disc *a* having copper studs firmly fixed at regular intervals in its periphery and placed transversely to its plane. This disc is caused to rotate very rapidly between two other discs *b* by means of a rapidly revolving electric motor or steam turbine. These side discs are also made to slowly turn round in a plane at right angles to that of the middle disc. The connections are as illustrated in the figure. The studs are of such length as to just touch the side discs in passing, and thereby bridge the gap between the latter.

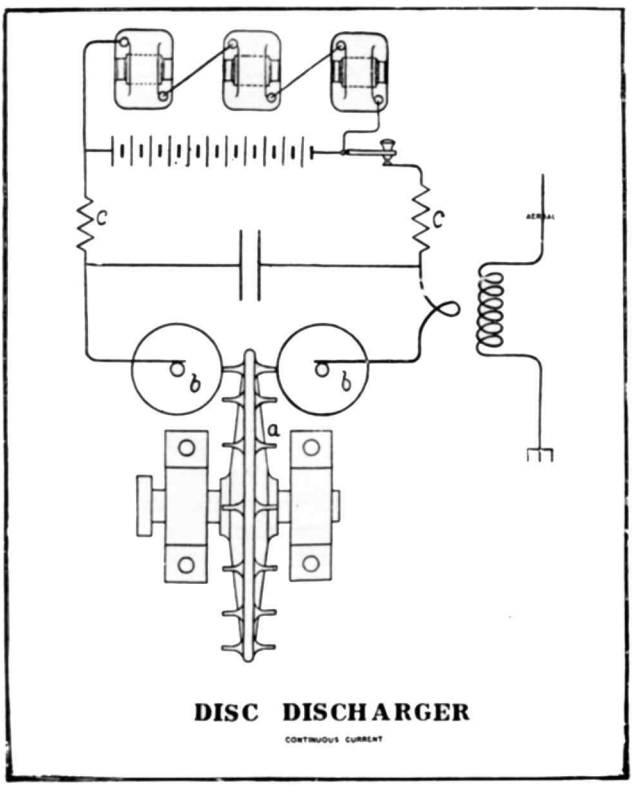



Fig. 5.

### High-Frequency Currents.

With the frequency employed at Clifden, namely 45,000, when a potential of 15,000 volts is used on the condenser, the spark gap is practically closed during the time in which one complete oscillation only is taking place, when the peripherical speed of the disc is about 600 feet a second. The result is that the primary circuit can continue oscillating without material loss by resistance in the spark gap. Of course the number of oscillations which can take place is governed by the breadth or thickness of the side discs, the primary circuit being abruptly opened as soon as the studs attached to the middle disc leave the side discs.

This sudden opening of the primary circuit tends to immediately quench any oscillations which may still persist in the condenser circuit; and this fact carries with it a further and not inconsiderable advantage; for, if the coupling of the condenser circuit to the aerial is of a suitable value, the energy of the primary will have practically all passed to the aerial circuit during the period of time in which the primary condenser circuit is closed by the stud filling the gap between the side discs; but, after this, the opening of the gap at the discs prevents the energy returning to the condenser circuit from the aerial as would happen were the ordinary spark gap employed. In this manner the usual reaction which would take place between the aerial and the condenser circuit can be obviated with the result that with this type of discharger and with a suitable degree of coupling the energy is radiated

from the aerial in the form of a pure wave, the loss from the spark gap resistance being reduced to a minimum.

An interesting feature of the Clifden plant, especially from a practical and engineering point of view, is the regular employment of high-tension direct current for charging the condenser. Continuous current at a potential which is capable of being raised to 20,000 volts is obtained by means of special direct-current generators; these machines charge a storage battery consisting of 6,000 cells all connected in series, and it may be pointed out that this battery is the largest of its kind in existence. The capacity of each cell is 40 ampere hours. When employing the cells alone the working voltage is from 11,000 to 12,000 volts, and when both the direct-current generators and the battery are used together the potential may be raised to 15,000 volts through utilizing the gassing voltage of the storage cells. For a considerable portion of the day the storage battery alone is employed, with a result that for 16 hours out of the 24 no running machinery need be used for operating the station with the single exception of the small motor revolving the disc.

The potential to which the condenser is charged reaches 18,000 volts when that of the battery or generators is 12,000. This potential is obtained in consequence of the rise of potential at the condenser plates, brought about by the rush of current through the choking or inductance coils at each charge. These coils are placed between the battery or generator and the condenser.

**Storage Batteries.**

No practical difficulty has been encountered either at Clifden or Glace Bay in regard to the insulation and maintenance of these high-tension storage batteries. Satisfactory insulation has been obtained by dividing the battery into small sets or cells placed on separate stands. These stands are suspended on insulators attached to girders fixed in the ceiling of the battery room. A system of switches, which can be all operated electrically and simultaneously, divides the battery into sections, the potential of each section being low enough to enable the cells to be handled without inconvenience or risk.

The arrangement of aerial adopted at Clifden and Glace Bay is shown in Fig. 6. This system which is based on the result of tests which I first described before the Roya Society in June, 1906, not only makes it possible to efficiently radiate and receive waves of any desired length but it also tends to confine the main portion of the radiation to any desired direction. The limitation of transmission to one direction is not very sharply defined, but nevertheless the results obtained are exceedingly useful for practical working. In a similar manner by means of these horizontal wires it is possible to define the bearing or direction of a sending station and also limit the receptivity of the receiver to waves arriving from a given direction.

Fig. 6.

The commercial working of radiotelegraphy and the widespread application of the system on shore and afloat in nearly all parts of the world has greatly facilitated the marshalling of facts and the observation of effects. Many of these as I have already stated still await a satisfactory explanation. A curious result which I first noticed over nine years ago in long distance tests carried out on the SS. "Philadelphia" and which still remains an important feature in long distance space telegraphy is the detrimental effect produced by daylight on the propagation of electric waves over great distances. The generally accepted hypothesis of the cause of this absorption of electric waves in sunlight is founded on the belief that the absorption is due to the ionisation of the gaseous molecules of the air affected by the ultra violet light, and as the ultra rays which emanate from the sun are largely absorbed in the upper atmosphere of the earth, it is probable that that portion of the earth's atmosphere which is facing the sun will contain more ions or electrons than that which is in darkness, and therefore, as Sir J. J. Thomson has shown, this illuminated or ionised air will absorb some of the energy of the electric waves. The wave length of the oscillations employed has much to do with this

interesting phenomenon, long waves being subject to the effect of daylight to a very much lesser degree than are short waves.

Although certain physicists thought some years ago that the daylight effect should be more marked on long waves than on short, the reverse has been my experience ; indeed in some transatlantic experiments in which waves about 8,000 metres long were used, the energy received by day at the distant receiving station was usually greater than that obtained at night. Recent observation, however, reveals the interesting fact that the effects vary greatly with the direction in which transmission is taking place ; the results obtained when transmitting in a northerly and southerly direction being often altogether different from those observed in the easterly and westerly one. Research in regard to the changes in the strength of the received radiations which are employed for telegraphy across the Atlantic has been recently greatly facilitated by the use of sensitive galvanometers by means of which the strength of the received signals can be measured with a fair degree of accuracy.

In regard to moderate power stations such as are employed on ships and which in compliance with the International Convention use wave lengths of 300 and 600 metres, the distance over which communication can be effected during day time is generally about the same whatever the bearing of the ships to each other or to the land stations—whilst at night interesting and apparently curious results are obtained. Ships, over 1,000 miles away, off the south of Spain or round the coast of Italy can almost always communicate during the hours of darkness with the Post Office stations situated on the coasts of England and Ireland, whilst the same ships, when at a similar distance on the Atlantic to the westward of these islands and on the usual track between England and America, can hardly ever communicate with these shore stations unless by means of specially powerful instruments.

It is also to be noticed that in order to reach ships in the Mediterranean the electric waves have to pass over a large portion of Europe and, in many cases, over the Alps. Such long stretches of land, especially when including very high mountains, constitute as is well known an insurmountable barrier to the propagation of short waves during day time. Although no such obstacles lie between the English and Irish stations and ships in the North Atlantic *en route* for North America a night transmission of 1,000 miles is there of exceptionally rare occurrence. The same effects generally are noticeable when ships are communicating with stations situated on the Atlantic coast of America.

