THE MARCONIGRAPH

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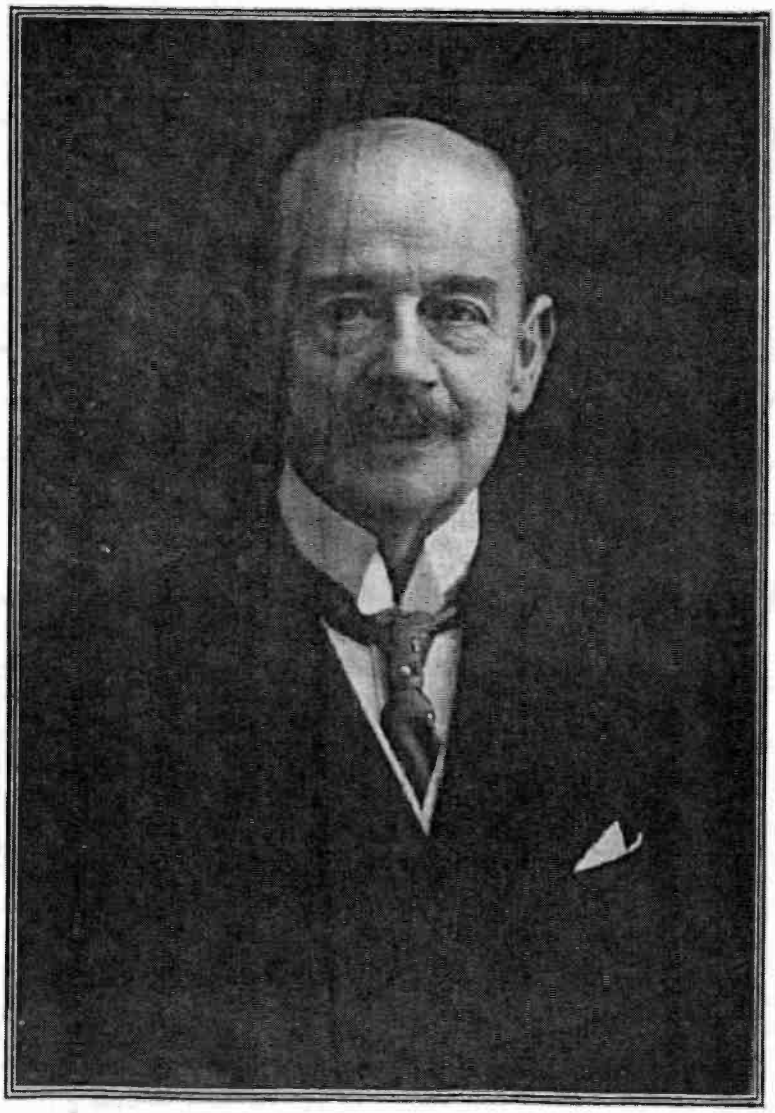
Where "Wireless" Alone Can Live.

THAT wireless telegraphy is available where the uses of the ordinary telegraph or cable are nullified is a matter of common knowledge, but the conditions under which this primitive system is rendered useless are usually connected with climatic influences, or the mischievous interference by enemies or malefactors. But in East Central Africa there exists a race which will not allow any other system than that of wireless telegraphy to exist. They are a primitive people, so innocently minded that they do not understand what theft is, and at the same time they have an unfortunate partiality for wire. As a result, it is impossible to erect telegraph poles with the necessary copper strands across the district, for once their erection is completed and the lines left unguarded, a raid is made on the pretty toy by these negroes, and the wire is converted into bracelets, necklaces, and other vain trifles. But let Mr. Felix Oswald tell the tale of this strange race of negroes whom he has discovered near Karungu on the eastern coast of Lake Victoria Nyanza, and of whose state of life he gave an interesting discourse before the Royal Geographical Society on December 16th, 1912.

The tribe, he said, belonged to the Jalwo Kavirondo—a race of hilotic negroes with a notable admixture of Hamitic blood. They are remarkable for their nudity and their utter lack of self-consciousness in this respect, just as if they were living in the Garden of Eden before the Fall.

Their standard of morality is conspicuously higher than that of neighbouring tribes. As a consequence they are a vigorous race, increasing in numbers, whilst the Nandi, owing to their lax morals, are dying out. They subsist entirely on millet and sour milk, only eating meat when any of their cattle or sheep die a natural death or when indulging in sacrificial feasts, on such occasions as the funeral of a chief. However, their physique is magnificent, and their power of bearing burdens is unexampled. Sometimes there is a small plantation of tobacco outside one of their homesteads, for they are confirmed smokers, the women more so than the men, and it is not uncommon to see even a young girl of thirteen smoking one of their long-stemmed pipes bound round with iron wire.

The women rarely wear anything but a string of blue beads or cowries round the neck and another round the waist, with an occasional coil of iron on the arms or legs; or, if married, a tail of grass fibre, the distinguishing badge of matrimony, is attached to the waist-belt. Old women often wear in addition a fillet of cowries encircling the forehead, probably as a sign of mourning. But the men have a passion for ornament, especially for coils of brass and iron wire. No bit of iron comes amiss to the Kavirondo men, and they even twist wire into large spectacle frames in imitation of European travellers. Hence it has not been found possible to run telegraph wires across the country, excepting along the well-patrolled Uganda Railway, but there is now a project for linking up the outlying Government stations by means of wireless telegraphy.



M. CHARLES BALSER

M. Charles Balser

Director of the Compagnie de Télégraphie Sans Fil, Brussels

ONLY recently one of the oldest firms on the Stock Exchange announced its impending resignation, and justified its action by declaring its intention of "working on broader lines as bankers and financiers."

This is a singularly happy phrase, for it exactly "places" the position of the great banker or the great financier in respect of his relationship with the community at large. At the same time it must be clearly understood that such a statement does not in any way infer a comparison between these two branches of commercial enterprise. Each has its own particular service to render to the public. Nevertheless, it is the banker who more particularly holds, by virtue of his office, a recognised position as guide, counsellor, and friend of the public. Into his keeping is entrusted the golden store of many a private purse, varying perhaps in the roundness of its sum, but representing infinite toil and patient thrift—the two principal factors of a nation's prosperity and power. For it should never be forgotten that though a nation may boast of its wealth, or of its vested interests, such wealth is of itself worthless; it is the energy and industry represented by the shining gold and the crisp paper currency which stands for the nation's credit and makes the boast tolerable. This then is handed to the banker to take charge of. Like a benevolent guardian, he sees what can best be done with it to further the interests of his wards. The very conditions of the trust involve his laying out the money to the fullest advantage, and in this way he is called to exercise a dual function—that of sower and reaper in the world's mart. The aggregated amounts entrusted to his care give him a powerful control over the affairs of men, so that not only is he the guardian of the individual interest, but the steward of the State; and if he be true to his trust, he weighs the merits and demerits of this or that scheme, supports whole-heartedly those enterprises which tend to the common good, discountenances the projects of fraudulent, idle schemers, and in this way keeps the balance of his country's prosperity. Considering their heavy responsibilities and the difficulties of their position, it is remarkable how few bankers there are who fail in this position of public trust, while those who carry it out well and faithfully receive, and justly, the esteem of their fellow men.

Foremost in the ranks of these princes of finance is M. Charles Balser. He is one of the most prominent figures in Belgian banking circles. He was head of the well-known banking firm of Balser & Co., which was for many years one of the principal banks in Brussels. In 1908, however, the important banking firm which is perhaps better known as the Deutsche Bank of Berlin entered into negotiations with M. Balser for amalgamating in Brussels his bank into their company, and finally an arrangement to this effect was completed, and on this occasion M. Balser became one of the directors of the old German bank.

It was in 1900 that M. Balser first came in touch with wireless telegraphy, and immediately recognised its importance as one of the coming factors in international communication. On the other hand, his ripe business experience found a suitable outlet in the Marconi International Marine Communication Co., Ltd., which had then but recently come into existence, and M. Balser was one of the first directors of the company and its ally, the Compagnie de Télégraphie Sans Fil, Brussels.

But the name of M. Charles Balser is known far and wide as a synonym for loyalty and business integrity. He has been a director of the Banque d'Outremer and many other important Colonial concerns since their foundation. He is chairman of the Société Belgo Allemande du Congo, the first German commercial house established in Central Africa at the Stanley Pool since the Franco-German Treaty of 1911, and is also a director of the Chinese Engineering and Mining Company.

On some Directive Aerials

By Dr. E. Bellini

THE Marconi vertical aerial radiates equally in every direction, and receives equally from every direction. The Marconi horizontal aerial radiates principally in a given direction, and receives best from the same direction. This latter is therefore a directive aerial.

Other directive aerials can be obtained by using two or more vertical Marconi aerials. We shall consider here only the case of two such aerials oscillating with a phase-difference of half a period, and the case of aerials derived immediately from such a pair.

The oscillating currents in two vertical aerials are said to have a phase-difference of half a period when, being at the same frequency, they pass through zero value at the same instant, and an instant later one of them is directed towards the sky and the other is directed towards the earth.

It is evident that if the two aerials are equal and very close together, and the currents in them have the same intensity and the same damping, their effects are equal and opposite in every direction. But if we put them some distance apart the conditions change. Let us suppose that A and B (Fig. 1) are the projections on the horizontal plane of these two aerials, the distance between them being *d*. It is evident that a receiving station situated on the line MN, at right angles to AB, and passing through the middle point, O, cannot receive anything, the current in the aerial, A, generating in the receiving aerial an electromotive force equal and opposite to that generated in it by the current in the aerial, B.

But if the receiving station is situated on the line AB then the electromotive forces are no longer in opposition of phase, as the waves generated by one aerial have to travel a longer distance before reaching the receiving station than the waves generated by the other aerial. Moreover, if the distance *d* is equal to half the wave-length radiated, it is easy to see that the two electro-motive forces not only will *not* be in opposition of phase, but they will coincide in phase, and will *add* completely one to the other.

That is in the direction along AB. In all other directions the phase-difference between these two electromotive forces will be sensibly the same as if the two aerials were at a distance apart equal to the projection of *d* on the direction considered. Thus, in the case of the direction OC this phase-difference will be that corresponding to the distance *ab*, *ab* being the projection of AB on the direction OC.

It can be demonstrated that the intensity of the current in a receiving aerial situated at a great distance in a direction OC making an

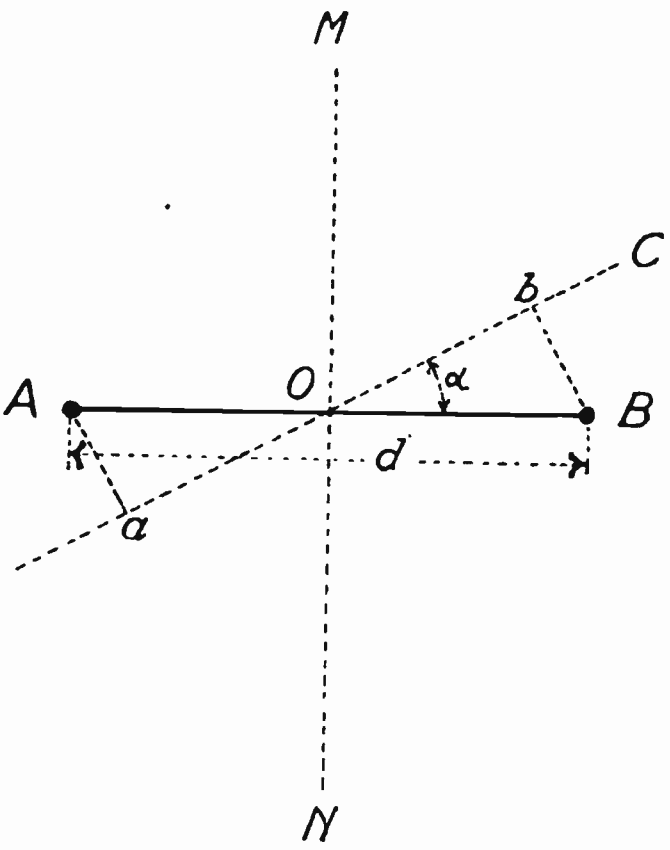


Fig. 1

angle α with the direction AB, is proportional to

$$\sin\left(\frac{\pi d}{\lambda}\cos\alpha\right),$$

where λ stands for the wave-length of the radiated wave.

If we suppose that the receiving station turns round the directive aerial, remaining at

a constant distance from the point O, the current intensity in the receiving aerial can be represented by a polar diagram. Fig. 2 shows

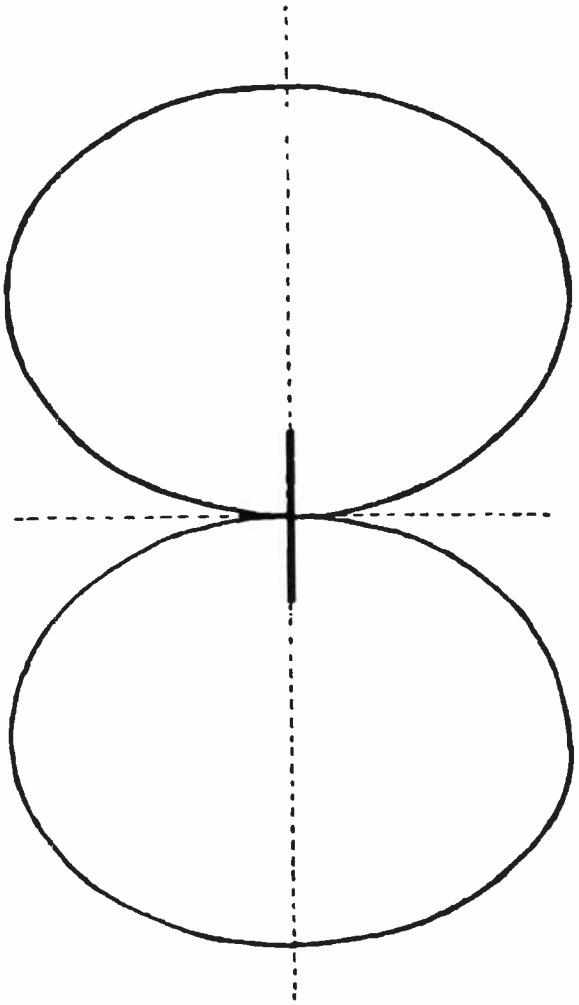


Fig. 2

such a diagram in the case of $d=\frac{\lambda}{2}$. It is formed by two flat tangent curves. But when d diminishes with regard to λ these curves tend to become circles, so that from $d=\frac{\lambda}{6}$ downwards these curves are practically circular. Fig. 3 shows this case.

The range of these directive aerials depends, apart from other factors such as current intensity, height of aerials, etc., on the distance between the two vertical aerials forming the directive aerial. The intensity of the electromagnetic field generated at a point lying in the direction of maximum radiation—viz., in the plane of these two vertical aerials, is proportional to $\sin \frac{\pi d}{\lambda}$.

The diagram of Fig. 4 shows how this intensity varies as a function of the ratio $\frac{d}{\lambda}$. It shows that:

(1) The intensity of the electromagnetic field is maximum when $\frac{d}{\lambda}=\frac{1}{2}$.

(2) This intensity does not vary much when $\frac{d}{\lambda}$ lies between $\frac{1}{2}$ and $\frac{3}{8}$.

Moreover, it can be demonstrated that:

(1) The intensity of the electromagnetic field generated by the directive aerial is double that generated by one of the vertical aerials, when $\frac{d}{\lambda}=\frac{1}{2}$; and

(2) The former intensity is equal to the latter when $\frac{d}{\lambda}=\frac{1}{6}$.

We have supposed that the two aerials were

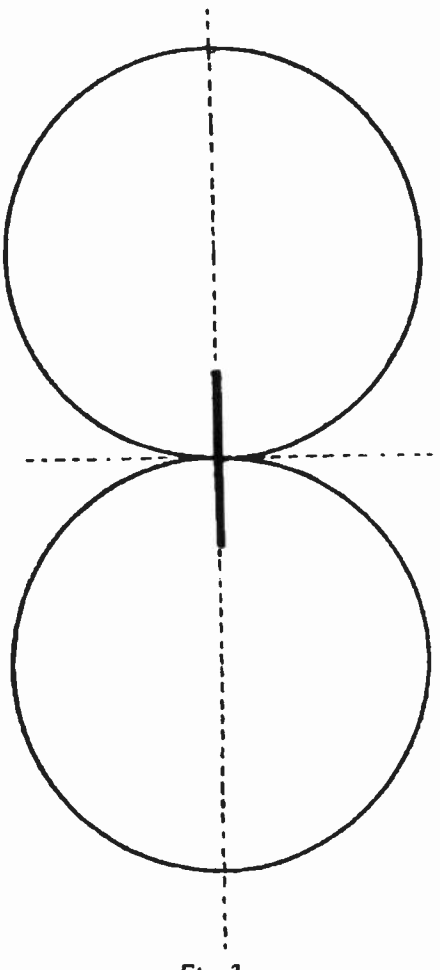


Fig. 3

connected to the earth, but it is easy to see that the earth in this case has no immediate action. As a matter of fact the earth receives

from one aerial a quantity of electricity equal, and of opposite sign, to that received from the other aerial. Its potential therefore does not vary; the earth acts as a simple conductive

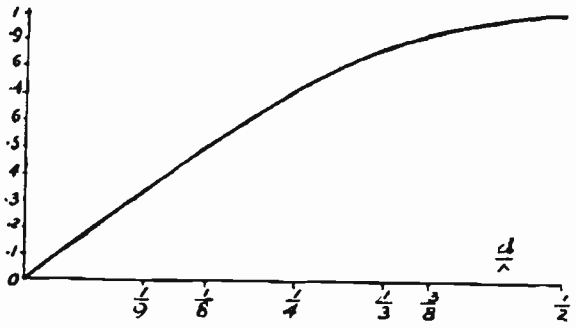


Fig. 4

connection between the bases of the two aerials. We, can, therefore, substitute for it a metallic connection, as shown in Fig. 5, and excite the combination of the two aerials by a jigger and a closed circuit. In practice this is of enormous advantage, as otherwise it would not be possible to excite the two earthed aerials so that a phase-difference of half a period could be generated and maintained in them. Moreover, as the horizontal conductor does not radiate appreciably, this unearthed aerial is quite equivalent to the pair of vertical earthed aerials.

Let us now consider looped aerials of whatever form we please, provided that they conform to the condition that they are symmetrical in regard to a vertical axis, MN, as shown in Figs. 6 to 11.