Although high power stations are now used for communicating across the Atlantic Ocean and messages can be sent by day as well as by night, there still exist periods of fairly regular daily occurrence during which the strength of the received signals is at a minimum. Thus in the morning and the evening when, in consequence of the difference in longitude, daylight or darkness extends only part of the way across the ocean, the received signals are at their weakest. It would almost appear as if electric waves in passing from dark space to illuminated space and *vice versa* were reflected and refracted in such manner as to be diverted from the normal path. Later results, however, seem to indicate that it is unlikely that this difficulty would be experienced in telegraphing over equal distances north and south on about the same meridian, as, in this case, the passage from daylight to darkness would occur more rapidly over the whole distance between the two stations.

Beyond 4,000 miles reception could only be carried out during night time. At Buenos Ayres, over 6,000 miles from Clifden, the night signals from both Clifden and Glace Bay were generally good, but their strength suffered some variations. It is rather remarkable that the radiations from Clifden should have been detected at Buenos Ayres so clearly at night time and not at all during the day, whilst in Canada the signals coming from Clifden (2,400 miles distant) are no stronger during the night than they are by day.

Further tests have been carried out recently for the Italian Government between a station situated at Massaua in East Africa and Coltano in Italy. Considerable interest attached to these experiments in view of the fact that the line connecting the two stations passes over exceedingly dry country and across vast stretches of desert, including parts of Abyssinia, the Soudan and the Libyan desert. The distance between the two

stations is about 2,600 miles. The wave length of the sending station in Africa was too small to allow of transmission being effected during day time, but the results obtained during the hours of darkness were exceedingly good, the received signals being quite steady and readable.

The improvements introduced at Clifden and Glace Bay have had the result of greatly minimising the interference to which wireless transmission over long distances was particularly exposed in the early days. The signals arriving at Clifden from Canada are as a rule easily read through any ordinary electrical atmospheric disturbance. This strengthening of the received signals has moreover made possible the use of recording instruments which not only give a fixed record of the received messages, but are also capable of being operated at a much higher rate of speed than could ever be obtained by means of an operator reading by sound or sight. The record of the signals is obtained by means of photography in the following manner:—A sensitive Einthoven string galvanometer is connected to the magnetic detector or valve receiver, and the deflections of its filament caused by the incoming signals are projected and photographically fixed on a sensitive strip which is moved along at a suitable speed. On some of these records it is interesting to note the characteristic marks and signs produced amongst the signals by natural electric waves or other electrical disturbances of the atmosphere, which, on account of their doubtful origin, have been called "X's."

Lord Rayleigh, in referring to trans-atlantic radiotelegraphy, stated in a paper read before the Royal Society in May, 1903, that the results which I had obtained in signalling across the Atlantic suggested "a more decided bending or diffraction of the waves round the protuberant earth than had been expected," and further said that it imparted a great interest to the theoretical problem. Professor Fleming, in his book on electric wave telegraphy, gives diagrams showing what may be taken to be a diagrammatic representation of the detachment of semi-loops of electric strain from a simple vertical wire. As will be seen, these waves do not propagate in the same manner as does free radiation from a classical Hertzian oscillator, but instead glide along the surface of the earth.

**Conductivity of the Earth.**

Professor Zenneck has examined the effect of earthed receiving and transmitting aerials and has endeavoured to show mathematically that when the lines of electrical force, constituting a wave front, pass along a surface of low specific inductive capacity —such as the earth—they become inclined forward, their lower ends being retarded by the resistance of the conductor to which they are attached. It therefore would seem that wireless telegraphy as at present practised is to some extent at least dependent on the conductivity of the earth, and that the difference in operation across long distances of sea compared to over land is sufficiently explained by the fact that sea water is a much better conductor than is land.

The importance or utility of the earth connection has been sometimes questioned, but in my opinion no practical system of wireless telegraphy exists where the instruments are not in some manner connected to earth. By connection to earth I do not necessarily mean an ordinary metallic connection as used for wire telegraphs. The earth wire may have a condenser in series with it, or it may be connected to what is really equivalent, a capacity area placed close to the surface of the ground. It is now perfectly well known that a condenser, if large enough, does not prevent the passage of high-frequency oscillations and therefore in this case, when a so-called balancing capacity is used, the antenna is for all practical purposes connected to earth. I am also of opinion that there is no foundation in the statement which has recently been repeated to the effect that an earth connection is detrimental to good tuning, provided of course that the earth is good. Certainly, in consequence of its resistance what electricians call a bad earth will damp out the oscillations and in that way make tuning difficult; but no such effect is noticed when employing an efficient earth connection.

**The Future of Wireless.**

In conclusion, I believe that I am not any too bold when I say that wireless

telegraphy is tending to revolutionise the means of communication from place to place on the earth's surface. For example, commercial messages containing a total of 812,200 words were sent and received between Clifden and Glace Bay from May 1st, 1910, to the end of April, 1911 ; wireless telegraphy has already furnished means of communication between ships and the shore where communication was before practically impossible. The fact that a system of Imperial Wireless Telegraphy was discussed by the Imperial Conference in London (p. 4) shows the supremely important position which radiotelegraphy over long distances has assumed in the short space of one decade. Its importance from a commercial, naval and military point of view has increased very greatly during the last few years as a consequence of the innumerable stations which have been erected or are now in course of construction on various coasts, in inland regions and on board ships in all parts of the world. Notwithstanding this multiplicity of stations and their almost constant operation, I can say from practical experience that mutual interference between properly equipped and efficiently tuned instruments has so far been almost entirely absent. Some interference does without doubt take place between ships, in consequence of the fact that the two wave lengths adopted in accordance with the rules laid down by the International Convention are not sufficient for the proper handling of the very large amount of messages transmitted from the ever increasing number of ships fitted with wireless telegraphy. A considerable advantage would be obtained by the utilisation of a third and longer wave to be employed exclusively for communication over long distances.

In regard to the high power transatlantic stations the facility with which interference has been prevented has to some extent exceeded my expectations. At a receiving station situated at a distance of only eight miles from the powerful sender at Clifden, during a recent demonstration arranged for the Admiralty, messages could be received from Glace Bay without any interference from Clifden when this latter station was transmitting at full power on a wave length differing only 25 per cent. from the wave radiated from Glace Bay. The ratio between the maximum recorded range of Clifden and 8 miles being in the proportion of 750 to 1. Arrangements are being made to permanently send and receive simultaneously at these stations which, when completed, will constitute in effect the duplexing of radiotelegraphic communication between Ireland and Canada. The result which I have last referred to also goes to show that it would be practicable to operate at one time on slightly different wave lengths a great number of long distance stations situated in England and Ireland without danger of mutual interference.

**Fundamental Principles.**

Although the mathematical theory of electric wave propagation through space was worked out by Clerk Maxwell more than 50 years ago, and notwithstanding all the experimental evidence obtained in laboratories concerning the nature of these waves, yet so far we understand but incompletely the true fundamental principles concerning the manner of propagation of the waves on which wireless telegraph transmission is based. For example, in the early days of wireless telegraphy it was generally believed that the curvature of the earth would constitute an insurmountable obstacle to the transmission of electric waves between widely separated points. For a considerable time not sufficient account was taken of the probable effect of the earth connection, especially in regard to the transmission of oscillations over long distances. Physicists seemed to consider for a long time that wireless telegraphy was solely dependent on the effects of free Hertzian radiation through space, and it was years before the probable effect of the conductivity of the earth was considered and discussed.

The extended use of wireless telegraphy is principally dependent on the ease with which a number of stations can be efficiently worked in the vicinity of each other. Considering that the wave lengths at present in use range from 200 to 23,000 feet, and moreover that wave group tuning and directive systems are now available, it is not difficult to foresee that this comparatively new method of communication is destined to fill a position of the greatest

importance in facilitating communication throughout the world.