We can imagine each of these aerials divided into pairs of elements by infinitely close

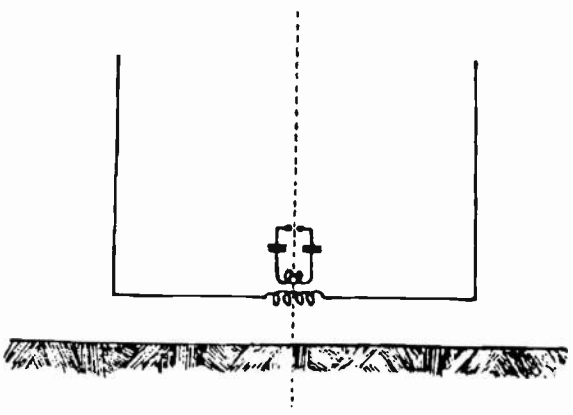


Fig. 5

horizontal planes such as *mn* and *op*. The currents in the two elements, *a* and *b*, are equal and in opposition of phase. These elements, *a* and *b*, will therefore act as an infinitely small directive aerial of the type already considered, having, however, the projecting-up parts not

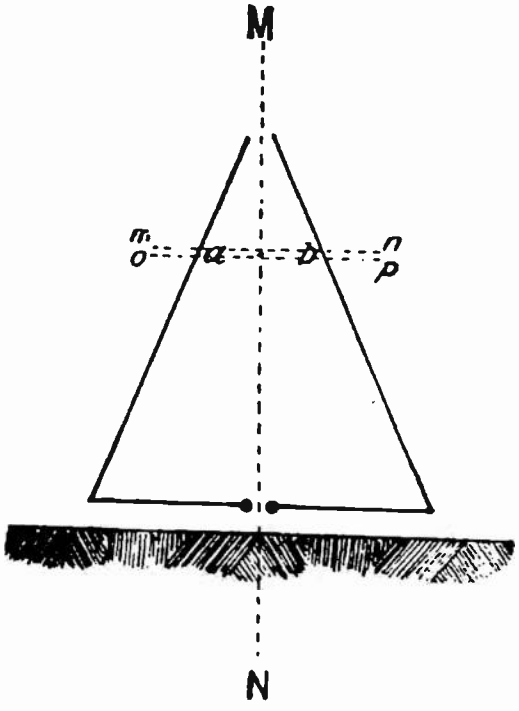


Fig. 6

vertical, but equally inclined to the vertical. The consequence of this inclination is that the action of the pair of elements considered is

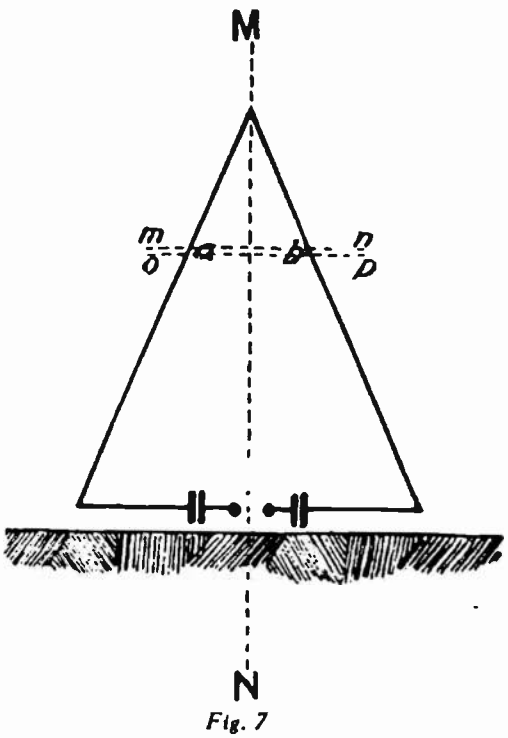


Fig. 7

smaller than if the elements were vertical, but it has no influence whatever on the form of the

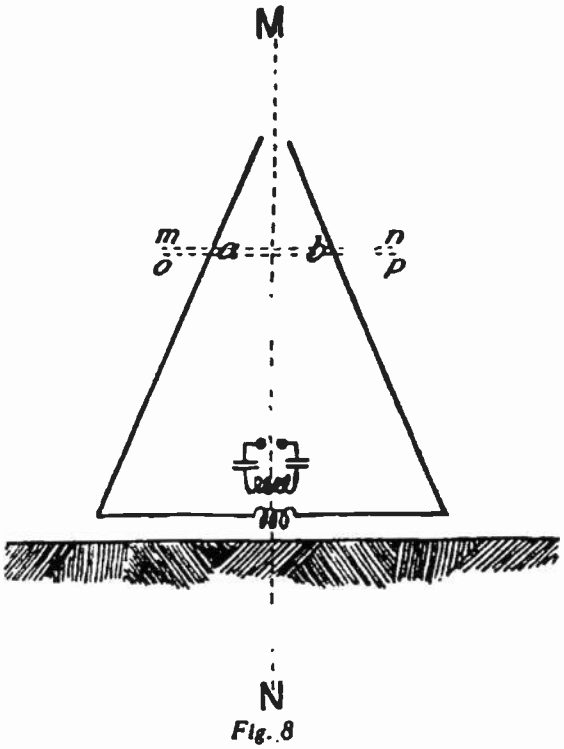


Fig. 8

polar diagram. The resultant action of all the pairs of elements such as *a* and *b* (viz., the action

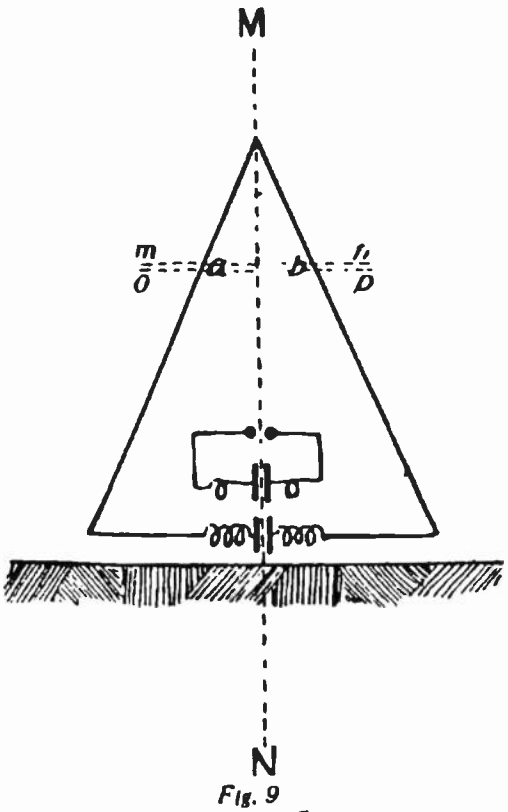


Fig. 9

of the looped aerial) will be the sum of the actions of all the pairs of elements, and if the maximum width of the aerial does not exceed $\frac{\lambda}{6}$, the diagram of the intensity of electromagnetic field generated by these aerials will be formed by the two tangent circumferences, like those of Fig. 3. The looped aerials are therefore directive aerials, having the direction of maximum radiation contained in their own plane; perpendicularly to their plane the radiation is *nil*.

The reciprocity between transmission and reception has for consequence the fact that these aerials are directive also for reception.

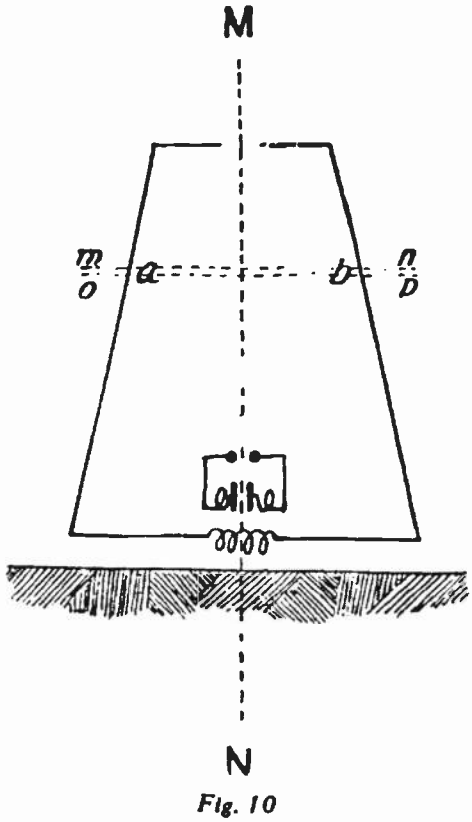


Fig. 10

If we suppose a sending station (with a vertical aerial) to turn around a directive receiving aerial, remaining always at the same distance from it, we can plot a polar diagram representing the current intensities in the receiving aerial as the direction of the transmitting station changes. These diagrams are identical with those of the intensity of the electromagnetic field generated by the same directive aerials employed as transmitters; so that the diagram of Fig. 2 represents also the diagram of current-intensity in the directive receiving aerial when $\frac{d}{\lambda}=\frac{1}{2}$, and the diagram of Fig. 3

represents also the diagram of current-intensity when $\frac{d}{\lambda}$ is equal to or less than $\frac{1}{6}$.

If in the aerials of Figs. 5 to 11 we replace the spark-gap by a detector, they will represent directive receiving aerials.

The method of employment of such directive aerials is obvious. Let us suppose, for instance, that a station, A (Fig. 12), is required to send messages to a station B, but at the same time it must be avoided that the messages should be picked up by a station C. This can be accomplished by arranging the direction of the directive aerial at A, so that its plane is perpendicular to the direction, AC, as shown in the figure. The most favourable conditions are obtained when the direction AB is at right angles to the direction AC.

Again, let us suppose that the direction of an unknown sending station is required to be found. To obtain it, we can swing the directive aerial connected to the receiver around a vertical axis, and find the position of it corresponding to the reception of maximum intensity. The

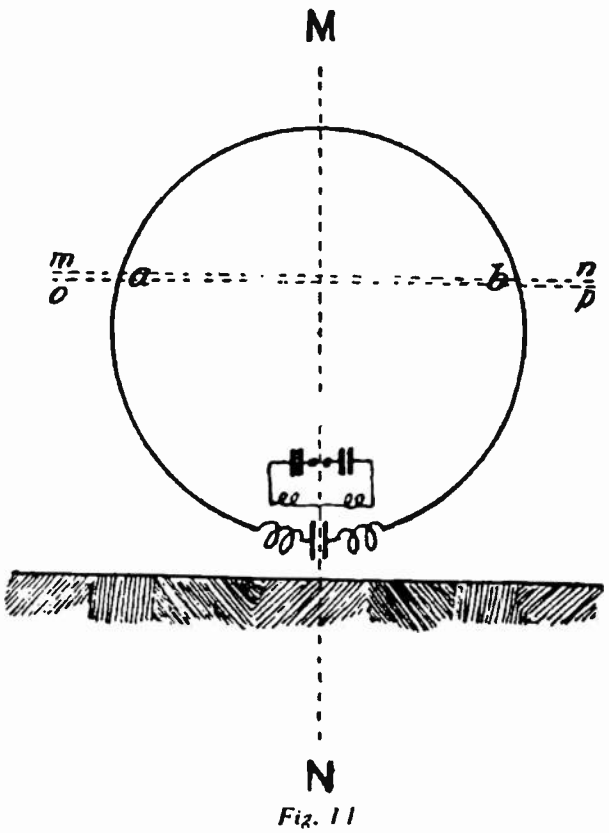


Fig. 11

unknown station is then contained in the plane of the aerial.

But the direction of maximum reception is not sharply defined, as the curves of current-intensity (Figs. 2 and 3) are flat at the top. The best method, therefore, to obtain the required direction is to swing the aerial to both sides of the maximum, and to find out the

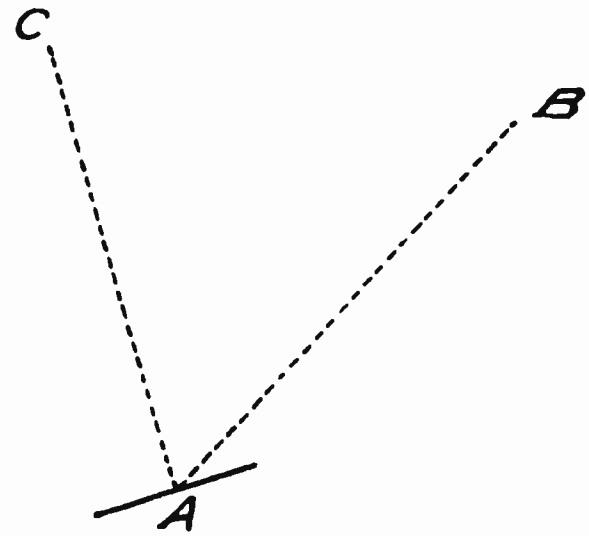


Fig. 12

two limits of direction beyond which the reception ceases. The line bisecting the angle formed by these two limiting directions gives the direction required.

But the swinging of aerials both for transmission and reception is practically impossible, unless they are of very small dimensions, and consequently of a very limited range. One way of avoiding this inconvenience is to employ a number of aerials arranged in star-fashion, using for transmission the one whose plane is closest to the required direction, and for reception testing which one of these aerials gives the maximum or the minimum current-intensity.

Instead of employing a number of such aerials arranged in star-fashion, two aerials alone can be used, at right angles, in conjunction with the radio-goniometer. This method has already been described in THE MARCONIGRAPH of September, 1912.

After the usual business had been transacted at the "Sir Wilfred Lawson" Division of the Sons of Temperance Friendly Society, held at the Infants' Schoolroom, Queen's Road, Buckland, near Portsmouth, Bro. W. Smith, the Grand Treasurer of the district, gave a lecture on wireless telegraphy, demonstrating his explanation with small instruments he had prepared.

"Experto Crede"

By "An Engineer"

A STORY is told of an expert in that exhilarating game for juvenile minds—ping-pong—who was taken to witness a game of lawn tennis. By dint of persistent practice in the table game this gentleman had developed all kinds of fancy strokes, and in his local ping-pong club he had become the admired of all eyes.

He felt absolutely at home while watching the game of tennis. There was the net—a little higher, it was true, than the one over which he was accustomed to send his "teasers," but that was of little importance—there were the balls, the racquets, just as there were in his pet game. In fact, but for a slight difference in rules, it was ping-pong, only on a slightly larger scale; and, as he was an adept in the latter game, he felt he would like to display his prowess on the tennis court. Accordingly he challenged the winner of the game he was watching, and, seizing the vanquished player's racquet, stood ready to meet his opponent.

An Erring Adage

We will draw a veil over the disastrous scene that followed, for the incident has been mentioned only to illustrate an attitude of mind which is not unknown in technical circles. It represents the argument *a fortiori* run wild, and the failure of quite a number of moral precepts widely disseminated, and which are exemplified in the adage: "Look after the pennies, and the pounds will look after themselves." However true such a precept may be, it can only lead to disastrous results if indiscriminately applied. Thus, a woman who was most scrupulously precise in her pin-money accounts would soon find herself at sea if she were suddenly confronted with the complicated financial affairs of a large business. The intelligent amateur who has dabbled all his life in home-made electricity—little motors, dynamos, wireless stations, and so forth—would be lost if he were plunged into a modern power station. Even the real expert finds himself "up against" difficulties of which he knew nought when he entered a larger sphere than that in which he was accustomed to move.

Mr. Duddell, in his interesting presidential address, from which we quote on page 430, lays stress on the advantages of high notes for wireless signals, quoting results of his own on the comparative sensitiveness of the telephone, combined with the ear, to notes of various frequencies. From these laboratory results, no doubt, Mr. Duddell would unhesitatingly decide to equip his wireless station, if he were to design one, with a transmitter giving a note of 900 or thereabouts. Apparently he would be right in doing so. But now comes one of those little details which Mr. Duddell could not be expected to know. Only the vast experience of a company, like the Marconi Company, which has been doing commercial wireless for years in every part of the globe, could tell him that all his advantages, so apparently important and convincing, are counterbalanced by the great disadvantage that the human ear tires more rapidly listening to high notes than to medium notes, a fact that is of great importance for prolonged commercial work.

The writer of the comment in last month's MARCONIGRAPH on the paper therein reproduced on flowing liquid dischargers, remarks:

> "It would be interesting to know how these methods would behave on higher powers, where so many excellent laboratory results behave in an unexpected and disappointing manner."

Impracticable Ideas

There is a good deal of truth in this, which at once forms one of the difficulties and one of the fascinations of wireless research. It also explains why such a vast proportion of the patents taken out yearly in connection with wireless telegraphy come to an obscure and early end.

Argument from the small to the large, from the laboratory to the power-house, from the experimental interchange of signals to the day and night service of the modern Marconi station, is as dangerous and unreliable in wireless as such argument generally is in the affairs of everyday life—or more so. "Experto Crede" is the only trusty motto to follow.

The managing director of the Marconi Company, in his reply, quoted in last month's MARCONIGRAPH, to the Federal Telegraph Company's statements regarding their San Francisco and Honolulu stations, is laying down this same good rule.

> "The long experience," he writes, "which we have had, and the knowledge of the necessities for the conduct of such a service" (commercial service) "calls for a station of a very different construction, and one of which the Federal Company has neither knowledge nor experience."

At a meeting of the Manchester Rotary Club, Mr. James McKeever, of the Northern Wireless Schools, Ltd., delivered a lantern lecture on wireless telegraphy, which was followed by a paper by Mr. A. L. Dugson, showing how he fitted up his private wireless installation. Members of the club were also entertained by listening to actual messages transmitted across the building on a model installation.

The Engineering of Wireless Telegraphy

THE inaugural address of the new President of the Institution of Electrical Engineers, Mr. W. Duddell, F.R.S., covered a wide range, and, unlike many addresses which have been delivered under the auspices of the premier electrical institution, it touched upon telegraphy. Naturally mention was made of the progress in wireless telegraphy, and in recalling the great interest that was awakened when in 1899 Mr. Marconi read his paper on wireless telegraphy before the Institution of Electrical Engineers. Mr. Duddell said :

" Since that date we have had a number of papers dealing with different parts of the apparatus, but we have not had a general review of the subject. The principles are well known. At the transmitting end we require to produce in the aerial conductor high-frequence currents of considerable power and of one definite frequency and to radiate the energy. At the receiver we wish to absorb the radiant energy, and to convert the high-frequency current in the aerial into audible or visible signals. The exact mechanism of the means of transmission between the two aerials is at the present moment under discussion, and opinions differ as to how far waves through the air, waves through the earth, and waves on the surface of the earth take part in the transmission. The matter has been very ably expounded in a paper by Professor Fleming, which was discussed at the last meeting of the British Association. The general conclusion seems to be that Hertzian waves propagated through the atmosphere are sufficient to explain transmission over short distances, but when we come to consider the observed bending of the radiation around the curvature of the earth, it is necessary to take into account the fact that the earth is far from being a perfect conductor, that the upper layers of the atmosphere are far from being insulating, and also the effect of sunlight on the conductivity of these upper layers. It must be remembered that the waves are being regularly transmitted round one-eighth of the earth's surface, and that Mr. Marconi has received signals over 6,000 miles; that is, round one earth quadrant."

Mr. W. Duddell, F.R.S.

Turning from theory to practice, Mr. Duddell said :

" The engineering problems which confront us at the transmitting end are the design and support of the aerial conductor, the machinery to produce in it high-frequency currents of one definite frequency and of considerable power, and the mechanism for cutting up the high-frequency currents to form the dots and dashes of the Morse code. The changes that have taken place in the design of the aerial have been mainly in two directions—the one to make it more suitable for the longer wave-lengths now in use, and the other to give the aerial such a shape that the radiation may be much stronger in one direction than in any other. The first desideratum is obtained by extending the height of the aerial and by increasing the capacity of the condenser formed by the upper part and the earth. The Eiffel Tower aerial, which consists of an inverted fan of six wires 300 metres high, and the Nauen aerial [destroyed by a gale, 1912] in the form of an umbrella and 200 metres high, are examples.

" Of the directive aerials, the Marconi type, consisting of a comparatively short vertical part and a much longer horizontal part, is the only one that has come into use for long distances. As an example, the aerials proposed by the Imperial Wireless Scheme are to be 300 ft. high, and apparently some two or three thousand feet long, supported by ten steel masts. The design of an inexpensive form of mast to carry the aerial is a difficult engineering problem.

" The forms favoured at the moment are

sectional tubes and lattice-girder constructions supported by stays.

"The type of generating plant depends upon the system employed, and here it is necessary to distinguish between the two forms which the high-frequency currency in the aerial may take.

"In the first form the amplitude of the high-frequency current in the aerial starts at zero, rises rapidly to a maximum value, and then dies away again. In the second form the current is of constant amplitude exactly similar to that produced by an alternator. Considering the first and older form, the oscillations are produced by the sudden discharge of a condenser through a small self-induction. If the condenser be charged by means of an alternator, in general one discharge will be obtained across the spark-gap with the corresponding train of oscillations during each half-period, thus the number of trains of oscillation per second is equal to twice* the alternator frequency.

"If we have a given amount of energy to transform per second, the higher the spark frequency the less the energy to be dealt with at each spark. Further, for a given size of condenser, the less the energy the less the voltage to which it will have to be charged. Hence, there are certain advantages in the high-spark frequency, and a further advantage will appear when we consider the receiver.

"The spark frequency has gradually increased from 10 to 20 per second with the induction coil to 100 to 200 per second, corresponding to commercial alternating-supply currents, up to 1,000 to 1,200 obtained from special designs of alternators.

"A method much in use for obtaining a high-spark frequency from an ordinary, say, 50-frequency supply is to employ a rotating spark-gap or discharger. The apparatus consists essentially of a number of revolving electrodes, which in turn come between the fixed electrodes of the spark-gap and cause discharges to take place, shortening the sparking distance. The number and speed of the revolving electrodes is so chosen as to give the required spark frequency. If such a discharger is used in connection with a continuous current, as is done at Clifden, one discharge is obtained each time the electrode or stud passes between the fixed electrodes of the gap. In the case, however, of an alternating-current supply the matter is a little more complicated, because the potential of the condenser varies according to the different parts of the wave-form at which the discharger causes the spark to take place.

"One great advantage of the revolving type of discharger over the older fixed gap is that the windage on the electrodes keeps them cool and blows away the conducting gases formed at each discharge, so that the gap rapidly passes from the conducting into the insulating condition. This is a matter of great importance, for if the gap did not rapidly recover its insulating properties an arc would be formed which would prevent the condenser being fully charged again."

Reception of Signals

Mr. Duddell later dealt with the actual manipulation of the signals, and then with the question of receiving. He said:

"The engineering difficulties which confront us in keying are really questions of switching on and off considerable powers a great many times per second with perfect certainty and definiteness in the contacts. In the early stations for a kilowatt or so the ordinary Morse key connected in the primary circuit of the transformer sufficed, but as the power got larger different types of relays were introduced. Some of these relays operated by interrupting the primary current, some the secondary current of the step-up transformer. In continuous wave systems on the arc method keying is sometimes carried out by altering the frequency by switching in and out self induction or capacity in one of the circuits. This has the advantage that the whole power is not interrupted, and it also keeps the load on the arc generator more constant, which tends to improve its steadiness. With alternators it is obvious that keying can be done in the field circuit, but with these machines another difficulty arises. When the load is thrown on and off the alternator there is naturally a tendency for the speed to fall and rise. If the speed varies the frequency and hence the wave-length of the radiation alters; this interferes with the tuning.

"Turning to the receiver, the changes that have been made are not so striking. The coherer has become practically obsolete. The magnetic detector which replaced the coherer about ten years ago still holds its own, although it is not very sensitive. Its reliability in action and the fact that it is almost fool-proof are for many purposes convincing arguments in its favour.

"The electrolytic detector has been but little used in this country. The Fleming valve and the crystal detector have come into considerable use. They are both highly

* This number can be varied by suitable adjustment, and several sparks may be obtained per half-period, or conversely a number of half-periods may elapse between the successive sparks.

sensitive and depend upon the curious properties in the one case of the residual gas of the electric lamp bulb, and in the other case on the contact between two minerals. The property which makes them useful as detectors is in each case their unilateral conductivity. The high-frequency currents induced in the receiving aerial by the incoming waves are not generally sufficiently strong to affect any of our ordinary alternating current measuring instruments. If, however, they can be rectified and converted into continuous currents, then it is easy to detect them, for it is common knowledge that the direct-current measuring instruments are in general hundreds, if not thousands, of times more sensitive than alternating-current ones.

"Corresponding to each spark at the transmitter a train of oscillations is received, and these trains of oscillations are rectified by the detector, and in general are passed through a telephone as an indicator. At each spark a click is heard in the telephone, so that with 600 sparks a second the diaphragm is attracted 600 times, producing a somewhat musical note.

"Herein lies one of the great advantages of high-spark frequency. There seems no doubt that the combination of the human ear and a telephone is much more sensitive for high-frequency notes than for low ones. In some tests I have made, using an alternating current to determine the minimum power required to produce an audible signal in a telephone receiver at different frequencies, I found in one case that the power was reduced from 430 micro-microwatts at 300 frequency to 7·7 micro-microwatts at 900 frequency. At higher frequencies it increased again.

"Due to atmospheric causes, there are generally audible in the telephone receiver clicks and noises commonly spoken of as atmospherics or strays. With high-spark frequencies the human ear easily distinguishes the musical note from these atmospherics; this enables the operators to read through a large amount of extraneous interference. The elimination or compensation of these atmospherics is one of the most important outstanding problems in wireless telegraphy."

Directive Wireless Telegraphy

A PAPER by Mr. F. Addey on "Directive Wireless Telegraphy" was read before the Institution of Post Office Electrical Engineers on December 9th, 1912.

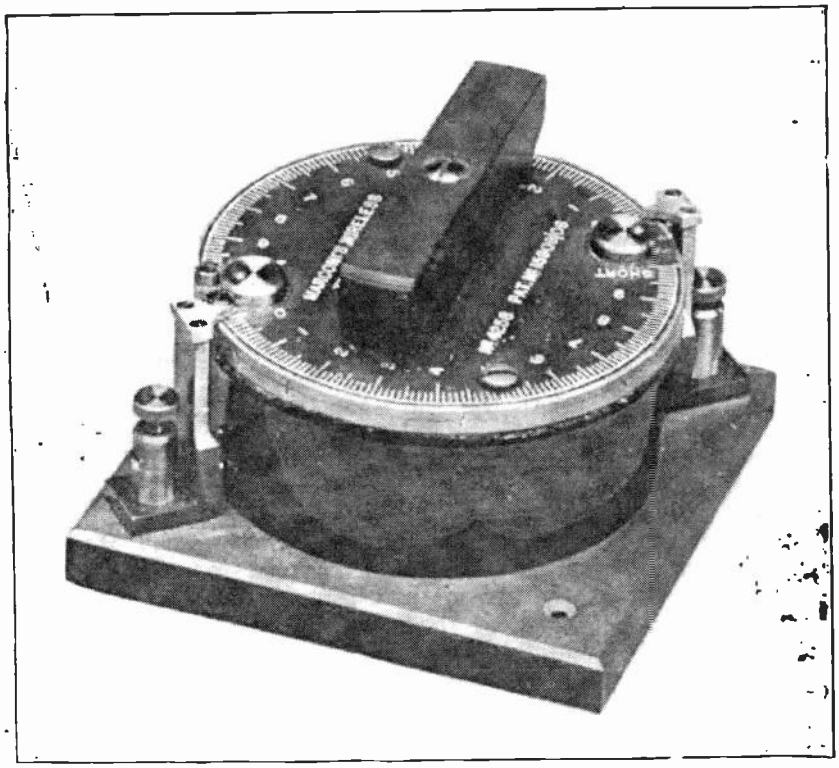
He pointed out that at an ordinary wireless telegraph station the signals were radiated equally in all directions, and that, of course, for many purposes this was advantageous. In certain circumstances it was very desirable, however, to be able to restrict the signals sent out from a station to a definite line, and to receive signals only when they came from a definite direction. For instance, by directing the emitted waves in this manner, interference with stations lying off the line was avoided and energy was saved which would otherwise be wasted. At a receiving station a directive arrangement greatly reduced trouble due to interference from other stations and from atmospheric discharges. He pointed out that the simplest use of a directive aerial was to increase the range of a station in a certain direction. The large Transatlantic Marconi stations were provided with directive inverted L aerials, because they always worked in the same direction.

A most important application of directive systems was to enable ships to obtain the bearings of wireless stations on shore. When a ship was navigating within sight of shore her exact position was ascertained by the process known as "cross-bearings," and Mr. Marconi, in 1906, patented an arrangement for attaining this end. A number of inverted L aerials radiating at equal angular distances from a point were erected on the shore. By means of a switch the receiving apparatus could be joined to any one of these aerials. By ascertaining on which aerial the maximum strength of signals was received from a ship the direction of the ship was determined. The necessity of using a number of aerials could be avoided by building a single directive aerial in such a way that it could be rotated so as to radiate or receive along any required direction. There were obvious disadvantages in such a method, and Bellini and Tosi had devised a very ingenious arrangement by which a resultant aerial could be rotated while the actual aerial system remained fixed.

The method by which the ship could obtain her bearings without the co-operation of an operator on shore, that, namely, in which the ship was fitted with a directive installation to ascertain the direction of a non-directive installation on the shore, had been developed by the Marconi Company, and was known as the Marconi wireless compass. In this system a modification of the Bellini-Tosi system was used, the opposite halves of each directive aerial being joined together at the top.

Exhibition of Scientific Apparatus

THERE was a comprehensive display of electrical, optical, and other physical apparatus at the eighth annual exhibition of the Physical Society of London, which was held at the Imperial College of Science and Technology, on December 17th, 1912. The Exhibition, which was contributed to by over 30 of the leading firms, attracted a good attendance. The lecturer on this occasion was Mr. S. G. Brown, who delivered a discourse on "Some Methods of Magnifying Feeble Signalling Currents." As is well known, Mr. Brown is chiefly concerned with relays for telegraphic work, and he dealt with the problem of converting the indications of extremely feeble signalling currents at the end of a submarine cable into useful signals.



Disc Condenser

One of the exhibits which attracted considerable notice was that of Marconi's Wireless Telegraph Company, who showed as wide a variety of apparatus as the limited space allowed. The exhibit which perhaps attracted most attention was the wireless compass, which is an instrument for use with a directive aerial system, either for locating the direction of a wireless station or for directive signalling. As the compass has already formed the subject of two articles in THE MARCONIGRAPH, it is unnecessary to add anything on the present occasion. Next in interest came the Universal Crystal Receiver, which is designed to work with a crystal of the low-resistance type over a range of wave-lengths of 300 to 3,000 metres. The secondary and primary windings of the coupling inductances are each wound in three portions, which are connected in series for long wave-lengths. Adjustable condensers are provided for tuning the aerial and detector circuits. The crystal is protected by a screening box, and is automatically cut out of circuit when transmitting by means of small relays in the instrument.

The knapsack transmitting and receiving set served to demonstrate the possibility of communicating up to 15 miles. This portable outfit consists of a light telescopic aluminium mast, with aerial wire and earth net, a portable battery of dry cells or accumulators, a box for the transmitting, and another for the receiving apparatus. The latter is an inductively coupled circuit with tuning condenser and crystal detector.

Other apparatus exhibited was an improved pattern of the well-known adjustable ebonite disc condenser, the contacts being enclosed in the case; an instrument for measuring the decrement of an oscillatory circuit, which could also be used for measuring wave-lengths, coupling capacity, self and mutual inductance. In the pattern exhibited the decrement was determined by a thermo junction and low-resistance galvanometer. There is little to be said about the valve receiver, or the adjustable air condenser. The latter instrument has been

designed to give the largest possible capacity for a given size.

The principal instrument on the stand of Messrs. Nalder Brothers & Thompson, Ltd., was that for measuring the insulation resistance and the leakage current flowing from the mains of single-phase or three-phase systems. The apparatus has been designed for use either on high or low tension circuits.

Some excellent types of unipivot instruments were exhibited by Mr. Robert W. Paul, and the working parts and constructional details of several types of instruments were open to inspection.

A new D.C. testing set was a feature of Messrs. Crompton & Co.'s stand. This instrument consists of one moving coil indicator, arranged so that it can be used either as an ammeter or voltmeter. The ranges available are from 0-75 millivolts to 0-600 volts, and 0-15 milliampères to 0-150 ampères, or further if desired. Other instruments on this stand were several types of round and sector moving coil and moving iron instruments for switchboard use, and a standard Crompton potentiometer with galvanometer and standard resistances.

Trans-Pacific Wireless Telegraphy

THERE has been some correspondence in *The Electrician* on the above subject. A letter from Dr. Lee de Forest raised a comparison between the efficiencies of the spark and arc methods of generating oscillations, and this brought from Dr. W. H. Eccles a reply, of which the following is an abstract:

"The position at present is somewhat as follows: The most trustworthy researches on the arc show that the over-all efficiency of transfer of energy reckoned between direct-current supply and antenna is less than 25 per cent. All these measurements have been made on arcs of much lower power than the new ones of the Federal Company. Now it is known that if the power supplied to the arc be raised by increasing the direct current, the representative point on the volt-ampere characteristic of the arc passes into less steep portions of the negative characteristic, and the oscillations get relatively feebler. Moreover, there are good physical reasons for supposing that the voltage across the oscillating arc must be kept below a rather low limit. Thus, so far as present-day science goes, the overall efficiency of the arc decreases as its power is increased. If this deduction from the common knowledge of the small Poulsen arc is not correct, it is to be hoped on scientific grounds that the Federal Company will permit some accurate scientific knowledge of their enormous arcs to be gathered and published. For it has obviously become financially impossible for private investigators, like myself, to follow this matter up in our own laboratories.

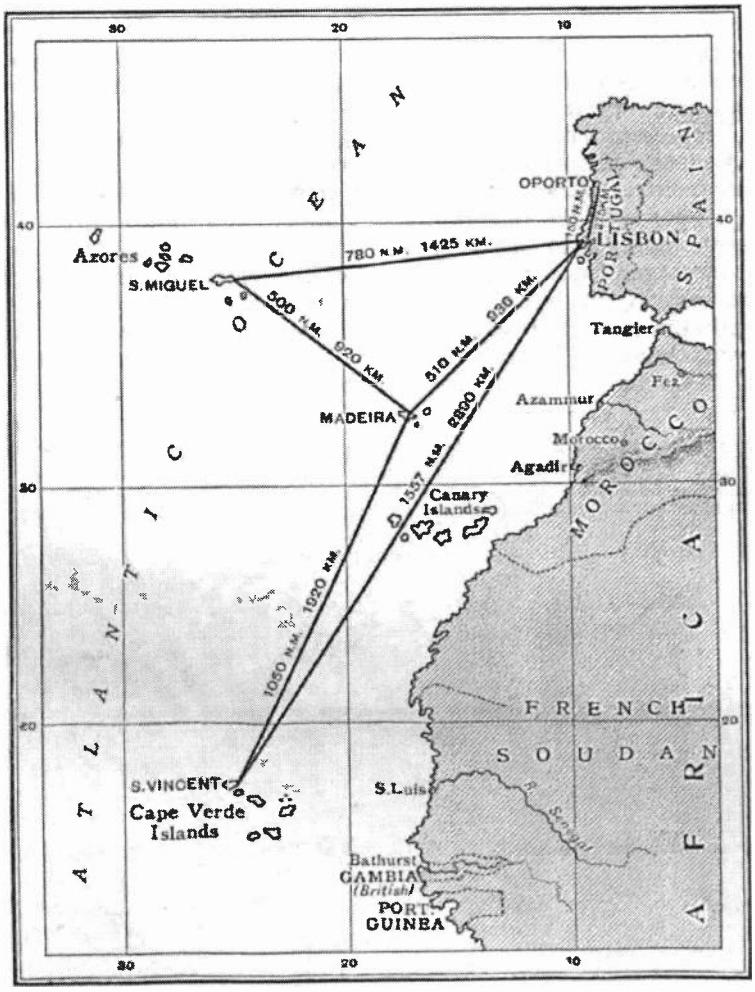
"As for the spark method of generating oscillations, we find that the modern short-gap methods, such as the Telefunken and the Marconi rotating discharger, have indisputably high efficiency. For example, the published measurements by Mr. A. J. Makower and myself show an overall efficiency of 50 per cent. with small plant on direct current, and it appears likely that this figure may be exceeded on large plants with alternating current. In fact, the Telefunken engineers and others took strong exception, it may be remembered, to our 50 per cent., as being much lower than their own measurements on larger plant. Possibly, an unbiassed judge would decide that the short-gap methods have an efficiency of over 60 per cent., and would remark that there is no known physical reason for a smaller figure arising at high powers.

"Summarising, in the present state of knowledge we are driven to conclude that the arc method transforms at most 25 per cent. of the electrical energy supplied into useful electrical oscillations, and at least 75 per cent. into local heat, while the modern spark transforms about 60 per cent. into oscillations, and 40 per cent. into heat. And it is probable, indeed practically certain, that these estimates err in favour of the arc. From all this we have to conclude that at stations radiating energy at equal rates the arc station generates twice as much local wasteful heat as the spark station.

"It is apparent, I hope, from this plain statement of known facts, that if the energetic directors of the American Poulsen interests wish to gain the sympathy of scientific engineers and investigators (and that they do is proved, Sir, by their addressing you) they ought to give us solid scientific measurement instead of unconvincing declamation."

Wireless Telegraphy in Portugal

THE contract for the erection of a number of wireless telegraph stations for the Portuguese Government was signed on December 7th by the Minister of Public Works, Francisco Jose F. Costa, and the Marquis L. Solari, representing Marconi's Wireless Telegraph Company of London. With the definite ratification of this contract, reference to which was made as far back as the April, 1912, number of the MARCONIGRAPH, Portugal will rank with other nations of the world enjoying the benefits of a wireless telegraph system. Such a possession must eventually become essential to any great maritime trading community, and the decision of the Portuguese Government to proceed immediately with the scheme is a welcome sign of a renaissance of Portugal's commercial greatness, for which we can find a parallel in the sixteenth century, when the influx of wealth furnished the economic basis for a sudden development of literary and artistic activity and culture.



Marconi Stations to be Erected for the Portuguese Government

Five stations in all will be erected. One of these will be in the Azores Archipelago, which lies due west of the Portuguese coast, a third of the way across the Atlantic towards America. Madeira, which lies to the south-west of the mainland, will be brought into radio-telegraphic communication with Lisbon, and much further away, within the tropics, and also in the Atlantic Ocean, is the Cape Verde Archipelago, on one of whose small islands the Government have decided to erect a station also. Each of these stations will be in direct communication with the station to be built at Lisbon. The fifth station will be at Oporto, and it will have a range of 500 kilometres. The Lisbon and Cape Verde stations will each have a range of 3,000 kilometres, Madeira, 1,900 kilometres, and the station on the Azores Island, 1,600 kilometres.

As will be seen from the map, this contract is of very great importance for the future development of wireless telegraphy between America and Europe, and West Africa, and for ships crossing the Atlantic. It is also a link in the chain of wireless stations between Brazil and Portugal, North America, England, and Portugal, and between Lisbon and all the Spanish, Italian, and English Marconi stations already open to public service. The geographical position of the station on the Cape Verde Islands will facilitate the development of a wireless service between Europe and South - West Africa.

The Madeira and Cape Verde stations will be of inestimable value to liners and other large ships proceeding from Europe to South Africa or to South America, and as about nine-tenths of the vessels on these routes fitted with wireless telegraphy are controlled by the Marconi Company or its associated companies, it will be seen that the traffic passing through these stations will be very great.

It should be mentioned that the Marconi system has been adopted by the Portuguese navy, and that many of the merchant ships are also fitted.

The Marconi Headquarters in Italy

And some Contracts

THE Marconi sphere of influence is limitless and its potency not to be gainsaid, for wherever civilisation has concentrated to form a centre of industry—a nerve centre, receiving intelligence from, and controlling the affairs of this mighty earth—there the Marconi organisation has its representatives, in order that it may furnish a means of communication between centre and centre. The simile is surely not *mal-apropos*, for wireless telegraphy is to this planet what the nerve is to the body—a means of flashing messages from quarter to quarter so swiftly, so unerringly, that the parts are able to take immediate action in response to the message received. Madrid, Paris, New York, Brussels, St. Petersburg, Hong Kong, Montreal, Melbourne, and Valparaiso—in all these cities, and many more besides, the Marconi interest is represented. Especially influential is the Rome office; but while in most of the foregoing cases Marconi wireless telegraphy is represented by affiliated companies, the Rome office is a branch of Marconi's Wireless Telegraph Company, Ltd., of London, ably represented by the Marquis L. Solari.

Many and important have been the contracts which it has carried out with the Italian Government. A detailed list would be wearisome to the reader, but mention must be made of a few of the more important transactions.

The highest power station that Italy possesses was erected at Coltano for the Ministry

The Headquarters of the Marconi Company in Italy, occupying the whole of the second floor.