**Practical Benefits.**

Apart from long distance work the practical value of wireless telegraphy may perhaps be divided into two parts (1) when used for tansmission over sea, (2) when used over land. Many countries, including Italy, Canada and Spain have already supplemented their ordinary telegraph systems by wireless telegraphy installations, but some time must pass before this method of communication will be very largely used for inland purposes in Europe generally, owing to the efficient network of landlines already existing which render further means of communication unnecessary; and therefore it is probable that, at any rate for the present, the main use of radiotelegraphy will be confined to extra-European countries, in some of which climatic conditions and other causes absolutely prohibit the efficient maintenance of landline telegraphy. A proof of this has been afforded by the success which has attended the working of the stations recently erected in Brazil on the Upper Amazon.

By the majority of people the most marvellous side of wireless telegraphy is perhaps considered to be its use at sea. Up to the time of its introduction ships at any appreciable distance from land had no means of getting in touch with the shore throughout the whole duration of their voyage. But those who now make long sea journeys are no longer cut off from the rest of the world; business men can continue to correspond at reasonable rates with their offices in America or Europe; ordinary social messages can be exchanged between passengers and their friends on shore; a daily newspaper is published on board most of the principal liners giving the chief news of the day. Wireless telegraphy has on more than one occasion proved an invaluable aid to the course of justice—a well-known instance of which is the arrest which took place recently through its agency of a notorious criminal when about to land in Canada.

The chief benefit, however, of radiotelegraphy lies in the facility which it affords to ships in distress of communicating their plight to neighbouring vessels or coast stations; that it is now considered indispensable for this reason is shown by the fact that several governments have passed a law making a wireless telegraph installation a compulsory part of the equipment of all passenger boats entering their ports.

**An International Congress.**

The International Congress of the Applications of Electricity, at Turin, has been definitely fixed for September 10th to September 17th, inclusive. A long and interesting programme of subjects has been promised for discussion, of which two will receive attention in these columns in due course; one being an account of a research on secrecy in wireless telegraphy by Mr. P. O. Pederson, and another on the same subject by Professor Quirino Majorana Calatabiano of Rome.

## Wireless in Camp.

One of the most interesting features of the annual "camp" at Farleton, near Milnthorpe, was the successful trials made with a Marconi field apparatus under Brevet-Lieutenant-Colonel Beddington. At the suggestion of General Sir W. H. Mackinnon, who had previously seen it at work in the presence of a distinguished assembly of officers, the operator was quickly in communication with the yeomanry camp 25 miles away. Messages were passing between two camps until 11.30 p.m., after which Colonel Beddington turned it on to the Poldhu wave. It was soon picking up messages from Lizard Point a distance of 400 miles. Communication was maintained up till 2 a.m., during which time Colonel Beddington received much information that did not appear in the morning's newspapers, such as the latest information from the Champagne districts of France, and news about the discovery of a gunpowder plot in Tokio. The Engineer officers who stayed up watching the wireless work were deeply interested. The apparatus was later pulled down and packed away for a 25 miles march back to Farleton. It was mounted on a light carriage, but can easily be carried on horseback.

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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.*



### Patent Litigation.

An action has been commenced by Marconi's Wireless Telegraph Co., Limited, against the Lodge-Muirhead Wireless and General Telegraphy Syndicate, Limited, for alleged infringement of patent.

### Mr. Marconi's Lecture.

In several countries it is already enacted that passenger ships entering their ports must carry a wireless telegraphy installation; this fact was mentioned by Mr. Marconi at the lecture before the Royal Institution of Great Britain, which is reproduced on pp. 7 to 15 of this issue. The lecture brings vividly before the mind the magnificent service done to the world by this great invention. Mr. Marconi made no idle boast when he said that the newest methods used in the wireless system were certain to revolutionise communication throughout the world, and the cordial unanimity with which his statement has been received by the scientific, the engineering and the lay press, is proof of the soundness of his forecast. Italy, Spain, Canada and other States have already commenced to supplement their ordinary telegraphic systems by wireless installations, and Mr. Marconi seems to think that gradually the wireless method will supersede the older everywhere for internal communication. In new and undeveloped countries, wireless telegraphy will never be even supplemented by the cumbrous network of wood and wire, at the mercy of storm and destruction by accident or by human purpose. The whole subject still bristles with mysteries and seems to be on the point of opening the door to natural laws or forces until quite recently not dreamed of. Mr. Marconi has dealt with some of the problems in a lucid and masterly way in his lecture, which should be widely read.

### Two Examples and a Moral.

Two incidents which have occurred within the past month deserve to be recalled because they furnish such eloquent evidence of the value of the "Marconi" system. The Managing Director of the Marconi Company had occasion to communicate with Colonel Thys of the Belgian government, but it was found that the Colonel was on his way to the Congo. The only means of sending a message was through Teneriffe, which was then being erected, and has since been opened. This was accordingly done; the message reaching the steamer on the high seas, and a full reply being received (also *via* Teneriffe) at the London Offices of the

Company in a very short time. Thus, the utility of the new station has been firmly established. When the network of stations now being erected around the coast of Spain is completed, it will have the most important bearings, and to business men in particular it will be an invaluable boon. The other incident shows how wireless telegraphy can come to the aid of the ordinary citizen in an emergency.

A young lady had arranged to leave Parkeston Quay, Harwich, for the Continent, and was accompanied to the steamer by her father. On the ringing of the bell at the starting of the steamer the gentleman hurried ashore, when he found, to his consternation, that he had left his daughter without any money in her possession. Inquiries at the telegraph office elicited the fact that the steamer (it was the SS. "Dresden") had a wireless installation on board, and three-quarters of an hour later he sent a message to the captain of the steamer asking him to furnish the lady passenger with a sum of money. Upon the arrival of the boat at Antwerp the lady wrote home stating that the captain had informed her of the receipt of a wireless message from her father, in accordance with whose desire he offered her sufficient funds to complete her journey. This incident brings home very forcibly the value of the Marconi system in an emergency, and demonstrates the fact that it can now serve the requirements of all sections of the community.

**Man v. Machine.**

The old bogey of the machine being too far in advance of the man in charge of it has been trotted out in the case of wireless telegraphy. We have heard this complaint applied with more or less appositeness in connection with other branches of industry, and it is not surprising, therefore, that it should now be our turn to receive the lash of the theorist. Speaking recently at a meeting in London, Commander F. G. Loring, the Inspector of Wireless Telegraphs to the G.P.O., said his impression was that the apparatus now supplied to ships was actually in advance of the men who used it. There can be no gainsaying the wonderful strides made in the perfecting of wireless apparatus, which, indeed, is quite in keeping with the rapid development of Mr. Marconi's ideas. The practical application of wireless telegraphy has come with a suddenness which is only to be compared with its demand, and it would occasion no surprise if operators did not reach the highest expectations. There are not the facilities in the training colleges and technical schools that exist for the benefit of the ordinary telegraphist and telephone operator; but thanks to the efforts of the Marconi Company, a really skilful army of operators has been recruited, and, in spite of Commander Loring's remarks, these men are extraordinary good. In skill, intelligence, enthusiasm, and devotion to duty, sometimes carried out under the most trying conditions, the wireless operator will bear favourable comparison with the operator engaged in any other branch of telegraph or telephone work.

**The Origin of Atmospherics.**

A discussion has been going on in the columns of *The Electrician* respecting the origin of "atmospherics" in wireless telegraphy. Several of the writers appear to overlook the fact that Mr. Marconi proposed the use of directive aerials for the investigation of the origin of "atmospherics" some time before any of the experiments mentioned by them. Mr. Marconi pointed out in a letter which appeared in a recent issue of our contemporary that he dealt with the subject in a paper before the Royal Society on March 15th, 1906. Mr. Marconi showed in that paper (*Proceedings* of the Royal Society A. Vol. lxxvii., 1906) that when using horizontal receiving wires arranged as described in his communication, he often noticed that the natural electrical perturbations of the atmosphere or stray electric waves, which were generally prevalent during the summer, appeared to proceed from certain definite directions which varied from time to time. Thus, on certain days, the receiving instruments when connected to wires which were oriented in such a way as to possess a maximum receptivity for electric waves coming from the south would give strong indications of the presence of these natural electric waves, whilst on differently oriented wires the effects were at the same time weaker or imperceptible. On other days these natural electric waves might apparently come from other directions. He

added that it would be exceedingly interesting to investigate whether there existed any relation between the direction of origin of these waves and the known bearing or direction of distant terrestrial or celestial storms from whence these stray electric waves most probably originated.