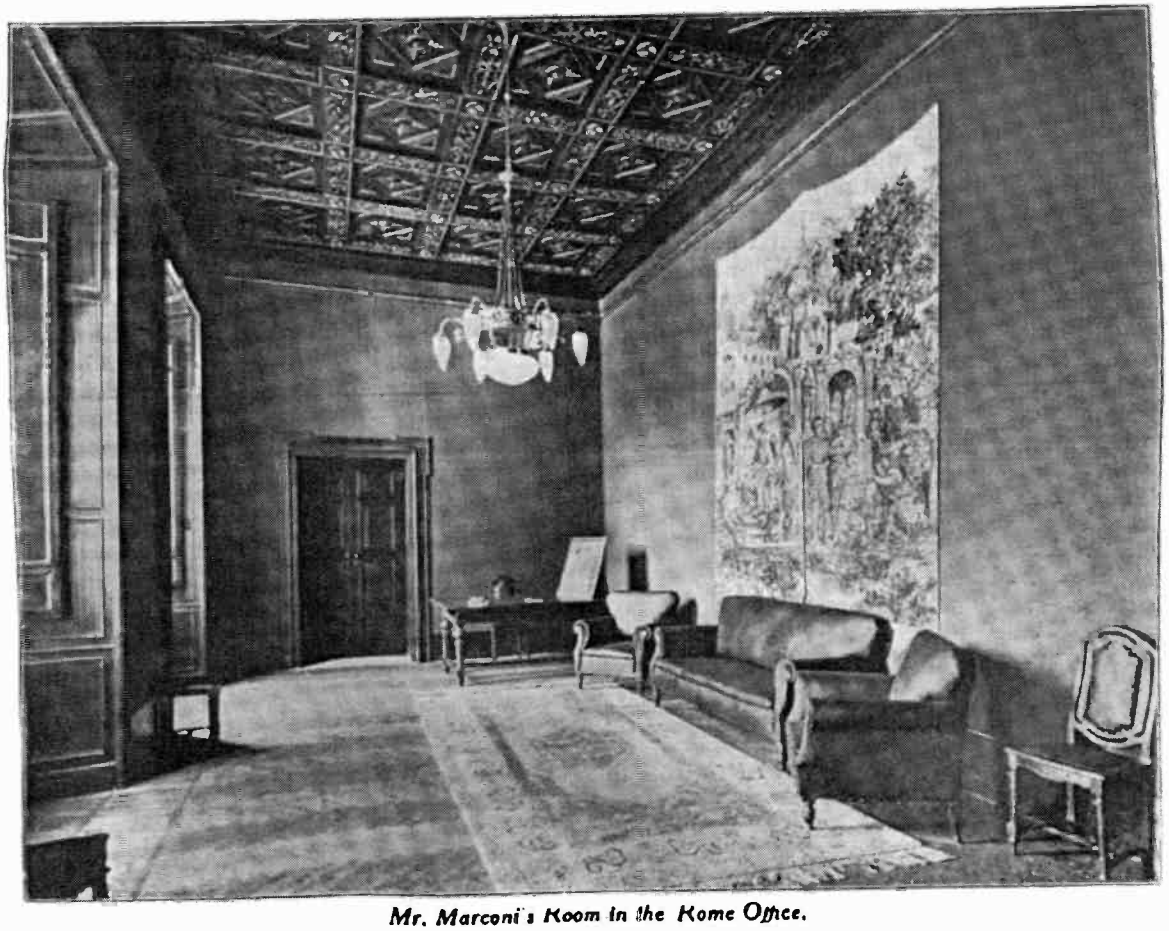
of Posts and Telegraphs. This station is capable of transmitting and receiving messages to and from ten thousand miles or more. Its available power is ten thousand kilowatts, and messages can be transmitted to Canada and America with the utmost ease. On the opening of the station the Minister of Posts and Telegraphs forwarded the following telegram to Mr. Marconi, in response to one received from him telling the Minister of the successful completion of the work:

"I thank you for your kind telegram, which I will make a point of communicating to-day to my colleagues of the Cabinet. The information that Coltano is now able to transmit to and receive from your English and Canadian stations will be much appreciated by my colleagues, as well as by the whole country. The trans-oceanic radiotelegraphic communication by means of the new high-power station will add to the triumph of your genius, and is a new instrument of civilisation and glory to the country."

Another station is at Bari, which is open to public service with the Balkan States, and three more have been erected at Naples, Cagliari, and Palermo, and these are open to public service amongst themselves, or can be used for communicating with ships at sea.

For the Ministry of Marine the Marconi Rome office have built a high-power station just outside the Italian capital, at Centocelle.

Other stations erected for this department of the Italian Government, for the purpose of marine communication, have been built at Capo Mele, Capo Sperone, Forte Spuria, Isola Chiesa (Maddalena), Monte Cappuccini (Ancona), Palmeria, Santa Maria di Leuca, Taranto Venezia, and Viesti.



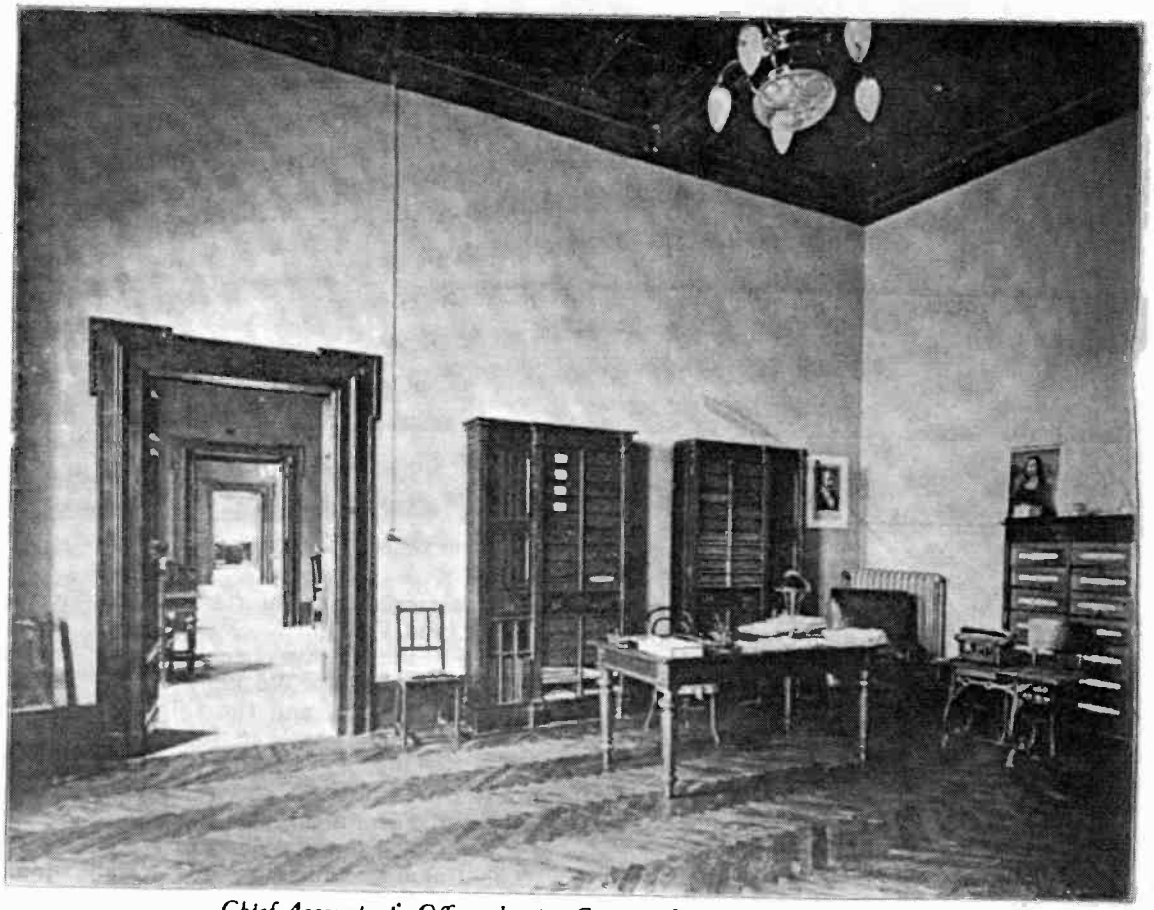
Mr. Marconi's Room in the Rome Office.

Three stations have been supplied for the Ministry of Public Works—one at Messina, another at Reggio, and the third at Villa San Giovanni—and have been found of great service in establishing adequate control over the important ferry-boat service which connects Sicily and the numerous islands of the Mediterranean with the mainland of Italy.

The Colonial Office has also from time to time given instructions for the erection of important stations in various districts of the

Italian colonies, and in no Government department has wireless telegraphy been found of greater use than in connection with the Colonial service. Italy has three Colonies—Eritrea, Benadir (or Italian Somaliland), and Libya, which consists of Tripoli and Cyrenaica. Eritrea is situated on the African coast of the Red Sea, and is bounded inland by the Anglo-Egyptian Soudan. The capital of the colony is Massawa, and here a high-power station has been erected which communicates with Coltano, in Italy, and Mogadiscio, in Somaliland. From this it would be gathered—and rightly—that Mogadiscio is supplied with a high-power station. But Italian Somaliland is well equipped with this means of communication, for stations have been erected in six of its more important towns—viz.: Bardera, Brava, Giumbo, Italia, Lugh, and Merka, while Mogadiscio is further supplied with means of ship and shore communication.

In no department of the service is the re-awakening of Italy more apparent than in the navy, and in witness of this the following facts are interesting. In 1900 there were eight first-class battleships, three armoured cruisers, four protected cruisers, and nine for foreign stations, while the fleet of torpedo-boats and destroyers was entirely out of date. To-day Italy possesses eleven first-class battleships, four Dreadnoughts (with two more nearing completion), ten armoured cruisers, a fleet of twenty-three destroyers, fifty-eight torpedo-boats, and twenty submarines. Nearly all of these vessels are fitted with wireless telegraphy, which has been installed by the Marconi Rome office, as the following list of equipments sufficiently demonstrates: Agordat, Alpine, Amalfi, Americo Vespucci, Ammiraglio Saint Bon, Andra Doria, Aquilone, Aretusa, Artigliere, Benedetto Brin, Bersagliere, Borea, Bronte, Calabria, Carabiniere, Carlo Alberto, Coatit, Corazziere, Dandolo, Dardo, Elba, Emanuele Filiberto, Espero, Etna, Etruria, Euro, Flavio Gioja, Francesco Ferruccio, Freccia, Fuciliere, Fulmine, Garibaldino, Giovanni Bausan, Giuseppe Garibaldi, Goito, Governolo, Granatiere, Iride, Italia, Lampo, Lanciere, Lepanto, Liguria, Lombardia, Marco Antonio Colonna, Marco Polo, Minerva, Napoli, Membo, Ostro, Partenope, Piemonte, Pisa, Pontiere, Puglia, Regina Elena, Regina Margherita, Re Umberto, Roma, Sardegna.



Chief Accountant's Office, showing Corridor leading to General Offices.

Sicilia, Straffetta, Sterope, Strale, S. Giorgio, S. Marco, Trinacria, Tripoli, Turbine, Urania, Varese, Vittor Pisani, Vittorio Emanuele, Volta, Volturno, Vulcano, and Zefiro.

For the Ministry of War the Rome Office has supplied all the wireless stations, both fixed and portable, used by the Italian Army in Italy and her Colonies.

But the Government is not alone in recognising the efficacy of the Marconi system. All the important Italian steamship companies have entered into special agreements with the Marconi Company. They are: Navigazione Generale Italiana, La Veloce, Italia, Lloyd Italiano, Lloyd Sabaudo, Ligure Brasiliana and Sicula Americana, and it goes without saying that all the ships of these companies are fitted with Marconi apparatus.

The head offices of the company are, of course, established in the Italian metropolis, but Marconi's Wireless Telegraph Company have important workshops at Genoa, where wireless apparatus is constructed and repaired, and, if necessary, fitted on merchant ships which touch at this, the most important of Italian ports. At Genoa there is also a depôt for the inspection of Marconi ship stations.

The Marconi Rome Office is divided into four departments, each of which attends to a particular branch of the complex affairs of Marconi's Wireless Telegraph Co., Ltd. First, there is the Secretary's Department, which, besides carrying on all necessary negotiations with the Italian Government, or any of the foreign States who transact business through the Italian branch, carries on scientific investigation with regard to its development, and undertakes all business connected with the registration of payments.

The Technical Department, as its name implies, regulates everything that comes within the cognisance of the engineer; and there is besides an Accounting Department and Traffic Department — two indispensable branches of any well regulated house.

At the present moment, however, the congratulatory air is prevalent in all departments, for the whole office has just been transferred to new quarters on the second floor of the monumental palace of the Prince of Venosa in the Corso Umberto Primo.

This palace was built about the end of the eighteenth century from the design of the famous Italian architect, Alessandro Specchi, whose most important work was the construction of the Ripetta Bridge on the Tiber, which, however, is no longer in existence. It is one of the most important buildings of the Corso—the Bond Street of Rome—and, although belonging to one of the decadent periods in Italian architecture, it possesses none of the meritricious ornament which is typical of such buildings, but has a simplicity of outline and a quiet dignity which makes it an outstanding feature in this pathway of palaces. It was originally built for the De Carolia family, from whom it passed to the Simonetti family, and was afterwards purchased by the Prince of Venosa, who only recently sold it to the Banco di Roma.

The new owners immediately took in hand the task of converting the building into luxurious offices, fitted with all modern conveniences, and the Banco di Roma was installed in its new premises in January, 1912. Soon afterwards, as the result of negotiations between the Banco di Roma and the Marconi Company, it was arranged that the Marconi Rome Office should be installed in the second floor of the palace. In August last all arrangements were completed, and the Rome Office took possession of the apartments overlooking the Corso Umberto, which were the rooms formerly set apart for the exclusive use of the Prince of Venosa.

They consist of five large halls and ten rooms; the first is a waiting room, which opens on to the fine marble staircase. Adjoining this is a large hall, decorated in the renaissance style, with panels of green damask. Another hall is known as Mr. Marconi's room, and is reserved for the exclusive use of the great inventor. It is also renaissance in style, but is hung with Italian tapestry, beautiful and old. Similar to this is the Marquis Solari's private office, while the other two halls are used by the Technical and Accounting Departments, and the remaining rooms by the Traffic Department and various members of the staff. Throughout the apartments the flooring is of fine teak wood, and the ceilings of carved oak, with deep-set gilt panels.

A lecture on "Radio-Telegraphy" was given by Mr. J. Ewen, M.B.A.A., before the Edinburgh Association of Science and Arts, on December 16th. The lecturer showed that wireless telegraphy was simply the development of the electrical researches made by Faraday, Hertz, and Clerk Maxwell. The credit of having turned these to practical account in this direction unquestionably belonged, he said, to Marconi, whose genius and indomitable perseverance had overcome innumerable difficulties. The wonderful devices for improving his instruments had been the marvel of the scientists. Notably, his skill had been shown in overcoming the prismatic effect of the sun's light on the electric waves.

The Gulf of Labrador Wireless System

By Harold Dunn

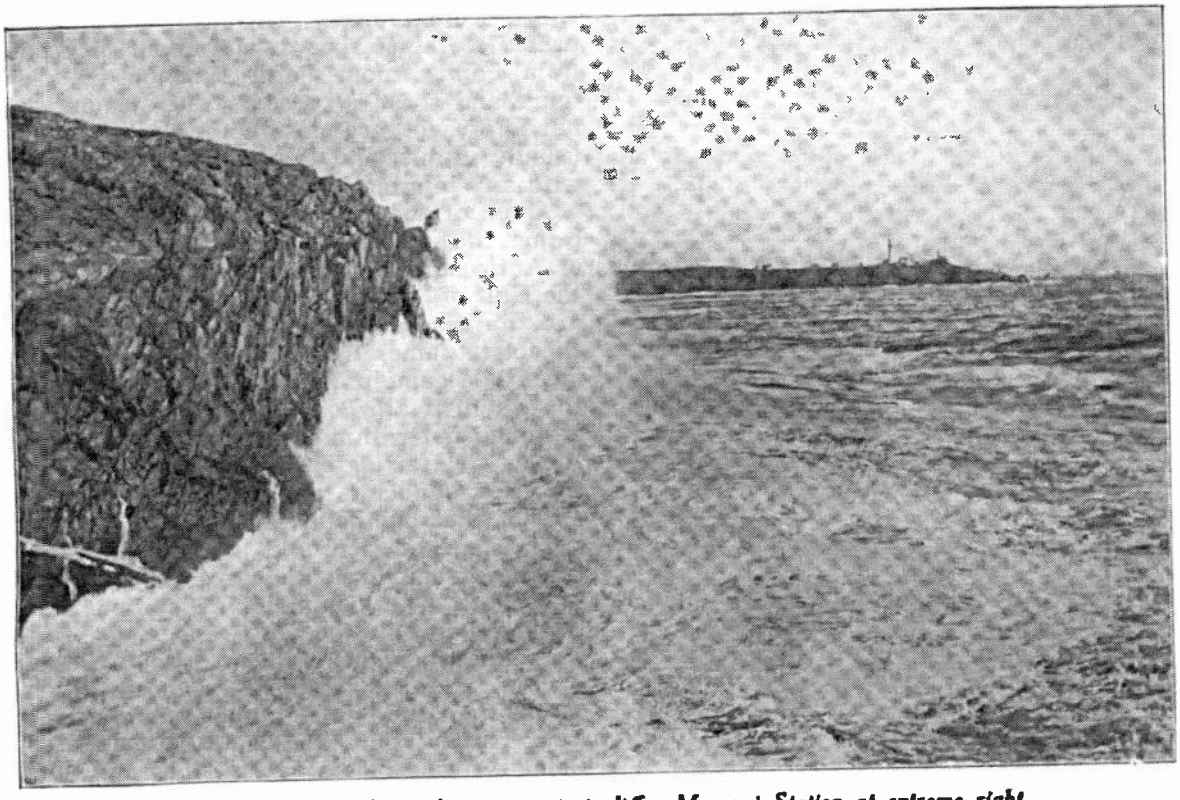
AMONG the various North Atlantic routes that which is known as the " Belle Isle " or " Gulf " route is becoming increasingly popular. This waterway connects the forts of Quebec and Montreal with those of Great Britain, and indeed with other European ports, for the tide of travel is an ever-growing one, and the development of commerce has resulted in the passage of a large number of cargo vessels along this route.

Those who are fortunate enough to make a trip across the North Atlantic during the dog days of August or September will find the Belle Isle - St. Lawrence route full of interest. Shortly before sighting land, and almost at the same time as a vessel comes within range of the Belle Isle wireless station, formidable-looking icebergs will appear on the horizon. It is then that minute care and skill must be exercised in the navigation of the vessel, and one is grateful to the foresight of the Canadian Government, who have provided means for depriving this hazardous route of many of its terrors. On the Atlantic coast of Canada, lighthouses using oil-vapour burners, diaphone fog-alarms, and last, but by no means least, wireless telegraph stations have been installed. The Canadian Government have from the first appreciated the possibilities of wireless telegraphy, and over a decade ago granted to Mr. Marconi a subsidy of $80,000 towards the equipment of a trans-atlantic station at Glace Bay.

Immediately on getting into touch with Belle Isle the captain makes use of wireless to ascertain the condition of the weather and the number of icebergs in the neighbourhood.

If the passengers are fortunate enough to pass Belle Isle in daylight and in the absence of fog, their attention will probably be attracted, on glancing over the starboard rail of the steamer, by the lighthouse and, immediately beside it, the Marconi mast. This lighthouse and Marconi station are erected on the highest land at the south-east end of the island, and about 360 feet above sea-level, making the top of the mast considerably over 500 feet above the sea. Another lighthouse is placed on the side of the hill, close to the sea, the reason for this being that fog often collects on the upper part of the island while the weather below is

Landing material at Point A. Maurier for Station now removed to Harrington

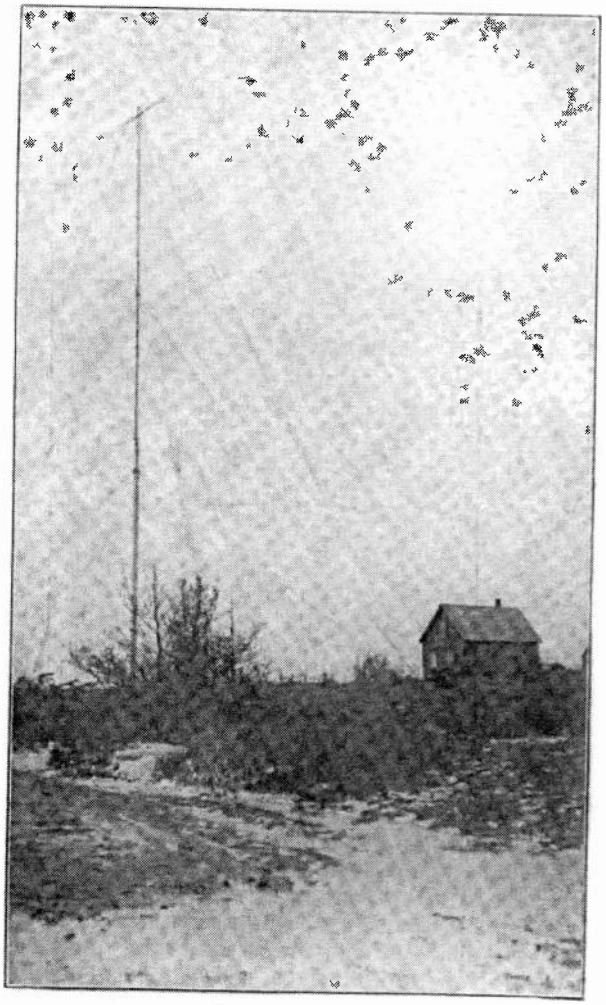


Cape Race : rough sea beating against cliff. Marconi Station at extreme right

quite clear. According to my experience, Belle Isle is most inaptly named, for the island is certainly not beautiful, and when the wind blows a gale—which, at the top of the hill, is very frequent—and the damp fog is also included, the place is very dreary for the lightkeeper and operators. Wireless is the only means of communication except when the Government steamers call to supply the lighthouse and Marconi station and bring mails. Belle Isle is really part of Labrador, and to the south of the island the Newfoundland coast can be seen about fifteen miles off, the nearest point being Cape Bauld, on which the Newfoundland Government have a lighthouse. On the north-east point of Belle Isle there is another lighthouse, and about ten miles to the north-west of this Battle Harbour is situated, where is erected the first of a chain of wireless stations along the Labrador coast, owned by the Newfoundland Government and operated under contract by the Marconi Company, and connected with the chain of stations through the Straits of Belle Isle and Gulf of St. Lawrence, which stations are owned by the Canadian Government and operated by the Marconi Company.