### Exploring the Earth's Interior.

Of all the novel applications of wireless telegraphy, perhaps the most unique is that proposed by Dr. H. Löwy, of Göttingen, for exploring the interior of the earth. A German scientific journal contains a long and elaborate account of Dr. Löwy's researches in connection with this matter; from which it is seen that either what is known as the reflection method or the absorption method is employed. In the former case, an antenna, which we will call T, is mounted on the earth, not vertically, but at an angle, and another antenna, R, is mounted some distance away. Directed waves are sent from T, and received at R, the intensity of these received waves being determined while the inclination of R is varied. If there is between T and R a layer of minerals in the ground, which acts as reflector for the electric waves, then two maxima will be observed in R, the one due to the direct transmission of the waves through the air, and the other due to the waves reflected in the ground. From the inclination of R, corresponding to the second maximum, the position of the reflecting layer can be estimated. The absorption method requires holes to be bored into the ground, 100 metres or more in depth, and deep enough to receive an antenna of 80 metres in height, such that the equatorial plane of the waves—*i.e.*, the plane in which the main transmission would take place—would be in dry ground. Three parallel holes are required; the central one contains the transmitter, and the other two receivers. If there is no metal between the two receivers, the intensities of the waves required will be equal if the distance between one receiver and the transmitter is equal to that of the transmitter and the other receiver; the existence of any metal between the transmitter and the second receiver will appear in a distinct weakening of the waves.

## Company News.

### The Share Market.

Though the Coronation holidays interfered more or less with business on the London Stock Exchange during June, Marconi shares were very prominent in the Industrial Section. There was great activity in this market, and the prospects were favourably discussed. The closing prices quoted on June 30th were as under:—

| | | | | |
|---|---|---|---|---|
| Ordinary | ... | ... | 46/- | 47/- |
| Preference | ... | ... | 42/6 | 45/- |

### Marconi International Marine Communication Company.

The annual meeting of the Marconi International Marine Communication Company was held at the offices of the Company in London on June 29th, Mr. S. Flood Page being inthe chair. Mr. G. Marconi was also present.

The report and accounts were duly received, approved and adopted. Commendatore G. Marconi and Mr. Alfonso Marconi, the retiring Directors, were re-elected, and the recommendation of the Board "that a dividend at the rate of 5 per cent. for the year ending December 31st, 1910, on the capital paid up at that date be paid on August 1st, 1911, to the members who are now on the register" was also carried.

In addressing the meeting, the Managing Director, Mr. Godfrey Isaacs, said:—"You are probably quite aware that this Company holds an exclusive licence from Marconi's Wireless Telegraph Company for the right to install and work the Marconi system of Wireless Telegraphy on board merchant and pleasure vessels which fly the flags of certain countries, including Great Britain, and you will have learned from the Report that to December 31st, 1910, the number of telegraph stations installed had increased from 143 in the previous year to 250, and that to the date of Report this number had still further appreciated to the figure of 303. The Directors are satisfied from the orders in hand that the same rate of progress will at least be maintained, and they think they are not over sanguine in estimating that at

the end of the current year the stations at work upon the high seas will number about 400. Needless to say, that with the growing number of telegraph stations so proportionately does our revenue increase, and it is a satisfactory feature in this business that the working expenses do not grow in the same proportion as does the revenue.

In recent times a very considerable development has been given to wireless telegraphy, and many new coast telegraph stations have been, and are being, erected in all parts of the world; there is therefore much greater facility to communicate from the high seas to the land and from the land to the high seas. We find consequently that our telegraph receipts increase, and we are confident that they will continue to increase in same ratio to the increase in the number of land stations. The travelling public is also becoming more accustomed to keep in touch both socially and commercially with those at home, and the more general this habit becomes so of course will the telegraphic receipts increase. There is also quite a considerable revenue derived from communications between ship and ship, and the increase in the number of ships installed with wireless telegraph stations of course necessarily increases the revenue from this source.

At the last General Meeting the Directors were able to express their confidence that the business would continue to show considerable extension. From the foregoing remarks the shareholders will, I am sure, endorse the opinion of the Board that a further considerably improved position will be shown at this time next year. Since the last General Meeting the Directors have done me the honour of appointing me Managing Director of this Company. It is an honour which I highly appreciate for, in the first instance, I can conceive no more enviable a position than that of directing a business which, apart from serving so great a commercial and social utility, serves an even infinitely higher purpose, that of eliminating the danger from travel at sea, and saving thousands of lives, for which the whole world is indebted to Mr. Marconi. In the second case, it is extremely satisfactory to have the direction of a business of such magnitude and so full of promise financially to all those interested in it.

**Marconi Wireless Telegraph Co. of New York.**

The report of the Marconi Wireless Telegraph Co. of New York, for the year ended January 31st last, states that, allowing for the usual depreciation (10 per cent.) on station and experimental work, the balance shows that the company is more than self-supporting. During the year the company sent and received 2,291 messages, containing 34,130 words more in 1910 than it did in 1909, and the money gain over 1909 in favour of 1910 was about $4,000. Over $11,000 was written off as depreciation, bringing the stations, etc., into a condition highly commended by the accountants. The loss of $1,700 shown in general working was caused by the opening and running of stations on the east coast, south of New York, which stations will eventually be most useful and, probably, paying, in connection with coastwise boats that the company are gradually acquiring as part of the Marconi equipped fleet. The aim is to control the whole of this business in the same way that the system operates the transatlantic liners. The number of commercial ship stations owned and controlled by the company and allied Marconi companies is constantly increasing, and there are now 469 steamships trading to America and various ports of the world fitted with the Marconi system; nine pleasure yachts are also fitted and have working arrangements by which the shore stations communicate with, send and take messages to and from 68 commercial vessels fitted or operated by companies with which this company has commercial dealings. Since the last meeting, four stations have been erected and equipped on the east coast of America south of New York, as follows:—Cape May, N.J.; Virginia Beach, Va.; Fernandina and Palm Beach, Fla. (working arrangements are in existence whereby the company uses the Government station at Key West); and is about to put up a station intermediate and between Virginia Beach and Fernandina, so that with the established stations north of New York a vessel sailing from Maine to Florida can be in communication the whole time. The Wellman airship, which started from Atlantic City to cross the Atlantic, was fitted with the Marconi apparatus. Successful work has also been done in connection with submarines.

Experiments recently conducted in England look to the acceleration of plant life by electrical treatment. It is stated that by such treatment small fruits can be brought to maturity weeks earlier, and the production of vegetables and large fruits can be much increased. If so, a new field opens for wireless. While the SS. " Princess Irene " was ashore recently, the operator thereon sent and received over 10,000 words. In 1910 the use of transatlantic wireless was offered to the American public, which was quick to avail itself of the great financial advantage offered by the Marconi system, the rate from New York to all points of the United Kingdom being 8c. a word lower than cables, and to the Continent in like proportion. A large, increasing and satisfactory business is now being done by the Marconi system in this work, and merchants, brokers and others having large interests abroad fully realise that excellent and reliable communications can be had by means of the Marconi system at considerably reduced rates. The strength of the Marconi system has been greatly added to this year by a decisive judgment obtained in the High Court of England in the action brought by Marconi's Wireless Telegraph Co. Ltd., against British Radiotelegraph and Telephone Co., wherein the Judge held that the defendant company had been infringing the Marconi patent 7,777, relating chiefly to tuning devices, and about which the English company writes as follows :—" The result of this action goes not only to prove the infringement of our patents by the British Radiotelegraph and Telephone Co., but also that all other so-called systems of wireless telegraphy, with or without variations, are infringements of the Marconi tuning patents." The Judge's decision was so carefully considered that an appeal was deemed useless, and the defendant company undertook to dismantle its stations and cease infringing. In the United States the company holds a patent almost identical with the above as to specifications and claims, which said patent was granted in 1904, and steps are now being taken to prove and sustain said patent by actions in the proper Courts of law against manufacturers and users, and it is the intention of the company to carry such actions on to a final issue and determination with the least possible delay.