The Labrador coast stations have been erected for the benefit of the Newfoundland fishermen, who go north in large numbers every year, thus enabling them to communicate with each other during the fortnightly periods of waiting for the mail steamers in summer time. They are also used by merchants in various parts of Newfoundland to communicate with their agents on the Labrador coast, there being no other telegraph available. The stations extend some 300 miles along the Labrador coast north from Battle Harbour, and are nine in number—namely, Battle Harbour, Venison Island, American Tickle, Domino, Grady, Indian Harbour, Holton, Cape Harrison and Mokkovik.

To return to our trip through the Straits of Belle Isle ; after passing the island we enter the Straits which divide the Labrador and Newfoundland coasts, and a steam of some sixty-five miles brings us to Point Amour, where there is another wireless station in addition to a lighthouse. Point Amour is on the Labrador coast, and on the opposite side of the Straits Flowers Island lighthouse can easily be seen if the weather be clear, the distance across being only nine miles. This is the narrowest part of the Straits, and is in all probability the least safe portion of the route in thick weather. A peculiarity of the fog in the Straits of Belle Isle, and also in the Gulf of St. Lawrence, is that it hangs in banks, and it is in connection with these fog banks



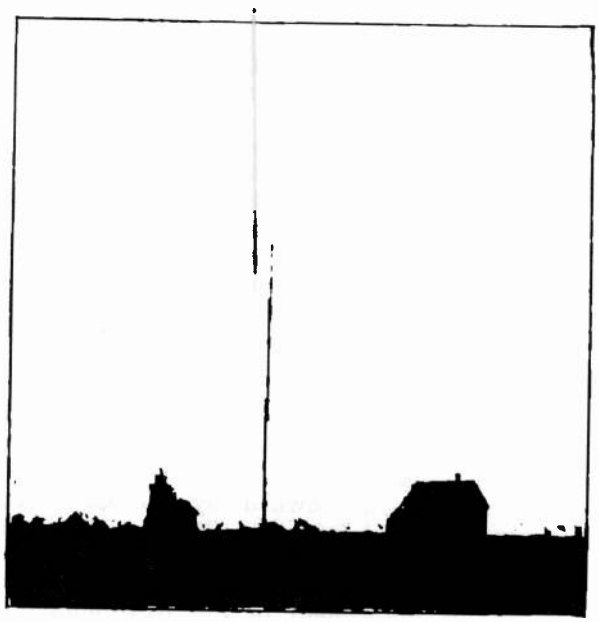
Cape Bear Station

that the "wireless" is particularly useful as an aid to navigation. It is possible for a steamer to be at one moment in the densest fog and at the next to be in brilliantly clear weather. It frequently occurs that a steamer may be approaching Point Amour and run into a fog bank when but a short distance from this narrow part of the Straits. The Captain will send a message to the station asking for a report of the weather. Should the reply give him "clear weather" at Point Amour, he will know that it is safe for him to proceed, as he is only in a small fog bank and will get out of it before running the risk of going ashore. Had he not the means of obtaining this information he might probably be very considerably delayed, as would, of course, be the case if the fog were general. Again, icebergs frequently drift south as far as Point Amour, and notifications of such menaces to shipping, which can be given by the wireless station, are of the greatest value.

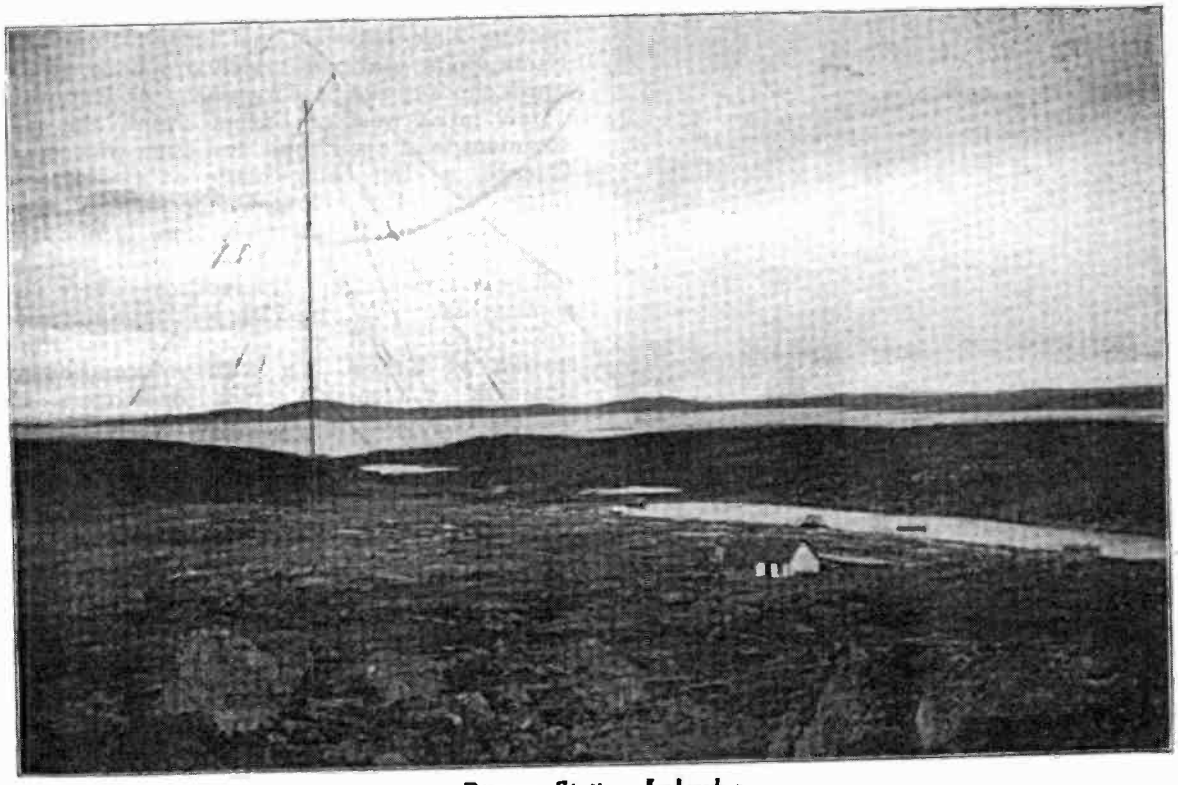
Proceeding further, Greenly Island light is passed to the starboard, and about fifty miles from Point Amour Point Rich on the Newfoundland coast is passed. The steamer does not approach very close here, but the light is usually visible, and the wireless station ready with any information required.

A run of about 240 miles from Point Amour brings the steamer off Heath Point on the Isle of Anticosti, which island is in the middle of the Gulf of St. Lawrence, and was some years ago purchased by Mr. Menier, of French chocolate fame, from the Canadian Government as a game preserve. About 120 miles to the east of Heath Point the steamer has passed, although not within visible range, the wireless station at Harrington, where Dr. Grenfell, of the Newfoundland and Labrador Deep Sea Mission, has one of his hospitals. Harrington is an island off that part of the Quebec coast which is sometimes known as the Canadian Labrador. The Heath Point station is the turning point in the Gulf, and the steamer, which has previously taken a south-westerly course, takes a westerly or north-westerly course from the lightship about fourteen miles from Heath Point, the water around Heath Point being in places very shallow and unsafe for large steamers.

From this point the steamer crosses to the Gaspé coast, sighting Fame Point, the first land of true Canadian soil to be approached. Fame Point is on the south shore of the Gulf of St. Lawrence, and has a lighthouse, fog-alarm and wireless station; this being the station through which all Canadian Government



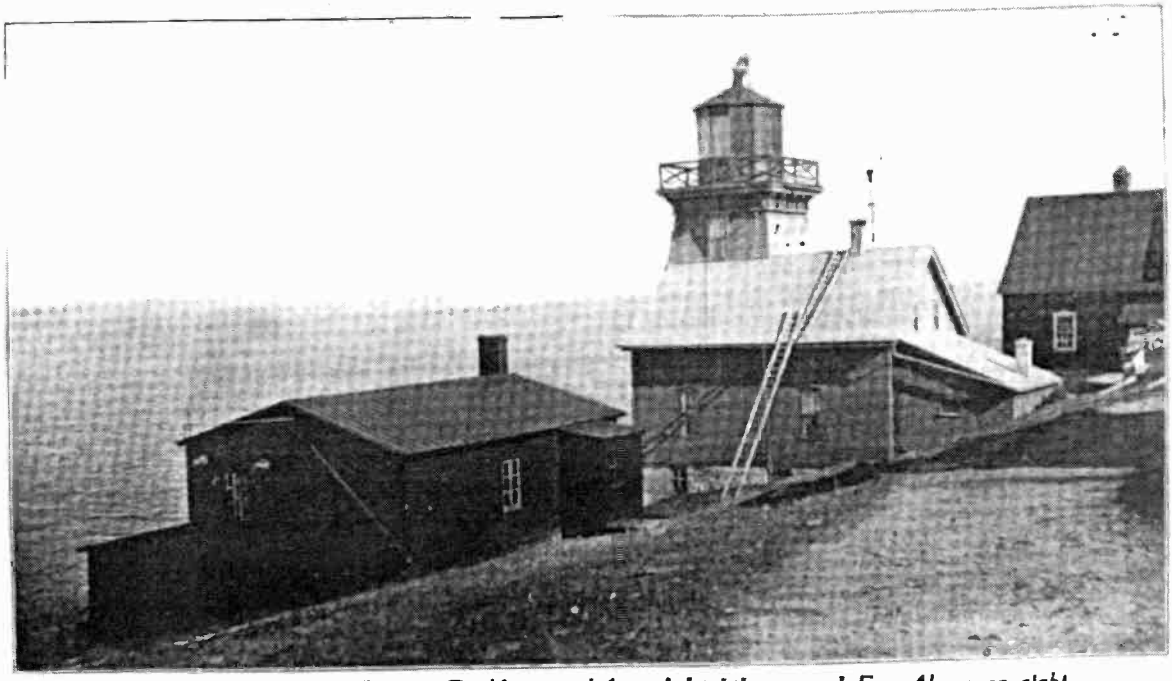
Cape Bear Station and Lighthouse



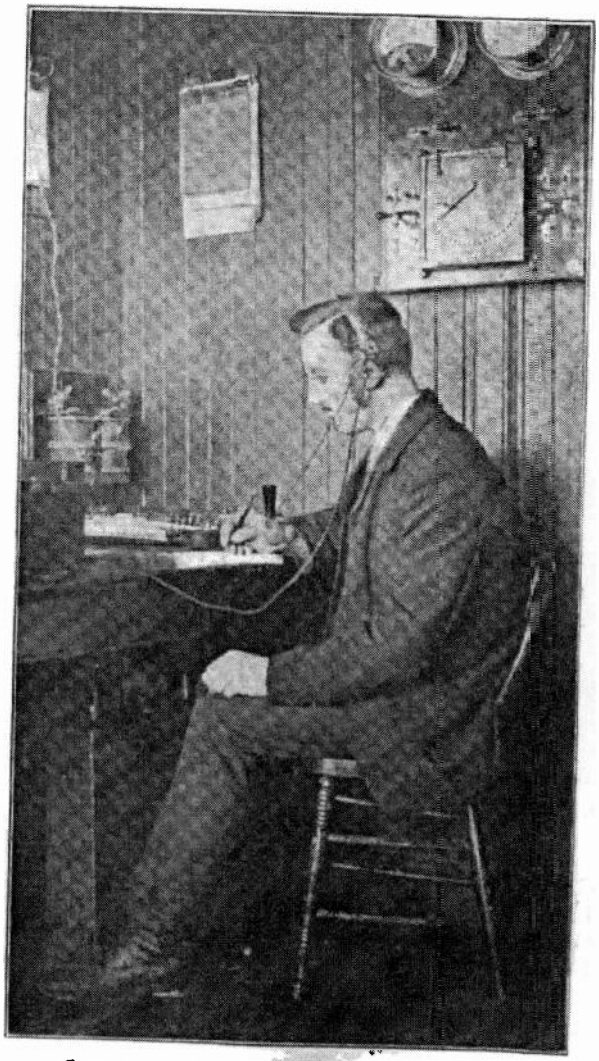
Donuno Station, Labrador

messages, weather reports and ship companies' messages are routed. The station has direct connection by land-line to Quebec, and for this and other reasons it is made the controlling station of the Gulf system.

There is a striking contrast between the Gaspé coast and the latter, consisting of Belle Isle, Labrador and Newfoundland coasts, chiefly of bare, bold rock; around Fame Point the Gaspé coast is a bold land of



Fame Point, showing Station Building on left and Lighthouse and Fog Alarm on right



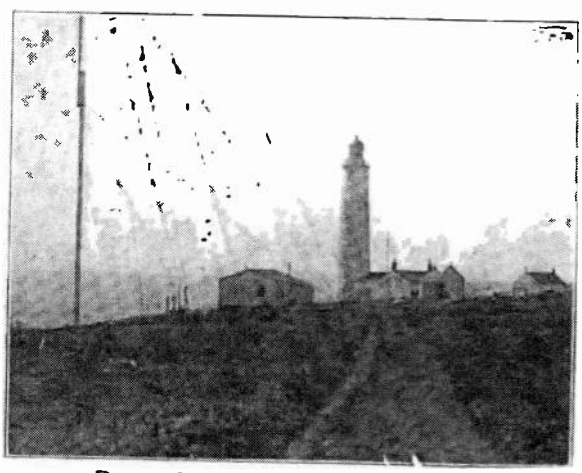
Operator receiving Message at Point Rich

considerable height, and densely wooded. About eighty miles west of Fame Point we pass Cape Chatte and enter the St. Lawrence River proper, for the river is said to end at Point des Monts on the north shore and Cape Chatte on the south shore and the Gulf to begin. At Cape Chatte the land is particularly high and bold, and not wooded, but as we get farther up the land becomes more undulating, the soil more fertile, the settlements more frequent, until Father Point is reached, about 160 miles from Fame Point and about 150 miles below Quebec.

Father Point is the pilot station for the St. Lawrence River, and all steamers stop and take pilots, each line of steamships engaging their own pilots. The wireless station at Father Point communicates with Clarke City on the north shore, which is about 140 miles north-east of Father Point and about 100 miles north-west of Fame Point, and is the connecting link between the Father Point and Fame Point stations, which are both on the south shore of the St. Lawrence. At Rimouski, a few miles west of Father Point, the mail steamers land their mail and then proceed to Quebec, a stop being made at Grosse Isle, thirty-two miles below Quebec, for medical inspection, and if the delay here is not long Quebec is soon reached, at which port all third-class passengers are landed. There is a wireless station at Grosse Isle for communication with Quebec, and supplying the quarantine station at Grosse Isle with information of steamers' movements, etc. Passengers intending to proceed to Montreal on the steamer should go ashore at Quebec without fail in order to see the old city, which is extremely interesting. From Quebec the steamer proceeds to Montreal with a new pilot on board. There are wireless stations at Quebec, Three Rivers (half-way between Quebec and Montreal), and Montreal, which stations are intercommunicating.

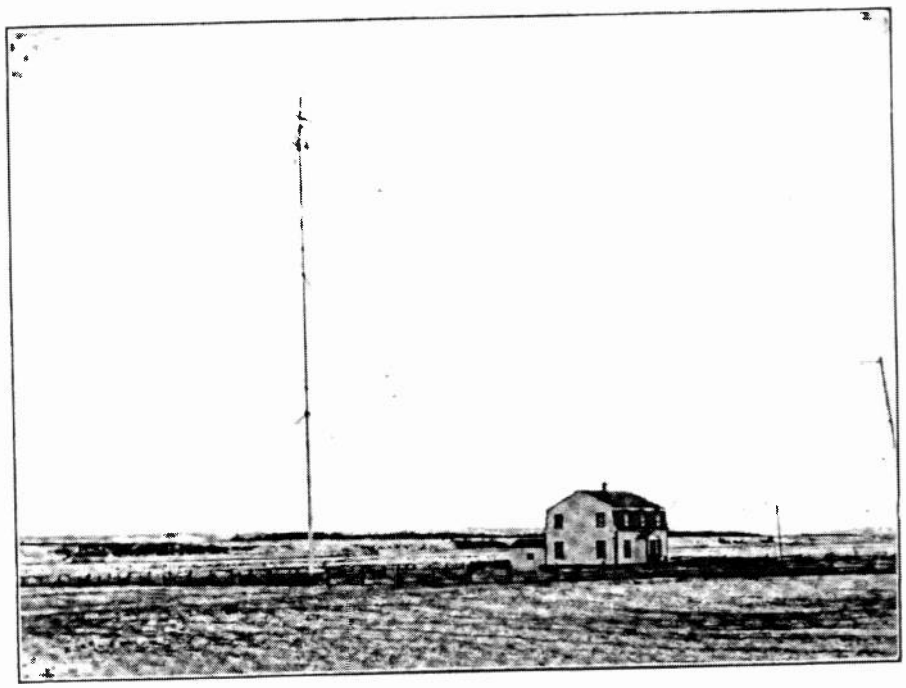
The whole trip through the Straits of Belle Isle, Gulf of St. Lawrence, and up the river as far as Montreal is at all times, but particularly in fine weather, most interesting; and when one considers that one's safety is so well provided for, that communication can be had with all parts of the world through the wireless stations, the majority of which are intercommunicating and often afford the only means of communication from the isolated places at which they are situated, the trip would appear quite out of the ordinary.

In the spring and late autumn, when the Straits of Belle Isle are not navigable, the steamers take the Cape Race route south of Newfoundland, communication being first established with Cape Race, which station can communicate with Cape Ray and is fitted with



Point Amour Station and Lighthouse

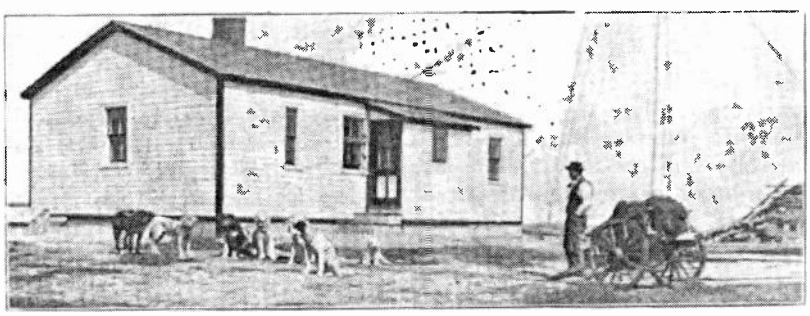
a 5-kw. set. Cape Ray is on the south-west of Newfoundland where the Cabot Straits connect the Atlantic with the Gulf of St. Lawrence. The station here communicates with Heath Point, Grindstone in the Magdalen Islands, North Sydney, Cape Race, and with Fame Point in case of emergency. Heath Point, which is the central station in the Gulf, communicates with Fame Point, Grindstone, Cape Ray, Harrington, Point Rich and Belle Isle, this latter communication being made whenever possible under clear conditions to clear traffic in order to prevent the necessity of transmitting messages from Belle Isle via Point Amour and Point Rich. The distance from Heath Point to Belle Isle is 300 miles, which two stations and the majority of the Gulf and Straits stations are fitted with 2-kw. engine-driven sets.



Father Point Station

The stations from Father Point through Clarke City, Fame Point, Heath Point, Harrington, Point Rich, Point Amour, Belle Isle and along the Labrador coast to Cape Harrison, form an unbroken chain of seventeen intercommunicating stations. Other branches allow of communication between all these stations and Cape Ray, Cape Race, North Sydney, Grindstone, Cape Bear in Prince Edward Island, and Pictou in Nova Scotia, the latter two stations being principally used for communication with ice-breakers navigating the Northumberland Straits in winter. In addition to the above-mentioned stations, one has just been erected at Fogo, about 150 miles south of Belle Isle on the east coast of Newfoundland, which station is for the purpose of communicating with the sealing fleet in the spring and for clearing the Labrador traffic and private steamer traffic through Belle Isle, instead of passing same down through the Gulf via Heath Point and Cape Ray as in former years.