## Land Stations in Spain.

### Teneriffe.

The Cia. Nacional de Telegrafia sin Hilos have received permission to open the Teneriffe station (which has been built by the Marconi Wireless Telegraph Co.) for communication with ships. This station was opened on June 25th. Both this and the Las Palmas station, the opening of which was fixed for a few days later, will be very busy stations, as they will handle all the traffic of ships travelling between Europe and South America and Africa, and also that of ships going to Australia which take the Cape Route. It will only be a very few days before the long wave plants at the Teneriffe station and the Las Palmas station will also be ready for communication with Cadiz. The ranges of these stations will be 1,600 kilometers on the long wave. The Cadiz station is also ready for service, both as regards communication with Teneriffe and Las Palmas, and with ships at sea.

### Cadiz.

The preliminary trials of the Cadiz station have been very satisfactory, strong readable signals having been received at all hours during the day and night. These stations are all equipped with a musical note. The Vigo station is progressing satisfactorily. This station is built on a flat topped mountain in a position commanding the whole of the Bay of Vigo, and when this station is also put into service, ships at sea will be able to remain in communication with land from the commencement of their voyage until they have gone a long way south of Teneriffe. The Barcelona station is also nearing completion.

The site for the station to be erected in the Balearic Islands has been chosen at the little port of Soller, which is situated on the north-west coast of the Island of Mallorca, and the work of the construction of the station is being put in hand at once.

## Notes on Books.

"A HANDBOOK OF WIRELESS TELEGRAPHY," by Dr. J. Erskine-Murray. (Crosby, Lockwood & Son, 10s. 6d.)

The fact that a third edition of Dr. Erskine-Murray's book has been called for shows what rapid progress the subject has made, and how keen is the desire of technical men, as well as the general public, to keep abreast of the advances made in wireless telegraphy. The first edition was published in 1907 and it was followed two years later by a second edition. After an interval of another two years the third edition makes its appearance. The latest edition bears traces of thorough revision; a considerable amount of new matter has been introduced, much of it from information supplied by Mr. Marconi, including the very interesting record of the transatlantic message transmitted from Glace Bay, N.S., to Clifden, which was shown in the June issue of *The Marconigraph*, and which forms the frontispiece to Dr. Erskine-Murray's book. As the volume reached us only a few days before going to press with our present issue, we have been unable, in the little time at our disposal, to deal with the contents on its merits, and we must therefore hold over our full review until the next issue.

Of the applications to which electricity is put at the present day, the variety is legion. In "ELECTRICITY IN THE SERVICE OF MAN" (Cassell, 7s. 6d. net), an attempt has been made to arrange and describe in a popular manner its many uses. The book is a new edition of a work which has been before the public for the last twenty-three years, when it consisted chiefly of a translation from the German of Dr. Urbanitzky. After the third edition, which appeared in 1893, with numerous e ditions by the present author, the enormous multiplication of electrical appliances necessitated the enlargement of the work. Subsequent developments have again rendered it convenient for purpose of treatment to adopt further modification, and the present volume is the result of these later efforts to secure harmony of arrangement in the matter dealt with. Dr. Walmsley handles the principles of magnetism, static electricity, dynamic phenomena, the voltaic currents, and continuous currents. This is a plainly written book. It starts in each section at the beginning, shows step by step how advance has been gained, and who have helped it on; illustrates different instruments, experiments and theories, and generally brings the students' knowledge abreast of the best information.

# Wireless and the Coronation.

THE thoughts paramount with the British public during the month of June were inspired almost solely by the Coronation. An indication of the public interests in the event, and of national feeling for the central figures—King George V. and his gracious consort Queen Mary—is to be found in the universal manifestations of loyal affection displayed of the citizens of this great Empire. It is but natural, therefore, that advantage should be taken of the occasion to reflect upon the growth and development of England and her sister nations in this great Imperial family, and that comparisons should be made with the conditions prevailing at the previous Coronation. Within that decade, many notable developments have taken place, only one of which it is necessary for us to refer to here. This is not the time to deal specifically with the importance and value, both commercial and scientific, of radio-telegraphy; but we can make use of the occasion to explain the part taken by wireless in the Coronation festivities on sea and on land, so that a fair estimate may be formed of its utility and adaptability for any occasion. The great Naval Review, held on June 24th, was an event, the size and significance of which was perhaps unparalleled in modern times, and formed a fitting climax to Coronation week. A correspondent who was present at Spithead on this memorable occasion has sent us an account of the great Review, and we cannot do better than print his graphic picture, showing in its true perspective the part played by wireless.

## At the Naval Review

### By J. R. Stapleton

During Coronation week the newspapers were flooded with particulars relating to, and contrasting, the Fleet that assembled in 1902 at the Review held after the Coronation of King Edward VII., and that anchored at Spithead on June 24th last. These comparisons served to show the tremendous strides that had taken place in naval construction and equipment during the past decade. But it was not only in armaments in the huge steel hulls and the enormous barbettes that improvements were noticeable; a great and wonderful change met the eye of the keen observer as he gazed up at the forest of masts assembled there, for he saw strung from and hung between them a weird cage-like network of wires, from which he knew that each vessel so equipped was installed with a wireless installation. Fully ninety per cent. of all the ships (not counting the yachts and smaller craft) at Spithead carried wireless plant. When it is remembered that at the Naval Review in 1902, less than ten per cent. of the ships assembled were fitted with wireless apparatus, it causes one "furiously to think." At the earlier date, wireless was regarded merely as a novelty, or some huge and elaborate scientific toy—the product of a brilliant and fertile mind; it played but a minor part in the naval arrangements made for the occasion. The contrast between 1902 and 1911 is most remarkable. No longer is the question, "Is wireless really practicable?" One really asks now, "What would we do without it?" Instructions, orders, and commands that were formerly communicated by means of flag signals or flashlights were transmitted along invisible waves from ship to ship to the immense satisfaction of the Admirals in charge. The ordinary visitor to the Review could not fail to observe the advance made in wireless during the past few years; nor did it fail to impress him. But if this progress was so apparent to the visitor, how much more so was it to the operator who sat with telephones attached to his ears and heard the almost continuous communications that were going on at the time of the Review.

The use to which wireless would be put during the Review was foreseen by the Postal Authorities, and in order to avoid interference with naval and commercial communications to and from ships in the neighbourhood of the Isle of Wight, the Postmaster-General issued the following regulations for the guidance of wireless operators employed on ships attending the Review :—

1. The Post Office Wireless Station at Niton, Isle of Wight (Call Signal GNI), will be the controlling station, and all operators are to comply strictly with any instructions given by that station, which will determine, in accordance with sections XIX. and XXIII. of the Regulations attached to the International Radiotelegraphic Convention, the order in which the ship stations should be allowed to transmit their correspondence.

2. Intercommunication between ships (other than ships of the Royal Navy) in the neighbourhood of the Isle of Wight must cease immediately at the request of the Post Office Wireless Station at Niton, in accordance with section XL. of the Regulations referred to above.

3. All Radiotelegrams, whether addressed to places in the United Kingdom or abroad, are to be transmitted via the Niton Station, where special arrangements have been made for dealing with the traffic.

4. A wave length of 300 metres should be used for all communications in order to minimize the risk of interference with Naval signalling.

5. The charge for the Radiotelegrams will be made up of—(1) the ship charge ; (2) the Coast Station charge (6d. a word without minimum) ; (3) "Wire" charge ; that is, the ordinary telegraph charge to places in the United Kingdom or abroad.

It was but natural that with such an unprecedented number of ships assembled within a short radius, some provision should be made for obviating interference. About 150 ships were fitted with wireless, 15 of them being merchant vessels carrying spectators. The possibility of interference was admirably overcome by tuning, the Naval vessels being worked on a 3,000 feet wave-length, and the merchant boats on a 1,000 ft. wave length. The Niton Station, controlled by the State, was set apart to deal with merchant ships, while the Naval vessels were worked by the Admiralty Station at Portsmouth. A large volume of traffic passed between the two stations. I was on board the "Themistocles"—a merchant ship chartered to take the Admiralty and War Office Officials, and my attention was naturally drawn to the working of the Niton Station. I have nought but praise for the operators on duty there ; they worked incessantly under the arduous conditions, and with complete success. Facility was given as far as possible to each ship to "clear," and yeoman service was rendered by Niton, which resulted in a tremendous amount of press and ordinary messages being transmitted and received through that station. I have not at hand the exact number of messages dealt with during the Naval Review, but I know it must have been enormous. To quote one ship alone, I heard the French

*At the Naval Review.*

steamer, "La Savoie," sent between 8 a.m. and noon over 70 messages to Niton, and when we left for Southampton at 6 p.m., that ship was still transmitting. This only applies to one ship, but I heard in addition that traffic was passing between the "Otranto," the "Batavia III.," the "Ascania," the "George Washington," and others.

Time prevents me from dwelling further upon the work done, and from showing the extent to which wireless was used during the Naval manœuvres; but I think it will be saying the very least when I add that it did play a most important part, and was used to great advantage. It supplied the Fleet with a daily news bulletin, and was the means of conveying to friends ashore assurances that the weather conditions were superb, and everything a huge success. It must have been a great satisfaction to those who have been instrumental in making wireless a practicability, to see it attain such a standard of perfection in so short a space of time. Never before have so many wireless installations been assembled together in the world's history, and it will be long before I forget steaming through twenty miles of aerials, as it was my privilege to do on that memorable Saturday morning when the "Themistocles" proceeded through the lines of the Fleet, and finally came to her anchorage.

## Coronation Celebrations at Chelmsford.

*(From a Correspondent.)*

Festivities of a nature befitting the position of this borough as the capital of Essex, and the town in which the Marconi Company's works are situated, were decided on some months ago, and were brought to a successful issue on June 22nd. The sum of £500 was voted by the Corporation, and with the aid of an enthusiastic committee numerous entertainments were provided for the amusement of all, young and old. The round of festivities commenced with services in the Churches at 11 in the morning and terminated with a ball in the Drill Hall, lasting until 3.30 a.m. on June 23rd.

On the conclusion of the morning services a large procession was formed, and wended its way through the main streets of the town to the spacious and beautiful Recreation Ground, where a brief service was held. This was followed by the firing of a *feu de joie* by the contingents of the Territorials present, and then by an eagerly anticipated demonstration of Wireless Telegraphy. For this purpose one of the Marconi Company's latest type of Cavalry Field Stations had been erected in the Recreation Ground, by means of which wireless communication was maintained with the Company's works, about three quarters of a mile distant, and it had been arranged that on receipt of a signal here a Union Jack should be broken at the head of the mast, which is of the Company's latest type of sectional steel construction, and reaches the towering height of 230 ft. In the absence of the Mayor (Mr. Alderman J. D. Cramphorn), who was commanded to attend the Coronation ceremony in Westminster Abbey, the signal was given by the Deputy Mayor, Councillor E. C. Gray. As this gentleman proceeded to the wireless station the silence was so intense as to be almost audible, and was only broken by the noise of the spark when he commenced to send the signal, but was changed to a scene of almost indescribable enthusiasm in the space of five seconds, when the Union Jack at the mast head floated proudly on the breeze, followed immediately by the flags on the staffs of the Recreation Ground and the Pro-Cathedral. The wireless installation was kept on the ground for some hours afterwards as a receiving station, and many interested spectators exercised the privilege of hearing signals transmitted from the works.

A wireless station has now been opened on the island of Bonaire. The charge for the transmission of messages abroad is 2fl. (3s. 4d.) for the first 10 words, and ·2fl. (4d.) for each additional word.

It has been suggested that the best method of filtering out the true atmospheric disturbance is to work with a low aerial and large capacity.

# Revised Rates for Radiotelegrams.

A Post Office Circular (No. 1998) has been issued, setting forth the revised rates for radiotelegrams exchanged with cross-channel ships and other vessels making short voyages. The revised rates came into force on July 1st, and at present apply to the services set out in the following table :—

| Service. | Ships. | Coast Station. | Charges. per word. | Charges. Minimum. |
|---|---|---|---|---|
| Batavier Packets— London—Rotterdam | Batavier II.<br>,, III.<br>,, IV.<br>,, V. | North Foreland<br>Scheveningen Haven | 2½d.<br>2½d. § | 2s. 1d.<br>2s. 1d.§ |
| Belgian Government Packets— Dover—Ostend | Jan Breydel<br>La Flandre<br>Leopold II.<br>Le Rapide<br>Marie Henriette<br>Pieter de Coninck<br>Princesse Clementine<br>Princesse Elisabeth<br>Princesse Henriette<br>Princesse Josephine<br>Ville de Douvres | Nieuport | 1d.§ (after 10 words) | 1s. 3d.§ (for 10 words and under). |
| City of Dublin Steam Packet Company's Mail Steamers— Holyhead—Kingstown | Ulster<br>Munster<br>Leinster<br>Connaught | Seaforth | 2½d. | 2s. 1d. |
| Gt. Eastern Railway Company's Mail Steamers— Harwich—Hook of Holland<br>Harwich—Antwerp | Amsterdam<br>Brussels<br>Colchester<br>Copenhagen<br>Dresden<br>Munich<br>St. Petersburg<br>Vienna | Parkeston Quay<br>Scheveningen Haven | 2d.§<br>3d.§ | 1s. 8d.§<br>2s. 6d.§ |
| London & North-Western Railway Co.'s Mail Steamers— Holyhead—Kingstown and Dublin (North Wall) | Anglia<br>Cambria<br>Hibernia<br>Scotia | Seaforth | 2½d. | 2s. 1d. |
| Midland Railway Company's Mail Steamers— Heysham—Belfast | Antrim<br>Donegal<br>Londonderry | Heysham Harbour | 1d. | 1s. |
| South Eastern and Chatham Railway Co.'s Mail Steamers— Folkestone—Boulogne<br>Dover—Calais | Invicta<br>Queen<br>Empress<br>Victoria<br>Onward | North Foreland | 3½d. | 2s. 11d. |
| Wilson Line Royal Mail Steamers— Hull—Norway<br>Hull—Sweden | Aaro<br>Oslo<br>Eskimo<br>Calypso | Caister—Cullercoats | 5d. | 2s. 6d. |
| Zeeland Company's Packets— Queensborough—Flushing<br>Folkestone—Flushing | Koningin Regentes<br>Koningin Wilhelmina<br>Mecklenburg<br>Oranje Nassau<br>Prinses Juliana<br>Prins Hendrik | North Foreland<br>Scheveningen Haven | 4d.<br>2d.§ | 3s. 4d.<br>1s. 8d.§ |

§ The ordinary charge for wire transmission to the coast station must be added.

# The United States and Wireless

## Compulsory Equipment of Ships.

THE effects of an Act which came intoforce in the United States on July 1st are likely to be far-reaching. In brief, this Act provides for the equipment of every ocean-going steamer leaving a United States port, and carrying fifty or more persons, including passengers or crew, with "an efficient apparatus for radio-communication, in good working order, in charge of a person skilled in the use of such apparatus, which apparatus shall be capable of transmitting and receiving messages over a distance of at least one hundred miles, night or day." This Act applies to vessels whether registered in the United States or in any foreign country, but it does not include vessels plying between ports less than 200 miles apart.

Three wireless ship inspectors have been appointed, one in the North Atlantic from New York to the Canadian boundary; another in middle Atlantic and gulf, from Philadelphia to Galveston, including Porto Rico; and the third is stationed in the Pacific from Puget Sound to San Diego, including Alaska and Hawaii. The Act empowers collectors of customs as well as wireless ship inspectors to visit ocean passenger steamers before they leave port, and as certain if they are equipped with the apparatus in charge of the operator.