Within the Labrador, Newfoundland, Straits of Belle Isle, River and Gulf of St. Lawrence stations up to Father Point there is a system of twenty-four intercommunicating stations, forming one of the finest systems in the world; and, considering that it is intended shortly to establish communication between Father Point and Quebec, this number of stations will be increased to twenty-eight.



The Work of the Post Office

THERE is probably no institution existing in the country which comes so near to the hearts and homes of the British people as the General Post Office. This vast organisation has become an indispensable social and commercial necessity, and it requires no exceptionally vivid imagination to invest with human interest the formidable rows of figures appearing in the annual reports of the Postmaster-General which reflect the manifold activities of the department over which he presides. Not many years ago, the statement that before long it might be possible to transmit and receive marconigrams to and from ships at sea would have been regarded with incredulity, but within recent years the developments in the Post Office have been enormous, and its activities form a striking contrast to the earlier days of this great institution.

It requires almost an effort to remember that the origin of the Post Office was quite as much a matter of police as it was to serve a commercial convenience. It was instituted under Cromwell's Government, and the Act of the Commonwealth which created it states that it was to be "for the benefit of commerce, for the convenience of despatches, and for the discovery of wicked and dangerous designs against the Commonwealth." The service with which our forefathers were more or less contented is well summarised in a spirited description in Cowper's *Task* of the arrival of the mail in the seventeenth century:

Hark, 'tis the twanging horn! O'er yonder bridge,
That with its wearisome but needful length
Bestrides the wintry flood, in which the moon
Sees her unwrinkled face reflected bright,
He comes the herald of a noisy world,
With spattered boots, strapped waist and frozen locks,
News from all nations lumbering at his back.
True to his charge, the close-packed load behind,
Yet careless what he brings, his one concern
Is to conduct it to the destined inn,
And having dropped the expected bag, pass on.

Late in the eighteenth century, however, the Post Office bestirred itself, and the postboy period, to which Cowper's lines apply so admirably, gave way to the more efficient travelling capacities and requirements of the time.

The work of the Post Office during 1911-12 furnishes striking testimony to the wide range covered. One feature which stands out in the latest annual report is the steady increase in the number of marconigrams dealt with at the Post Office coast stations—the outward messages to ships reaching a total of 6,680 during the year, as compared with 5,640 in 1910-11: the inward marconigrams from ships being 37,827 as compared with 34,161 in 1910-11. These figures represent an increase of 11·8 per cent. over the preceding year. But what is more striking is not so much the actual increase, but the enormous field for future business which awaits cultivation, for immediately the general public are made sufficiently familiar with the cheap and easy facilities that exist for communicating with their friends at sea over long or short distances there will be an enormous increase in the amount of traffic through Post Office stations. This class of communication must appeal with double force to commercial men, who by means of wireless telegraphy are able to transact important business affairs while on the high seas at extremely low cost.

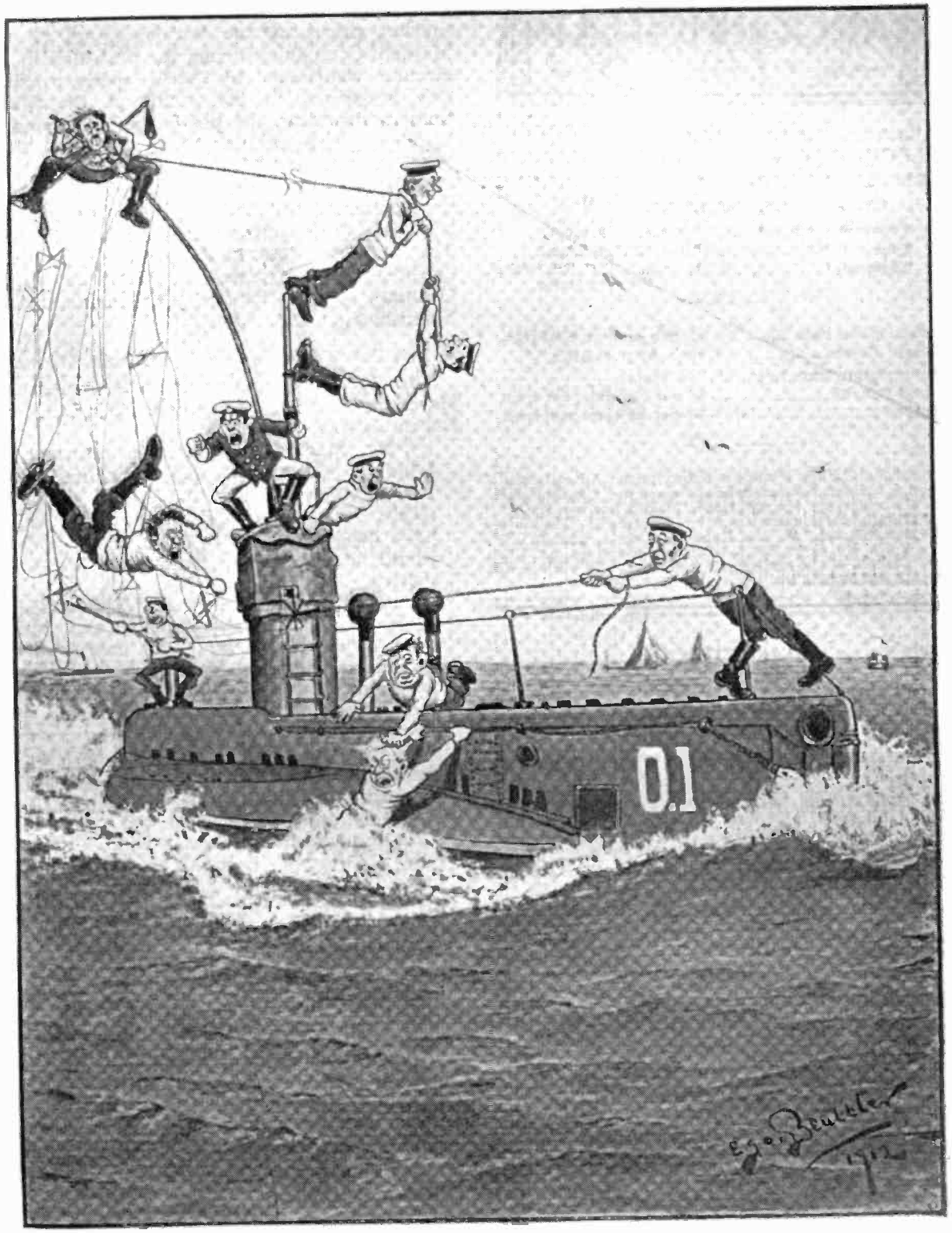
P.O. Wireless Stations

The Post Office stations at present open for general correspondence with ships at sea are as follows: Cullercoats (Northumberland), Caister (Norfolk), North Foreland (Kent), Niton (Isle of Wight), Bolt Head (Devonshire), Lizard (Cornwall), Seaforth (Liverpool), Rosslare (Wexford), Crookhaven (Cork), and Malin Head (Donegal). In addition to these there are the long-distance stations of the Marconi Company at Clifden in Ireland and Poldhu in Cornwall. The Cullercoats station was purchased by the Post Office in March, 1912, and its transfer marks the first step in the reorganisation of the coast station, in respect to which an expenditure of £16,000 was authorised last year.

The report draws attention to the announcement which was published during the early part of 1912, that telegrams for the United States and Canada are now accepted at all postal telegraph offices for transmission by the Marconi Company's wireless telegraph service between Clifden in Ireland and Glace Bay in Canada. The charge is 4d. per word less than the cable rate for ordinary telegrams, and 2d. less than the half-cable rate for deferred telegrams. That these reductions are appreciated by the public is evidence of the popularity of the Marconi Transatlantic Service, and of its efficiency.

During the past year 153 new licences, covering 202 new land stations, were granted in the United Kingdom under the Wireless Telegraphy Act. On March 31st last there were in existence 8 licences for the purpose of private business, excluding installations on Trinity House lightships and 258 licences for the purpose of experiment.

There are many other features of this report that might be worth noticing, but we must content ourselves for the present with this brief reference to the section devoted to wireless telegraphy.



FITTING UP A SUBMARINE WITH WIRELESS

THE MARCONIGRAPH

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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.

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The Share Market

London: December 23rd, 1912.

A considerable fall has taken place in the market prices of the various issues of the Marconi Companies during the past month. A circular was issued by the Company to allay any uneasiness in the minds of the shareholders regarding the position of these undertakings. This circular made it quite clear that their prospects have in no wise been jeopardised or weakened by any recent developments, but that on the contrary, the success of these concerns is proceeding steadily. The market prices have hardened up very considerably, and closed on December 23rd: Ordinary, 4 1/16; Preference, 3 13/16; Canadian, 18s.; Spanish, 1 1/16; American, 1 5/8.

The Spark System and Continuous Waves.

The following statement was issued by Marconi's Wireless Telegraph Co., Ltd., on December 14th, 1912:

"Mr. Marconi has recently returned to London, and has become acquainted with the statements which have been made in recent weeks, and with the opinions which have been expressed that continuous waves would in the future supersede the spark system.

"As these statements and opinions are liable to mislead shareholders and cause them some uneasiness, I am instructed to inform you that Mr. Marconi himself tested continuous wave systems many years ago, and experimented with them during the greater part of 1907 at the Poldhu station. As a result of these experiments he learned the advantages and disadvantages pertaining to continuous waves, and eventually arrived at a compromise between the continuous wave and spark systems, combining the best points of both. This resulted in material changes in his system for long distance work, and new and important improvements were patented by him in 1907, which are mainly responsible for the progress since made in long-distance wireless telegraphy.

"These inventions, which materially modify the spark system, seem to be surprisingly little known, notwithstanding the lectures delivered by Mr. Marconi at the Royal Institution of Great Britain on March 13th, 1908, and June 2nd, 1911, the Nobel Prize Lecture at Stockholm in 1909, and the address to the New York Electrical Society on April 17th, 1912, when he made statements relating to the use he was making of continuous waves, semi-continuous waves, and the elimination of the spark.

"By Order of the Board,
"HENRY W. ALLEN, *Secretary*."

The Imperial Wireless Scheme

Proceedings before the Select Committee

THE Select Committee of the House of Commons, inquiring into the contract by the Post Office with Marconi's Wireless Telegraph Co., Ltd., adjourned for a brief vacation on December 19th, 1912, after holding twenty-two meetings. The first ten of these were reported in the December number of this magazine; since then the greater portion of the time has been occupied in hearing evidence from representatives of various Government departments. This evidence was interrupted by Mr. Beach Thompson, the President of the Federal Telegraph Company of America, who again presented himself in the witness chair on November 25th and 27th, and read messages received by him from America, bearing on the question of communication by the Poulsen system. The messages purported to have been sent in each case by H. P. Veeder, Secretary of the Federal Telegraph Company, from San Francisco, on dates between November 16th and November 22nd, and they stated that communication had been established with Honolulu. Thereupon, Lord Robert Cecil read the following letter which had been sent to Sir Albert Spicer, Chairman of the Committee, by Mr. Godfrey C. Isaacs, managing director of Marconi's Wireless Telegraph Co.

"I propose to give evidence at a later stage respecting the statements made by Mr. Beach Thompson on Monday [November 25th], and to place before the Committee telegrams and affidavits with respect thereto. In the meantime, I think it may be of some assistance to you to have transcribed copies of the telegrams received by me on the 21st inst. [November], and this morning [November 27th]."

TELEGRAM FROM NEW YORK 21ST NOVEMBER, 1912. "GINMAN LISTENING POULSEN COMPANY DEMONSTRATION BRITISH CONSUL REPORTS 11.33 A.M. WEDNESDAY. FRISCO SAYS: '*This 42 kw. 60 volts 70 amp. more than used any time yesterday, your signals are weak too, not anything like so good as yesterday must keep in communication somehow stop.*' 12.14 P.M. FRISCO SAYS: '*Beach in, killed you: did you get three and four: in case lose you stand by will send blind for demonstration provide cannot hear you stop.*' 12.27 P.M. FRISCO SAYS: '*Demonstration now here are you ready have beach out now stop.*' 12.47 P.M.: '*Stand by, we will have message few minutes: just stand by stop.*' 1.0 P.M. WEDNESDAY: '*Frisco sends thirty-three words code messages Consul Honolulu repeating each word twice stop.*' 1.37 P.M.: '*Frisco evidently repeating from Honolulu asks repetition text words stop.*' 1.42 P.M. FRISCO SAYS: '*Did you get your O.K. to our three and four send them again.*' 2.27 P.M. FRISCO SAYS: '*Beach came in killed you stop.*' 1.0 P.M. (?) WEDNESDAY, FRISCO SAYS: '*Nothing doing beach was in.*' 3.15 P.M.: '*Ditto stop.*'"

"That," continued Lord Robert Cecil, "is the end of the quotations from what was going on as I understand it in the Poulsen Company: and then comes this:

'*Ginman sent three word code messages Sawler via Federal compared cable tranmission occupied one hour and fifty minutes reply received by Federal Company five hours later: transmission and reception checked logs affidavits mailed Frisco stop. Our system*" [*Marconi*] "*Received message from steamer 'Wilhelmina' using standard 2 kw. 615 miles day stop. Communication has been established Cape Cod Santa Marta nightly with 35 kilowatts stop.*"

Mr. Beach Thompson was examined in great detail by Mr. Booth as to the finances of the American Poulsen companies. He explained that there were two companies in America, one of which he called an "operating company," and the other a "holding company." They had not published balance-sheets or prospectuses. The entire management of the company was in the hands of three trustees, and the shareholders had delegated their powers to these trustees. Asked whether he was prepared to take a contract with the British Empire for stations, he replied that the American company was not prepared to do so.

Referring to the letter which the witness had sent to the chairman of the Committee, Mr. Booth asked whether the capital of £5,000,000 was subscribed or not. Mr. Beach

Thompson replied that it was the nominal capital; he declined to say how much was subscribed. He added: I do not care to go into any of those questions; you are only wasting time.

The Chairman: May I remind you that you have voluntarily given us those figures, and therefore any member of the Committee has a perfect right to ask questions on them?

Mr. Booth: You say 75 per cent. of the stock is pooled. Do you mean the subscribed capital is pooled, or the nominal capital is pooled?—Seventy-five per cent. of the nominal capital is pooled.

How can you pool stock that has not been taken up or subscribed?—That is a question for the attorney.

Is there scrip for it?—It is all either in the hands of subscribers or trustees. It is issued as fully-paid stock. By that I do not mean to convey that we have paid cash to the full amount.

Mr. Thompson was next questioned regarding his relations with Mr. Carl Philip. In his letter to the chairman, Mr. Thompson stated that Mr. Philip came to him at the Savoy Hotel some time in October, and said that he had an offer from a brokerage house for a large block of stock. The price mentioned was $30 per share, and he (Mr. Philip) said he would sell his stock. He said that he thought the party which was buying was the Marconi Company, and that he was going to see Mr. Isaacs. In reply to Mr. Booth, he admitted that Mr. Philip was a director of the company, and represented the Danish interests on the Board. They travelled together on the same steamer, but he said it was by accident that they met there, and during the voyage "they never mentioned business."

Mr. H. A. Madge, the Admiralty wireless expert on H.M.S. "Vernon," was examined at considerable length by various members of the Committee. In reply to Lord Robert Cecil, he expressed the opinion that, from a technical point of view, the company would make a better job of the work than the Admiralty would. Referring to the designs submitted by the Marconi Company, Mr. Madge expressed his opinion that everything he had seen throughout showed thoroughly sound engineering, and in every case the designs seemed to be amply well thought out and convenient. He felt that the Marconi Company had got experience, and most valuable experience; that in entrusting the stations to them the Government were making certain of having available a staff—and a large staff—and a staff that had been working on long-distance work for some time. He felt that most of the parts that were to be used were the result of experience, and many of the particular pieces of apparatus would be possible standards that had been in use elsewhere, and it was probable that they had been well tested. Taking the design in a general way, it was a design about which there should be a certainty that it was sound and thorough. In reply to further questions, he thought that the main outline of the scheme and installation was sound, and not only the details, but the way they were worked out by men of experience and brains who were experts.

The Marconi system had been proved. It was a system that was well developed. It was not new. It had been well worked out, and had arrived at a well-developed stage—well beyond the experimental stage as far as the main principles of the system were concerned. He had never seen the high-speed apparatus of the Marconi Company, but he had a general idea of the methods that would be used to obtain duplex working, and there seemed every possibility and probability, and every likelihood, that the system would be satisfactory. It was a disadvantage in regard to the Poulsen system that it was in its infancy, and there was not the same experience in regard to it. The Marconi Company's staff had the experience of putting up long-distance stations at Coltano, Poldhu, Clifden, Glace Bay, and elsewhere. They had also erected a very large number of smaller stations. In the case of the Marconi system there was a greater certainty and a greater probability of things going through without a hitch.

Lieut. Raymond Fitzmaurice, who was formerly in the Naval Ordnance Department of the Admiralty, and who is now employed on Aeronautical Wireless Telegraphy, asserted that if he got a communication from the Committee of Imperial Defence that this scheme should be carried through at the earliest possible date, he would go to the company that was doing the work.

Capt. E. F. B. Charlton, Assistant-Director of Torpedoes at the Admiralty, explained that his position carried with it the responsibilities in all matters connected with the design, working, and development of wireless telegraphy at the Admiralty. All the experience which the Admiralty had of high-power stations was at Malta and at Gibraltar, but these stations were not quite so powerful as those which will be put up in the Imperial chain. It was necessary that the Admiralty should keep their experimental party going at full strength, which they would be unable to do if they undertook the contract. The final agreement appeared to him to be a good commercial working agreement. He said that the matter was urgent and pressing, and it was unfortunate that this country had been talking so long about this scheme. The Admiralty were in possession of information in regard to the pro-

ceedings of other nations in the matter of wireless chains, and while we were inquiring and debating and talking about the matter, which had been described as vitally essential from the Admiralty and War Office point of view, other nations were going on. Capt. Charlton was then asked whether he was prepared to agree, after all the questions had been put to him since he made the statement, that this agreement was a good commercial agreement. He replied in the affirmative.

Mr. Percy Minter, Assistant Director of Naval Contracts, next occupied the witness chair. He informed the Committee that he could speak only as regards the business side of the agreement as far as the Admiralty was concerned with it. The terms and conditions were understood by the Admiralty to be exceptionally good, and the best which the General Post Office, after strenuous negotiations, had found it possible to induce the Marconi Company to accept. The agreement represented a settlement which the Admiralty concurred in as being preferable to the only alternative at the time available—viz., the erection of the stations by the Admiralty. Mr. Minter then made some observations with a view of showing that there appeared to him to have been very strong grounds for giving the contract to the Marconi Company; and in justification to its terms, one of the points that occurred to him was the experience of the company, for the Government were obtaining not only the use of the patents, but also the company's experience. Even though the Government might have the power to use the Marconi patents, under the terms of the Crown Clause in the Patents Act, it could not have the right to their co-operation without coming to terms. He was not certain that the Crown Clause in the Patents Acts really applied to this case. That clause gave the Government power to use patents, but for the purpose of the Crown. It appeared to him open to doubt whether the use of these stations for commercial messages or general public messages amounted to a user for the service of the Crown.

Mr. Minter was asked whether, from his position as Assistant Director of Naval Contracts, he thought, in its present state, it was a fair business agreement. He replied that, assuming the terms were the best that the Marconi Company would accept—and he had no reason to doubt that it was so—he could not see that there was anything better that the Government could have done. Questioned with regard to the point mentioned as to the application of the Crown Clause in the Patents Act, under which the Government were entitled to use patents on payment of a sum to be fixed by arbitration, he pointed out that that Clause only applied to the United Kingdom, and it would therefore be doubtful whether they could erect the six stations which were proposed and to get the right to use the patents upon arbitration terms with regard to all the stations. The Admiralty had an agreement with the Marconi Company, under which they were paying the company a royalty for the use of the company's patents.

Capt. Maurice FitzMaurice was asked to give evidence because he was a member of the Cables Landing Rights Committee, and also a member of the Imperial Wireless Telegraph Committee. He was of opinion that the cables were likely, at some future time, to be entirely superseded by wireless. A further reason for prompt action lay in the fact that so long ago as March 1910 the Marconi Company offered to establish a chain of long-distance stations throughout the Empire without any subsidy, and to give the public the benefit of a substantial reduction of rates. The company had for some time been pressing for a decision in the matter. The Marconi Company had established the only commercial long-distance service at present in operation. They stood in a very strong position, and their co-operation was almost essential if an Imperial scheme was to be carried out. The Admiralty would find it difficult to erect the stations, and would only do so in the very last resort.

The next witness was Colonel G. M. W. Macdonogh from the War Office, who supported the Admiralty evidence as to the necessity for proceeding with the scheme without delay. If the Admiralty had undertaken to erect the stations, they would be almost forced to get assistance from the Marconi Company. The War Office were making use of Marconi patents, but not under any agreement with them; in fact, they were in correspondence at the present time with the Marconi Company with regard to the War Office making use of the company's patents without their authority. He was of opinion that the Marconi Company was the only company which had the experience of which the Government stood in need.

Major Boys, who represented the department of the War Office which deals with wireless telegraph equipment, agreed with the description of the attitude of the War Office towards the agreement given by Colonel Macdonogh.

On December 9th Mr. J. E. Taylor, a staff engineer attached to the Engineer-in-Chief's Department at the General Post Office, who is in charge of the technical section controlling applications of wireless telegraphy under the Post Office administration, presented a long technical statement, which it is impossible to summarise adequately in the space at our

disposal. He was followed by Commander F. G. Loring, Inspector of Wireless Telegraphy to the General Post Office, who before giving evidence read the following telegram which the Secretary of the Post Office had received from the Foreign Office. This telegram was from Consul-General Ross, at San Francisco:

"December 10th, 1912. Paraphrase of telegram received from Consul-General Ross (San Francisco). My telegram of December 2nd. The Federal Company here will not permit me to make the test respecting which you telegraphed to me on November 30th. I have just received a telegram from the company which runs as follows: 'Following from manager of company, December 7th, Paris. The President must refuse to give any further information unless official request is made to him personally by the Committee. Moreover, it would not be in order until February. The testimony given by me before the Committee was taken out by order by consent.'"

Commander Loring expressed the opinion that even if they did get a demonstration of the Poulsen system, such as they had received now—that is, a demonstration of a single exchange between two stations—before they could have accepted the Poulsen tender they would have had to go very thoroughly into the working of the company, and prove that communication could be maintained not over a day, or week, or month, but over a very considerable period. He was convinced that it would be exceedingly risky to take on anyone for this job whose system was not properly tested and tried. The Admiralty were "not a truly effective competitor, because they had never actually done the thing," and he thought it was one reason why they had thought twice about undertaking the scheme. He was of opinion that the only contractor possible was the Marconi Company. It was put to witness by Lord Robert Cecil that if the agreement confers a virtual monopoly on the Marconi Company, it would be a serious obstacle to adopting the continuous wave system when it does come. Commander Loring asked why anybody should assume that because the Marconi Company in the year 1912 were using the spark system. The continuous wave was not particular to anybody, and was not a patent. It was a method of production. Why should not the Marconi Company adopt the continuous wave, if it was going to be better? He could not understand such a point. He thought Mr. Marconi was in advance of the times. He had this circuit across the Atlantic to experiment with, and he had a great advantage in that he could put up the stations and had been experimenting for some years.

The Right Hon. Sir George Reid, High Commissioner for the Commonwealth of Australia, gave evidence on December 12th, and he was followed by Sir Richard Solomon, the High Commissioner in London for South Africa. Then Mr. Crompton Llewelyn-Davies, a solicitor to the Post Office, gave evidence in regard to the legal aspects of the agreement, and Mr. E. W. Farnall, one of the assistant secretaries, gave evidence regarding certain interviews. In the course of his examination Mr. Farnall was asked whether he had heard statements by the Poulsen people to the effect that they were confident they could do the work. According to the records of Mr. Farnall's department, the statement was made as far back as 1907 that the Poulsen Company "had absolutely no doubt of being able to establish a thoroughly satisfactory service with America." He added that the statement was then made that the Poulsen engineers had succeeded with a transportable station which the company had recently supplied to the German Government in establishing communication between Berlin and Cambridge in both directions. The Poulsen people were saying in 1912 what they said five years ago.

He was then asked whether as a business man, and having representations made to him that this was a matter to be put in hand at once, and having regard to the fact that it was five years ago that such a statement was made, would he think it a wise and reasonable thing to give a contract to those people now. Mr. Farnall replied "Most certainly not." Mr. Redmond drew witness's attention to the statement that the Poulsen Company had recently supplied to the German Government, and had established thoroughly satisfactory communication between Berlin and Cambridge with a transportable station, and he asked witness whether he knew of any such communication as that existing now. Mr. Farnall replied: "No—and I do not believe it ever existed." He added that they had never heard at the Post Office of any direct communication by the Poulsen Company between Berlin and Cambridge.

Mr. Roland Wilkins followed Mr. Farnall in the witness chair. Mr. Roland Wilkins is principal clerk in charge of the division of the Treasury which deals with the Post Office, etc. On December 18th and 19th evidence was given by Sir Henry Norman, who gave an account of the development of wireless telegraphy, the advance in which in recent years had, he said, been amazing, thanks largely to the work of Mr. Marconi, who had done more than any man living to adapt scientific wireless to the practical use of mankind. After hearing Sir G. Croydon Marks, the Committee adjourned till January 1st.

Parliamentary News

SITES FOR WIRELESS STATIONS.—Asked by Major Archer-Shee why the Commission, which had been appointed to select sites for the Imperial wireless scheme, had not been sent out, Mr. Herbert Samuel replied that the whole question of the establishment of Imperial wireless stations being under the consideration of a Committee of the House, it was not thought proper to incur the expense involved by the despatch of the Commission until the report has been received.

"But," said the Major, "the selection and purchase of sites and the erection of buildings are matters not before the Marconi Committee. Why have the Government delayed taking any steps?" Mr. Samuel tried to satisfy his interrogator by pointing out that it would be disrespectful to the Committee if he took any steps. Besides, what would happen if the Committee might recommend suspension of the whole scheme!

* * *

MARCONI WIRELESS RIGHTS.—Major Archer-Shee has been somewhat perturbed by the agreement between the Marconi Wireless Telegraph Company of Canada and the Newfoundland Government, and this prompted him to ask the Postmaster-General on December 19th for further information regarding this agreement. He wanted to know whether exclusive rights for wireless telegraphy stations had been granted to the company until 1926; whether this referred to Transatlantic wireless stations, and, if so, what action His Majesty's Government proposed to take to prevent a monopoly of wireless communication across the Atlantic being set up by the Marconi Company.

Captain Norton, who gave a written reply to this question on behalf of the Post Office, said that he understood that the Newfoundland Government had entered into an agreement with the Marconi Wireless Telegraph Company of Canada granting rights existing till 1926 for the erection of stations in Newfoundland. The Postmaster-General, not having seen a copy of the agreement, he was not in a position to say whether it conferred a monopoly for the erection of long-distance installations.

* * *

FRIABLE LAND LINES.—A great deal of inconvenience is felt in the North of Scotland owing to breakages of telegraph land lines, and the line between Mull, Coll, and Tiree has been down since November 22nd. When questioned about it in the House of Commons, the Postmaster-General said he was making careful inquiries into the suggestion of a wireless service between Tiree and the mainland in consequence of the frequent telegraphic breakdowns.

* * *

WIRELESS STATIONS IN EAST AFRICA.—A question put to the Colonial Secretary by Sir Hildred Carlile elicited from Mr. L. Harcourt the information that the cost of the high-power station proposed to be erected under the Imperial wireless scheme in the highlands of East Africa will be borne by the Home Government. It is also proposed to erect a low-power station at Mombasa, the cost of which will be a charge upon the revenues of the East Africa Protectorate.

* * *

THE IMPERIAL SCHEME.—On November 25th Major Archer-Shee asked the Postmaster-General whether he had any further statement to make with reference to the attitude of the Governments of New Zealand, Canada and Newfoundland towards the agreement with the Marconi Company. Mr. Herbert Samuel replied there had been no question of establishing at the present time a Transatlantic service as part of the State-owned Imperial wireless system. The participation of the Governments of Canada and Newfoundland was therefore not invited or discussed. The Government of New Zealand had entered into arrangements, before the negotiations with the Marconi Company began, for the erection of a station capable of communicating with Australia, a distance of about 1,100 miles.

A wireless communication was received on December 6th last by the naval authorities at Queenstown from the captain of the Booth Line's "Hilary," of Liverpool, stating that the vessel had passed on December 5th, at 1.30 p.m., in lat. 46.29 north, long. 6.53 west, a derelict wooden vessel whose hull stood about 12 feet out of the water. The ship did not seem to have been long abandoned. The captain reported that the derelict was right in the track of Transatlantic liners, and therefore most dangerous to navigation, especially at night.

Canadian Notes

The new through word-rate is the direct result of the recommendation of the recent International Radiotelegraphic Convention held in London, as tending to uniformity and simplicity in handling messages to ships, and thus directly in the interests of public convenience and popularity. All the former complications between "domestic" and "cable" rates and terms are done away with, and the inclusive through-rate from any given point on this continent to any Transatlantic ocean liner can be ascertained on application to any telegraph office. By means of sailing lists, supplied to the various inland telegraph offices, the proper coastal station to be employed can be seen at a glance, as well as the day and hour at which any particular vessel can be reached.

As regards the revised word-rate tariff, the new schedule is distinctly advantageous to the public, particularly in respect of the so-called "winter service" through Canadian coastal stations. Whereas under the old "domestic" rate a 10-word message originating anywhere in Eastern Canada, as far west as the Soo, and transmitted to a boat via Sable Island or Cape Sable, N.S., cost $4·30, under the new plan it will cost 34 cents per word, or $3·40 for ten words. To Cape Race the former rate was $3·90; the present word-rate of 34 cents makes $3·40 for ten words. To Halifax and St. John the old charge was $2·30 for ten-word message; it will now cost 13 cents per word, or $1·30 for the message. The summer rates for communication through the St. Lawrence river and Gulf stations during season of navigation will show, with few minor exceptions, equally favourable charges to the public.

* * *

It is officially announced from Port Arthur that, owing to the remarkably open season this year, a record is being made in shipping. The installation of the Government wireless telegraph station has added materially to the safety of the boats on the lakes, especially at this time of the year, as they keep in constant touch with the wireless station and are notified of the approaching storms, when, if considered necessary, they can take to shelter. With the wireless telegraph in existence on the Great Lakes no boat is ever entirely out of range of assistance.

* * *

The equipment of the C.G.S. "Estevan" has been completed by the Marconi Wireless Telegraph Company of Canada. The stations equipped by the same company at Midland, Tobermory and Sault Ste. Marie have been completed, and the Government have made their official inspection.

* * *

The work on the duplex receiving stations at Louisburg, N.S., is proceeding rapidly. All the steel masts for the receiving aerial have been completed. The receiving house and dwellings are now nearing completion, and a considerable amount of work has been done on the connecting lines between Glace Bay and Louisburg.

* * *

Three steel masts and five wooden mast, have been erected at the Glace Bay stations and a change in the wave-length at Glace Bay has been made permanently.

* * *

The following stations in Newfoundland, Labrador, have been closed since November 1st, 1912: Mokkovik, Cape Harrison, Holton, Indian Harbour, Grady, Domino, American Tickle and Venison Island; the Harrington station in the Gulf of St. Lawrence has also been closed down. These stations will remain closed until the opening of navigation this year, which is expected to be between May 15th and June 1st.

* * *

The combined land rates for wireless messages via Canadian stations came into force on January 1st. Under the new arrangements messages to ships on the high seas can be handed in at any telegraph office.

* * *

The Dominion House of Commons considered on December 6th, 1912, a measure enforcing the use of wireless telegraphy on all vessels carrying more than 50 passengers, and plying between points 200 miles or more apart. It was suggested that the distance should be reduced to 100 miles, and that the Bill should apply to all vessels carrying passengers. The Hon. J. D. Hazen, who sponsored the Bill, expressed his willingness to accept the view of the House of Commons on both these questions.

An agreement has been signed by the Marconi Wireless Telegraph Company of Canada with the Newfoundland Government under which the Canadian company is granted exclusive rights for wireless telegraph stations until the year 1926. A number of coast stations are to be erected forthwith, in connection with which the company is to receive a Government subsidy.

Correspondence

ELECTROMAGNETIC AND LIGHT WAVES.

(To the Editor)

SIR,—I was much interested to read on page 402 of the December MARCONIGRAPH a note dealing with electromagnetic and light waves. The human factor appears to have been entirely neglected, or, what amounts to the same thing, equal eye efficiency is claimed for all.

Experimental or other errors made in determining the limit of visibility are multiplied by 25,000, and the final result claimed to be correct. The atmosphere would undoubtedly play an important part in modifying the figures, but absorption seems to have been overlooked.

Again, 0·1 watt per candle power is given as the mechanical equivalent of light, and is apparently assumed to be a constant. This is far from being the case, and in the case of a quartz lamp=0·014, about one-eighth of the figure given. The energy radiated as light employing such a source would in this case be $0{\cdot}014 \times 2{,}560 \div 34$ watts, a far different result from the 250 watt in example.

The efficiency of the wireless set surely will not remain for ever at 20 per cent., and variation will continually be introduced as the apparatus improves. If a law is to be established, rigid adherence must result, and conformity must not depend upon assumed efficiencies and any particular light source chosen.

Yours,

DANIEL H. OGLEY, B.Eng.

Royal Technical Institute, Salford,

December 5th, 1912.

Questions and Answers

We invite our readers to send us questions, preferably on technical problems, that have arisen in actual practice.

A. W.—*Radiation Resistance.*—What is the energy in an electromagnetic wave, such as is employed in wireless telegraphy, as it leaves the aerial, and how is it most easily measured? —*Answer.*—In the space at our disposal it is quite impossible to deal at all fully with this, one of the most intricate questions of wireless. The radiated energy at a sending station can be expressed as a function of the aerial current and the radiation resistance of the aerial. The process of radiation withdraws energy from the aerial-earth circuit just as is the case when a resistance is placed in a circuit; and the expression "radiation resistance" is used to mean the resistance which, under the given conditions, would use up the same amount of energy as that removed from the circuit by radiation. So far as the current in the aerial-earth system is concerned, this "radiation resistance" adds on to the ordinary ohmic resistance of the system (representing all the joulean losses in aerial and earth), so that if R is the joulean resistance and r the radiation resistance, the total power used up in the aerial-earth is $P=(R+r)I^2$. In this equation the only quantity which can be easily and directly measured is I. P can be more or less satisfactorily measured by a calorimetric method involving the use of an artificial circuit made to represent the aerial-earth circuit as closely as possible, or by making use of the fact that if L=total inductance of the aerial earth circuit, n=frequency of wave, and δ=decrement, then

$$\delta=\frac{R+r}{2nL},$$

whence $P=2nL\delta I^2$. Even when P and I are thus known, to find r we have to eliminate R, which is by no means an easy thing to do. One method is to obtain two equations by measuring the current received in a neighbouring aerial in two cases, R being kept constant in the two cases, and only r (the radiation resistance) being changed by altering the height of the transmitting aerial. If r is found by some such method, then the energy radiated from the aerial is given by the product I^2r.

E. W. D.—*An Operator's Problem.*—On a ship fitted with a 1½-kw. set I recently noticed that the strength of the signals increased as the speed of the converter decreased, and, according to the timing lamp, the "tune" improved.—*Answer.*—The effect noticed is due to the fact that the spark frequency of the primary circuit, of which the number of alternator periods is a determining factor, has been changed by altering the speed of the converter by the field regulator, and the circuits are in better phase when the machine is running slow. As the charging rate has been altered the spark discharges occur at more regular intervals, and better results are obtained. Probably the spark note is not so good as when the machine is running faster.

The Interstate Commerce Commission has ruled that it has jurisdiction over wireless messages from United States commercial stations to ships at sea, whether American or foreign, but no jurisdiction over messages between two American ships at sea. This means that the Commission may determine upon complaint as to the reasonableness of charges.

Reviews of Books

"HISTORICAL AND ECONOMICAL GEOGRAPHIES," by Horace Piggott and P. J. Finch. (London: J. M. Dent & Sons, Ltd. Book I. 390 pp.)

A geography that makes the study of the earth a reasonable and vital science is always to be welcomed; but thrice welcome is a book which aims at showing the practical application of the study, its influence on human development, and its relation to human affairs. On such principles the authors of the book under notice have based their work, and they are to be congratulated on a production which contains not a single dull page. Only the first volume has, however, been published, but as it is introductory to the remainder of the series, it is possible to gather the full scope of the work, and certainly the authors have extended their views far beyond the range of the average geographer, and have called in the aid of geology, archæology, history, and kindred sciences, in order to demonstrate the relationship of this study to human affairs. It is rarely that we find such matters as the need for communication between city and city—continent and continent—dealt with in a book of this character; but this subject has proved an important branch in the making of the world's geography, and it is therefore pleasant to read a chapter on communication in this introductory volume of Dent's Geography. Railways, shipping, telegraphic and telephonic communication are all admirably dealt with considering the small space available for this one among so many complex interests; and we note with particular satisfaction a reference to wireless telegraphy. There are two maps, one showing some of the Trans-Atlantic stations operated by the Marconi Company, and another the stations which it is proposed to erect for the Imperial chain.

"TRADLÖS TELEGRAFI," by Thor Thörnblad. (Stockholm: P. A. Norstedt & Söners Förlad. In parts, 2 kronor each.)

From Sweden comes an interesting work on wireless telegraphy which is introduced with a "foreword" by Prof. Ivar Fredholm, the distinguished professor of mathematics and physics at the Stockholm University. Lieut. Thörnblad has treated his subject exhaustively, but the work will not lose in interest for the general reader on this account, and it should be of great assistance to those who are concerned with questions of wireless telegraphy. It is issued in parts: the first part containing a history of the subject. In parts II. and III. the physical problems are discussed, and the various systems are described in the succeeding numbers. Part VIII. is the latest to be issued, and we look forward to the completion of the volume with much interest.

Some Works of Reference

WHITAKER'S ALMANAC FOR 1913 contains a careful and accurate summary of useful information concerning every subject of interest, which makes the book invaluable for every business man's office as well as for every student's library.

* * *

The INTERNATIONAL WHITAKER is a new work which will undoubtedly be invaluable as a companion to WHITAKER'S ALMANACK. Hitherto there has been no compendium of information in regard to foreign nations at a popular price. In 500 closely printed pages is contained a detailed account of the financial, social and military affairs of each nation, with British and American diplomatic and consular representatives in foreign countries. The foreign facts are ranged under such headings as population, history, government, defence, finance, industries, trade, currency and others.

* * *

WHITAKER'S PEERAGE has now added a further sixteen pages to its size, and its 850 pages of information about the British nobility is a surprisingly cheap five shillingsworth. In addition to the brief biographies of peers, baronets and knights, it contains, as usual, many pages explaining to the curious or the careless the intricacies of descent and the niceties of etiquette.

* * *

Our old friend HAZELL'S ANNUAL turns up as usual to present us with a connected story of the events of the past year and a guide to the questions likely to come to the fore in 1913. The story of the Balkan War is brought down to the armistice of Tchataldja, and is illustrated by a map which has the advantage of having been drawn after the victorious progress of the allied armies, and of showing, therefore, all the place-names mentioned in the narrative. Maps illustrate also special articles on the Marconi Agreement, the Panama Canal, and the proposed Trans-Persian Railway to India. Our naval and military forces and the forces of the Dominions are dealt with at length, and are lucidly compared with those of foreign countries. The points of the political, social and religious movements of the day are presented with a clearness which renders them intelligible to anyone, while the interests of scientific, artistic, literary and sporting tastes are catered for as fully as usual. Some idea of the extraordinary extent and variety of the information compressed into this indispensable volume may be conveyed by the statement that its index fills 34 pages and contains about 7,000 references.

Contract News

The ITALIAN GOVERNMENT have ordered two further 1½-kw. Marconi portable cart sets.

The CHILIAN GOVERNMENT have instructed the Marconi Company to equip six destroyers and transports, now in course of construction, with 1½-kw. ship sets.