Where an ocean passenger steamer subject to the Act is without the apparatus and the operator prescribed, or either of them, and is about to attempt to leave port, the customs officer or wireless ship inspector visiting the vessel shall (*a*) notify the master of the fine to which he will be liable, and of the particulars in respect of which the law has not been complied with; (*b*) communicate with the collector of customs and, (*c*) prepare in writing a report of his action. The Act does not authorise the refusal of clearance in case of violation of its provisions, but it specifically provides for the imposition of a fine in a sum not more than five thousand dollars upon conviction by the court. The collector of customs, accordingly, when advised that an ocean passenger steamer is subject to the Act is attempting to leave port in violation of its requirements, must at once notify the United States attorney. Subsequently he shall report the case briefly to the Secretary of Commerce and Labour.

Vessels entering a port of the United States are not subject to the Act, but customs officers and wireless ship inspectors may accept as evidence of the efficiency of the apparatus and the skill of the operator wireless messages shown to have been transmitted and received by him over a distance of at least one hundred miles, by night or day, during the voyage to the United States. In cases of violations of the Act the efficiency of the apparatus and the skill of the operator will be determined by the court.

The second section of the Act deals with operators, and is prefaced by the excerpts of Article VI. of the Service regulations annexed to the Berlin International Radiotelegraphic Convention:

> The service of the ship station must be carried on by a telegraphist holding a certificate issued by the Government to whose authority the ship is subject. This certificate testifies to the technical proficiency of the telegraphist as regards—(*a*) the adjustment of apparatus; (*b*) transmission and sound-reading at a speed which must not fall short of 20 words a minute; (*c*) knowledge of the regulations applicable to the exchange of radiotelegraphic traffic.
>
> In addition, the certificate testifies that the Government has bound the telegraphist to the obligation of preserving the secrecy of correspondence.

The Berlin Convention has been ratified by Great Britain, Canada, Australia, British South Africa, India and New Zealand, Germany and all German protectorates, France, Norway, Japan, the Netherlands and Dutch Indies, Russia, Sweden, Austria-Hungary, Spain, Denmark, Belgium, Brazil, Turkey, Portugal, Roumania, Mexico, Bulgaria, Persia, and Tunis. Wireless operators holding valid certificates issued by the Governments named above will be recognised as persons "skilled in the use of such apparatus" within the meaning of the Act, unless in the case of a specific individual there may be special reason to doubt the operator's skill and reliability. These certificates will be issued by the Commissioner of Navigation after examination.

The apparatus forms the subject of the third portion of the Act. The efficiency of the wireless apparatus which has been certified by a foreign government will be recognised in the United States, but this will not prevent a customs officer or wireless ship inspector testing the apparatus himself to see that it is in good working order. The current necessary to transmit and receive messages must at all times while the steamer is under way be available for the wireless operator's use. A storage battery or some other auxiliary which will produce sufficient power to operate the transmitting apparatus for four hours, ordinary sending, should be installed and ready for use in case of mishap to the electric plant of the vessel. After January 1st, 1912, vessels will be required to carry such battery or auxiliary.

We reproduce below Navigation Service Form 751, which is a copy of the operator's certificate and skill in radio-communication. This certificate is valid for two years.

This is to certify that, under the provisions of the Act of June 24th, 1910, ——— ——— has been examined in radio-communication and has passed in :

(*a*) The adjustment of apparatus, correction of faults, and change from one wave length to another ;

(*b*) Transmission and sound reading at a speed of not less than fifteen words a minute, American Morse, twelve words, Continental, five letters counting as one word.

The candidate's practical knowledge of adjustment was tested on a ——— set of apparatus. His knowledge of other systems and of international radiotelegraphic regulations and American naval wireless regulations is shown below : ——— ——— ———.

(Signature of examining officer) ——— ———

Place———————, Date———————, 191

By direction of the Secretary of Commerce and Labour :

———————,

*Commmissioner of Navigation, Washington D.C*

I, ——— ———, do solemnly swear that I will faithfully preserve the secrecy of all messages coming to my knowledge through my employment under this certificate ; that this obligation is taken freely, without mental reservation or purpose of evasion ; and that I will well and faithfully discharge the duties of the office : So help me God.

(Signature of holder) ——— ———.

Date of birth, ——— ———, ———

Place of birth, ————————, ————.

Sworn to and subscribed before me this —— day of ——, A.D. 191 .

[SEAL.] ——— ———. *Notary Public.*

## The Equipment of SS. "Olympic."

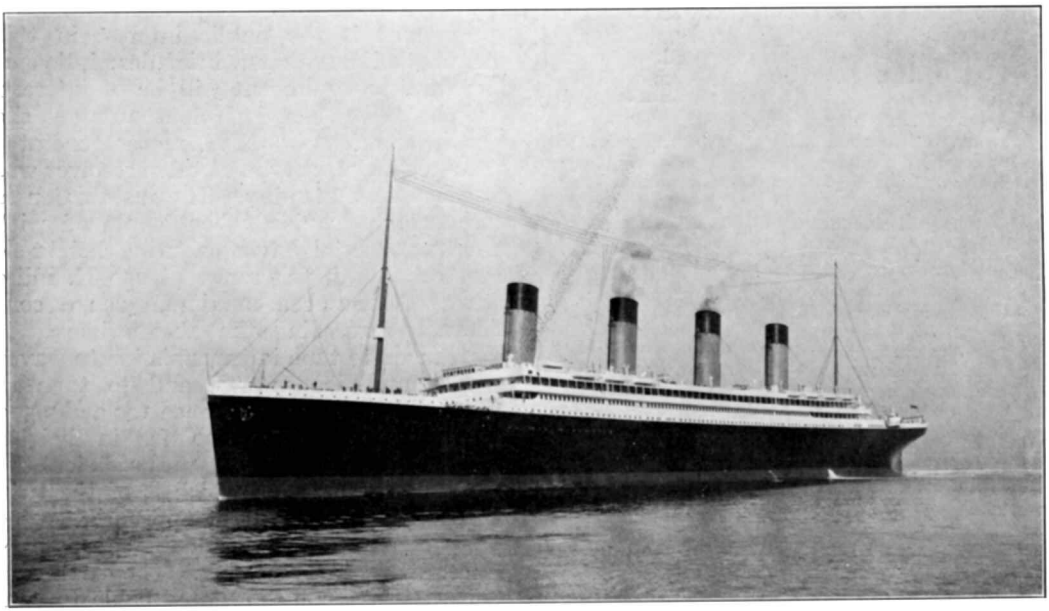
New York welcomed the "Olympic" on her arrival in port on June 21st with an enthusiasm which, as one writer said, baffled description. The "Olympic's" success on her maiden trip was reported in the daily papers by means of Marconigrams before the arrival of the vessel in port. An extraordinary incident occurred as the "Olympic" was passing through the lower bay. Mr. Thomas Sopwith, the English aviator, hovered over the steamer in his aeroplane and dropped aboard a pair of spectacles carefully wrapped and addressed to Mr. W. A. Burpee, a prominent Philadelphia merchant. Mr. Burpee had broken his spectacles shortly before sailing, and sent them to Wanamaker's store for repairs. Just before the "Olympic" sailed Mr. Burpee sent a wireless message to Wanamaker's, which has a wireless installation, requesting that the spectacles be sent to him in London. Taking advantage of Mr. Sopwith's ascent, Wanamaker's sent a wireless message to Mr. Burpee that the spectacles would be delivered by aeroplane. Mr. Sopwith was then engaged to make the delivery, which was safely accomplished.

So great is the public interest in this mammoth liner, that a brief description of her wireless equipment will be of interest. Shortly before leaving Southampton she was fitted with a 5 K.W. motor generator set, and the latest type of valve receiver was installed as a standby. The installation is designed to provide, when employed with a suitable aerial having a mean height of 170 feet, a working range of 250 N. miles over water, and a maximum range considerably exceeding the above figure. It is arranged to tune in transmission to waves of 300 and 600 metres, and to tune in reception to all waves between 100 and 2,500 metres. Two masts, 200 ft. in height, stepped 600 ft. apart, are used for the support of the aerial, which is of the twin T type, one aerial only of appropriate type being employed for the double purpose of transmitting and receiving. The earth connection is made by insulated cable to convenient points on the hull of the vessel.

Electrical power is supplied at 110 volts (continuous current) for the purpose of running the plant. This, too, consists of a motor generator set, comprising a continuous current motor mounted on a common bed with and direct coupled to an alternating current generator. The motor takes its power from the continuous current supply, and furnishes mechanical power to the laternator sufficient for an output of 5 K.W. at 300 volt.

The manipulating gear consists of a Morse key, actuating electrically an electro-magnetic relay key in the transformer primary circuit. The Morse key is provided with telephone short circuiting contacts to prevent the operator's ear being rendered insensitive by noise in the telephone during transmission.

The receiver is a standard magnetic detector and multiple tuner, providing for the reception of all waves between 100 and 2,500 metres. The multiple tuner is calibrated to permit of the instrument being set to any pre-arranged wave length, and further to be provided with a change switch to permit of instantaneous change of the circuit from a highly syntonised tuned condition to an untuned condition (for standing by), especially devised for picking up incoming signals of widely different wave lengths. By reason of its robust nature the magnetic detector may be employed permanently connected to the transmitting aerial, thus dispensing with all mechanical change over switching arrangements, between transmitting and receiving, and, in conjunction with the short circuiting contacts on the manipulating key, permitting the operator being interrupted in the transmission of a message in the event of erroneous reception at a corresponding station. A suitable testing buzzer is provided and permanently installed for the purpose of instantaneously testing the receiving circuits, and a tuning lamp and adjustable choke are permanently installed for the purpose of indicating the condition of syntony of the transmitting circuits, and a wave-meter, covering the full range of the transmitting circuit is supplied. A tool box containing an electrician's complete repairing kit, together with all special tools and spare parts for the different machines, is furnished.



*The SS. "Olympic" on her Maiden Voyage. View showing Aerial.*

# Maritime Wireless Telegraphy.

A DISPATCH was received in London, via Halifax, N.S., from a passenger on board the SS. "Olympic," which was making her first voyage across the Atlantic, stating that the ship was "surpassing the most sanguine expectations," also that "the many congratulations from passing ships keep the wireless apparatus busy all day." The message was transmitted by wireless telegraphy from the "Olympic" on Monday midnight, June 19th, and was received in London in the early hours of the following morning.

IN their desire to reach England in time to witness the celebration of the Coronation, several American visitors made their final arrangements by Marconigram. One enterprising agency having seats to dispose of on the processional route inserted an advertisement in the newspaper published on board one of the Cunard liners, and from mid-Atlantic seats were arranged for and purchased by means of Marconigram.

THE following vessels, with the exception of the "Olympic," which has a 5 K.W. set, were fitted with 1½ K.W. Marconi apparatus during the month of June:—"Caesarea" and "Sainia" for the London and South Western Railway Co.; "Ruahine" for the New Zealand Shipping Co.; "Warwickshire" and "Worcestershire" for Bibby Bros.; "Burutu" for the Elder Dempster Co.; "Arawa" for Shaw, Savill & Albion Co., and "San Guglielmo" for Pierce Bros.

The SY. "Viking," belonging to the Polytechnic Touring Association, was fitted with a 5 K.W. set.

THREE boats belonging to the Isle of Man Steam Packet Company are to be equipped with Marconi wireless apparatus.

THE BELGIAN COMPANY have completed a contract with the Compagnie Belge Maritime de Congo for the publication of a newspaper on board their vessels "Leopoldville," "Elisabethville," and "Bruxellville," trading between Antwerp and the Congo. The first issue was published on July 1st.

A MID-ATLANTIC Marconigram was recently received by Messrs. W. L. Stewart and Co., Ltd., of 26, Albemarle Street, Piccadilly, London, W., with an order for a motor car.

THE AMERICAN COMPANY have received instructions from the owners, the Munson Steamship Company, to equip the "Curityba" and "Olinda" trading between New York and Eastern Cuban ports.

THE TRINIDAD SHIPPING AND TRADING COMPANY SS. "Pegu," which is at present in course of construction, is to be fitted with a Standard 1½ K.W. Ship Set complete. The "Grenada" and "Maracas" will also probably be fitted by the American Company at New York.

THE BELGIAN COMPANY have received instructions from the Nordenfelske Company to install a Marconi set on the SS. "Haakon VII," sailing between Newcastle-on-Tyne and Trondjhem.

A STRONG movement is on foot to establish wireless connection between Hong Kong and Singapore, and the shipping and business interests are deeply interested in the plan and are anxious for its early adoption.

THE CIA NACIONAL DE TELEGRAFIA SIN HILOS (The Spanish Co.) have received a Royal Order to install Marconi apparatus on board the battleship "Carlos V."

THE BELGIAN COMPANY have received instructions from the Koninklyke Paketvaart Maatschappij to equip the "Van Cloon" and "Van Overstraten" with Marconi apparatus. These vessels are engaged in the Dutch East India trade.

## Obituary.

We regret to announce the death of Mr. W. J. Croxen, who was employed as chief clerk at Clifden. After a short illness he was obliged to undergo an operation for cancer, the effects of which unfortunately proved fatal. Mr. Croxen leaves a widow and one child. No provision having been made for them, it has been decided to open a fund on their behalf, and donations, which may be sent by members of any of the Marconi Companies, or by the public generally, will be very gratefully received and acknowledged by the Editor of *The Marconigraph*, Watergate House, Adelphi, London, W.C.

We regret to announce the death, during the month, of Mr. J. McCarthy. The deceased joined the staff of the International Marine Communication Company on April 18th, 1910. From that date to May 8th he was stationed at the Liverpool Training College, when he received an appointment on the staff of the company. He was a conscientious and attentive worker. His first voyage was made on the SS. "Inanda" of the Aberdeen Line, and afterwards he was appointed Marconi Officer in charge of the installation on the SS. "Saxon." It was on his third voyage to South Africa that he was taken ill shortly before arriving in port. On arrival he was taken to hospital, where he passed away on June 9th. Mr. McCarthy was buried in the Union Castle Cemetery in Cape Town, a special plot of land for burying members of the crews of the Union Castle line.

The death occurred recently of Mr. William Lynd, who has frequently lectured on Wireless Telegraphy, and was well known to the Marconi Companies for the past twelve or thirteen years.

## Movements of Engineers.

Mr. W. G. Covell left Chelmsford for Glace Bay on June 9th.

Mr. R. G. Kindersley returned from Spain on June 26th, and now leaves for Broomfield, where he will be engaged upon special design and experimental work.

Mr. A. G. Savill, on his return from Varna, took up holiday relief at Clifden on June 12th.

Mr. R. K. Rice returned from Tavin on June 17th, and is at present engaged on ship installation work.

Mr. C. G. Rattray returned from Spezia on board the Greek battleship "Averoff" on June 10th, and immediately proceeded to Spithead for the completion of installation work.

Mr. N. G. Rackstraw sailed from Singapore on June 7th, in the SS. "Sumatra," and is due to arrive on July 15th.

Mr. P. E. Privett (from Chelmsford) left for Clifden on June 26th.

## Personal.

Mr. S. Kos, who recently returned to England from South Africa, where he had been in charge of the erection of the Slangkop Station, is leaving for Borneo, where he will be in charge of the Balakapan Station, which is about to be opened. The illustration shows Mr. Kos tuning up on the SS. "Balmoral Castle," which was one of the first of the Union Castle liners to be fitted with wireless.

We are pleased to note that Mr. John Bottomley, General Manager of the Marconi Wireless Telegraph Company of America, was, on June 15th, elected President, for the ensuing year, of the New York Electrical Society.

Mr. F. E. D. Pereira has been appointed Superintendent of the Telegraph Staff at Liverpool.

A sum of £1,100 was expended on the installation of a complete transmitting and receiving wireless apparatus at Her Majesty's Theatre, Sydney, in connection with the production of the play, "Via Wireless."

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