Six new vessels of the RUSSIAN VOLUNTEER FLEET are to be equipped with standard 1½-kw. Marconi apparatus. The volunteer fleet was originally raised by voluntary subscription, and it helps to form the reserve forces of the Russian Navy. In times of peace the vessels are engaged in carrying on a regular trading service, principally to the Far East. The officers are for the most part Naval Reserve Men.

A submarine now building for the NORWEGIAN GOVERNMENT will be fitted with a ½-kw. set.

A ½-kw. Marconi apparatus is to be installed on a tug intended for use in Table Bay, and belonging to the SOUTH AFRICAN GOVERNMENT.

The Compagnie de Télégraphie Sans Fil of Brussels have received orders for fitting the following vessels:

"Viking" for the SVITZER SALVAGE COMPANY OF COPENHAGEN, with a ½-kw. set and emergency gear.

"Christianiafjord" and "Bergensfjord," which are now being built for the NORSKE AMERIKA LINE, will be fitted with Marconi apparatus.

"Reina Victoria Eugenia" and "Infanta Isabel de Borbon" will be fitted with 5-kw. Marconi set and emergency gear for the CIA. TRANSATLANTICA ESPANOLA. One of the steamers is now being built at Messrs. Denny Bros.' yard, Dumbarton, and the other at Messrs. Swan, Hunter and Wigham Richardson's, Newcastle-on-Tyne.

The following Vessels have been equipped with Marconi Installations during the past month.

Owners.	Name of Vessel.	Installation.	Service.
Ellerman Line	s.s. "City of Lahore"	1½ kw. and emergency set	Passenger between England and India via Suez Canal
" " ...	s.s. "City of Calcutta"	1½ kw. and emergency set	Passenger between England and India via Suez Canal
" " ...	s.s. "City of Birmingham"	1½ kw. and emergency set	Passenger between England and India via Suez Canal
" " ...	s.s. "City of Paris"	1½ kw. and emergency set	Passenger between England and India via Suez Canal
" " ...	s.s. "City of Dunkirk"	½ kw. and emergency set	Cargo vessel between England and India
" " ...	s.s. "City of Naples"	½ kw. and emergency set	Cargo vessel between England and India
" " ...	s.s. "City of Bristol"	½ kw. and emergency set	Cargo vessel between England and India
(This is a portion of the order for equipping fifty vessels.)			
Atlantic Transport Co. ...	s.s. "Minnetonka"	1½ kw. and emergency set (refitted)	Passenger between Tilbury and New York
Elder Dempster	s.s. "Abosso" ...	1½ kw. and emergency set	Passenger between Liverpool and Lagos
P. & O. Steam Navigation Co.	s.s. "Borneo" ...	1½ kw. and emergency set	Intermediate passenger boat running between London and Calcutta
" " "	s.s. "Namur" ...	1½ kw. and emergency set	Intermediate passenger boat running between London and Yokohama
Tyser Line	s.s. "Hawkes Bay"	1½ kw. and emergency set	Cargo vessel destined for the East
British India Steam Navigation Co.	s.s. "Edavana" ...	1½ kw. and emergency set	Passenger travelling between Calcutta, Rangoon, and the Straits
" " "	s.s. "Tara" ...	1½ kw. and emergency set	Passenger travelling between Calcutta, Rangoon, and the Straits
" " "	s.s. "Thongwa" ...	1½ kw. and emergency set	Passenger travelling between Calcutta, Rangoon, and the Straits
Anglo-American Oil Co. ...	s.s. "Delaware" ...	½ kw. and emergency set	Cargo vessel between Baltimore, Philadelphia and New York
" " " ...	s.s. "Appalachee"	½ kw. and emergency set	Cargo vessel between Baltimore, Philadelphia and New York
Mexican Petroleum Co. ...	s.s. "Herbert G. Wylie"	½ kw. and emergency set	Oil transport between Mexico and United States

Orders have been received by the Marconi Co., Ltd., to equip the following Vessels with Wireless Installations.

Owners.	Name of Vessel.	Installation.	Service.
The Nelson Line	s.s. "Highland Brae"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
" " ...	s.s. "Highland Glen"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
" " ...	s.s. "Highland Loch"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
" " ...	ss. "Highland Pride"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
" " ...	s.s "Highland Rover"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
" " ...	s.s. "Highland Corrie"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
" " ...	s.s. "Highland Piper"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
" " ...	s,s. "Highland Laddie"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
" " ...	s.s. "Highland Warrior"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
" " ...	s.s. "Highland Scot"	1½ kw. and emergency set	Cargo vessel carrying limited number of passengers between London and Buenos Ayres
A. Holt & Co. ...	s.s. "Nestor" ...	1½ kw. and emergency set	Passenger between Glasgow and Sydney, N.S.W.
" "	s.s. "Ulysses" ...	1½ kw. and emergency set	Passenger between Glasgow and Sydney, N.S.W.
New York and South American Line	s.s. "Crofton Hall"	1½ kw. and emergency set	Passenger between United States and South American States
Elder Dempster & C ...	s.s. "Elmina" ...	1½ kw. and emergency set	Passenger between Liverpool and Lagos
Colonial Sugar Company of Australia	s.s. "Fiona" ...	1½ kw. and emergency set	
P. & O. Steam Navigation Co.	s.s. "Isis"	1½ kw. and emergency set	Passenger between England and the East
" " "	s.s. "Osiris" ...	1½ kw. and emergency set	Passenger between England and the East
La Compagnie Generale Transatlantique	s.s. "Versailles" ...	1½ kw. and emergency set	Passenger between Bordeaux and Casablanca

Marconi's Wireless Telegraph Co., Ltd., have received instructions to install wireless telegraphy apparatus on two new vessels at present in course of construction, but destined for service with THE REID NEWFOUNDLAND COMPANY.

In addition to the ten vessels of the NELSON LINE which are to be immediately equipped with wireless, arrangements have been completed with Marconi's Company whereby the seven new vessels which the Nelson Line has decided to build will also be fitted with wireless.

The DEMPSTER LINE has decided to have eleven additional vessels of its fleet equipped with wireless, and orders have been placed with Marconi's Company, Ltd., accordingly.

LES SOCIÉTÉS DES PÊCHERIES have approached La Compagnie Française de Télégraphie sans Fil with a view to having wireless installed on their trawlers.

Several vessels owned by the Sociedad Navegacion e Industria, and of the Cia Mahones a de Navegacion, have been fitted with Marconi apparatus by the COMPANIA NACIONAL DE TELEGRAFIA SIN HILOS. The "Rabat," of the COMPANIA TRANSATLANTICA ESPANOLA, has also been equipped.

Maritime Wireless Telegraphy

THE European public know comparatively little of the shipping services which link up the American Continent with China and Japan. Some of the liners on the Pacific routes are among the finest in the world, and, like the vessels traversing the better-known Atlantic and Eastern routes, they go forth upon their voyages equipped with that marvellous instrument of communication—wireless telegraphy. To the fleet of the Canadian

Mrs. G. M. Bosworth, wife of the Vice-President of the C. P. R. and Director of the Marconi Wireless Telegraph Company of Canada.

Pacific Railway trading across the Pacific is shortly to be added the " Empress of Asia," which was launched from the yard of the builders, the Fairfield Shipbuilding & Engineering Co., Ltd., Govan, on November 23rd, 1912. The christening ceremony was performed by Mrs. Bosworth, the wife of Mr. G. M. Bosworth, vice-president of the Canadian Pacific Railway Company, and a director of the Marconi Wireless Telegraph Company of Canada.

The " Empress of Asia " is the eighth vessel built by Fairfields for the Canadian Pacific Railway, and with her sister ship, the " Empress of Russia," marks a new epoch in Trans-Pacific travel. These two vessels will be by far the largest plying between the American Continent, Japan and China, measuring 590 ft. in length, 68 ft. in breadth, and 46 ft. in depth, and of about 15,000 tons gross. Their speed will be 18 knots an hour.

In addition to their size and speed these vessels will have a number of attractive features. The main saloon will be no less than 74 ft. long and 64 ft. wide, lit from the sides by a number of beautifully designed windows nearly 5 ft. wide, and from above by a large well.

The first-class state-rooms on the bridge deck will be enclosed in a complete steel deck-house. Each of these rooms will have sleeping berths for two persons, and a couch so arranged as to be easily converted to a bed should it be found necessary. The sleeping berths again will be so designed that should one passenger only engage the room, all evidence of the other berth will be hidden, leaving only a single brass bedstead.

A number of single as well as double berth rooms will be provided so that the growing class of passengers who desire privacy can be catered for. There will also be a number of suites consisting of bedroom, sitting-room and bathroom. Besides the usual spacious dining saloon, lounge, café, library and writing-room, a large gymnasium will be provided on the upper deck. This will be fitted with a large variety of exercising machines. Another feature adopted for the first time will be the laundry, which will be found of great convenience, especially in the hot weather on the Chinese coast. In view of the service in which these vessels are to be engaged, the installation of refrigerating machinery fitted is very large, and comprises two machines for the preservation of perishable provisions for the ship's use. In order to ensure the safety of the vessels in the event of collision or grounding, the hulls are to be subdivided by numerous watertight bulkheads, closely spaced ; one effect of which will be that any four compartments can be open to the sea, or flooded, and the vessel will remain afloat. This is considerably in excess of Board of Trade requirements.

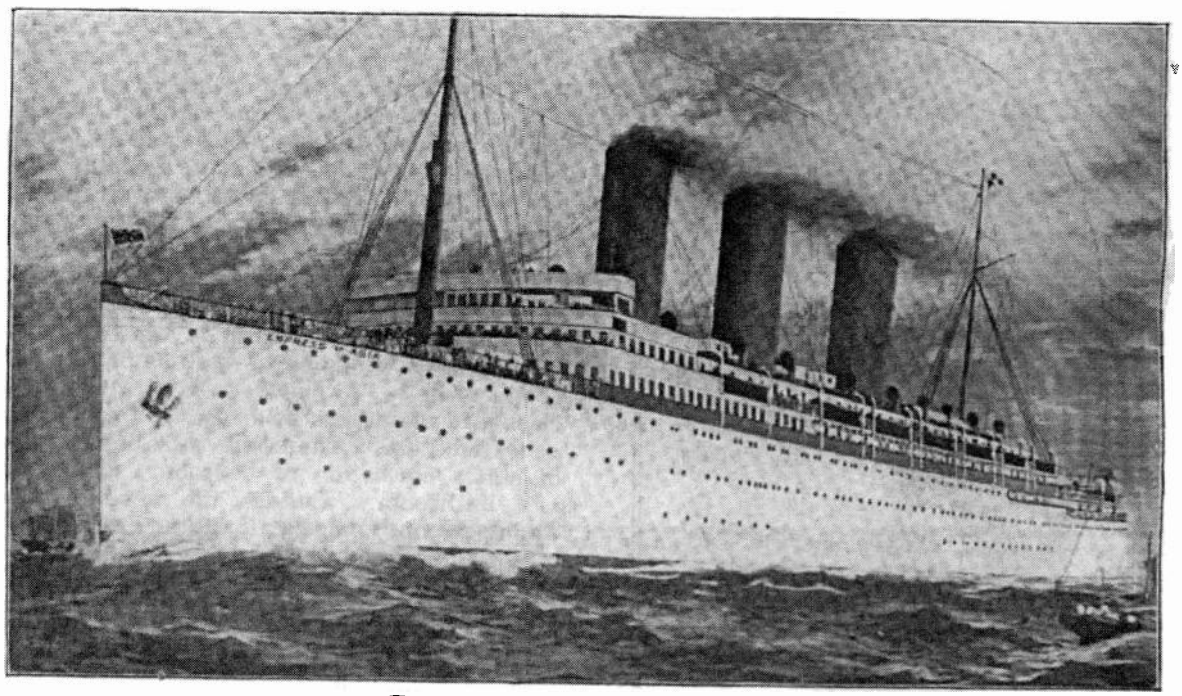
A departure from current practice has been made in deciding to construct the vessels with cruiser sterns and rudders entirely underhung This form of stern, besides giving the vessels a very distinctive appearance, increases the

effective length of the waterline, and so assists propulsion and adds considerably to the available deck areas at the after end.

The vessel will, of course, be fitted with a standard Marconi 1½-kw. modern apparatus. Special arrangements have been made for carrying silk, as it is by the Canadian Pacific route that the bulk of this commodity is conveyed from Japan to the markets of the world. By following a specified northern course, the C.P.R. mail steamers shorten the route by about 300 miles as compared to the routes to United States ports.

The necessity of wireless telegraphy was very much emphasised when the "Noruega" met with a very serious accident some weeks ago off Cape Hatteras. The "Noruega," of course, was equipped with the Marconi system, and the operator at once got into communication with two United States battleships and two revenue cutters. Assistance was promptly given, and the ship was towed to Newport News. The only salvage which the company had to pay was some $12.50, which had to be paid out on account of meals of some of the passengers who were taken off and placed on board a revenue cutter.

According to the *Times*, grave uneasiness was shown during the past month among underwriters for the safety of no fewer than ten large cargo vessels considerably overdue on Atlantic passages. All the vessels were known to have met with very violent weather, but none of them were equipped with apparatus for wireless telegraphy. The financial interests in the missing vessels were very large—the values of the ships and cargoes being roughly given in each case between £50,000 and £100,000. There is no exaggerating the uneasiness felt by the absence of news concerning the missing vessels; some of the vessels were practically uninsurable, and rates advanced to 90 per cent. The occurrences of the past month are a striking argument in favour of the equipment with wireless apparatus of all classes of vessels, especially those carrying large crews and valuable cargoes.



The s.s. "Empress of Asia" (C.P.R.)

Preparations are being made at Fishguard Harbour for equipping the four turbine Fishguard-Rosslare vessels, the "Saints," with the Marconi wireless apparatus. Three additional telegraphic clerks are to be appointed to the harbour staff, all the members of which are to receive instruction in wireless telegraphy, and they will then take turns on the vessels.

The accounts of the P. & O. Company for the year ending September 30th, 1912, show an item—£7,845—as expended on wireless telegraphy. It is stated in the report that there will be a considerable increase under this head in future accounts.

The Gun-Runners

A Syntonic Tale of Two Arcs, a Spark, and a Loose Coupling

IT was Sir Harry Lancing, the licensed wit of the Savage Club, who described the steam yacht "Miranda" as a "morganatic cruiser." The description caused a wave of laughter round the smoking-room of the club, followed by ripples along Pall Mall and Piccadilly, and occasional eddies in Mayfair and Belgravia—in all of which areas the Hon. Percy Morgan was well known. His reputation for Imperial patriotism had narrowed the doubt as to his descent. Everybody — himself included—regretted deeply that he was the second son, and not the first, of Baron Morgan of Belvedere. Save for that accident of heredity he would have been the decorative head of the All-Red party in the House of Lords. As things were, it was necessary for him to establish his position by means of intrinsic merit—aided, perhaps, with a little judicious advertisement.

Consequently he had built the "Miranda" for his Imperial tour. It would have been easy for him to telephone to Cook's for an itinerary, and to perform the tour by coupon; but that would have smacked of Bayswater, out of which his family had risen two generations before. So he called for naval architects, and shipbuilders, and engineers, and decorators, and upholsterers, and artists to produce a 3,000-ton steam yacht which would represent the climax of speed and luxury. Nothing was left undone which could induce the daily and weekly papers to take a keen interest in the vessel and its mission. The model selected was that of a British cruiser—not, it must be observed, the all-grey craft which is made to slink past unobserved, but the earlier type, with its full and conspicuous glory of yellow funnels, white paint for the deck works, and black hull with gilt lines.

The "Wireless" Crown

The crowning feature of the vessel was the wireless installation, which was then a novelty except among ships of war and a few of the largest liners. Visitors who were privileged to see over the boat prior to her departure from Southampton, gazed with proper awe at the aerials, and peered with an expression of wonder within the operator's cabin. So much was made of this installation that the owner was suspected by more than one weekly review of being a shareholder in the company, and of having done the whole thing as a blatant puff.

So the Honourable Percy Morgan set out on his grand tour with his daughter to keep him company. The vessel had been named after her; and she—according once more to Sir Harry Lancing—had been called Miranda as a hint that her father's proper name was Prosper-o.

The world heard from the "Miranda" at the West Indies, British Guiana, the Falkland Islands, New Zealand, Australia, the Malay Peninsula, Rangoon and India. It was in India that Mr. Morgan learned all about the Persian question, and he was so impressed with it that he determined to survey the Persian Gulf, although his daughter had grave doubts about the scenic and social values of that region.

"The place is infested by pirates," she declared. Then she added, as an afterthought, "I shall be bored to death."

"That is not the method adopted by the modern pirate," remarked her father, with that air of easy facetiousness which was afterwards, he hoped, to delight the House of Commons, if not the House of Lords.

In spite of her protest, the course was set for the Gulf of Oman—a place which, Miranda feared, would turn out to be a gulf of Noman. She felt inclined to pray for a pirate to provide a diversion which would make her cease to regret the loss of the hospitable excitements of India.

The Straits of Ormuz were traversed without incident, but when the "Miranda" entered the Persian Gulf the monotonous serenity of the blue sky was broken by the signs of storm. Captain Colquhoun wanted to turn back immediately to Bandar Abbas, and he relapsed into his native Gaelic when Mr. Morgan reminded him, with uplifted forefinger, that Britannia ruled the waves. Within an hour or two, however, even Mr. Morgan was tempted to doubt whether Britannia's sphere of influence extended to the Persian Gulf. The "Miranda" had weathered not a few storms during her long voyage, but as the vessel reeled and shook under waves that fell upon her from all points of the compass at once, Mr. Morgan began to wonder if his obituary notice in the *Times* would extend to one or two columns.

Towards evening the influence of Britannia began to make itself felt, and it was possible for Mr. Morgan and Miranda to venture on deck. It was then that the look-out sighted a sailing vessel, scudding under bare poles, with her fore top-mast broken and leaning in a tangle of cordage and torn sails against the main-mast.

Captain Colquhoun did not wait for orders to shift his course and bear down upon the stricken vessel. The salvage instinct is nowhere stronger than in the Scotchman. As for Mr. Morgan, he perceived at once that the rescue would represent a paragraph in every British newspaper, and possibly some foreign ones.

The vessel, however, showed no signals of distress. When the "Miranda" drew near enough for details to be observed, the crew were visible on the poop, huddled together out of reach of waves that swept the main deck. The approach of the "Miranda" seemed to agitate them, as they could be seen gesticulating wildly and pointing at the oncoming steamer. Captain Colquhoun wanted to lower a boat to take a towing rope across, since he judged that the crew, like most seamen from south of the 54th parallel, were not fit to save themselves; but Mr. Morgan stiffly reminded him that the "Miranda" carried the latest type of rocket apparatus.

The "Miranda" came close to windward of the sailing ship. The first rocket went wide, but the second carried the rope close to the main-mast, where it hung amidst the wreckage. Then the rescuers waited for the rescued to act. They waited while Captain Colquhoun said, "I told you so," in a variety of Gaelic forms. He was on the point of ordering a boat to be lowered when a tall figure broke from the swaying crowd on the poop, hung for a moment or two on the port ladder until the deck lifted itself clear of the welter of water, and then raced amidships and climbed the ratlines of the main-mast.

One Man on Board

Miranda confessed to herself, as she watched the performance through binoculars, that it was worth coming all the way to the Persian Gulf to see it. The rope hung tantalisingly out of reach; and with the irregular swaying of the vessel it was doubly difficult for the climber to know which hold to trust. He scrambled higher in the maze of rigging, testing each strand with swift care before he leaned his weight on it; but his manœuvres, although they were vastly exciting, did not bring the coveted rope much nearer to his hands. Then he retired to a yard-arm, where he appeared to think the situation over, and in a few minutes he renewed the attack with a length of rope tied to a block. He swung this out until, after many attempts, it fell across the rocket rope and curled round it. Before the watchers on the "Miranda" had finished cheering, he was on deck with the rope between his teeth.

Here the performance changed to comedy. Making the rope fast to a stanchion, the man ran aft and plunged among the crew, emerging after a struggle holding two men by the collar. He ran with them towards the ladder, released them, and pointed forward. They cringed like schoolboys afraid to take a plunge; but when they caught the gleam of a revolver barrel they dropped down the ladder and fled along the deck, timing their performance so badly that they were all but swept away in a great sea that poured over the gunwale. The tall figure followed and drove them to the bow, where the three hauled until the thick rope fastened to the rocket rope came on board and was made fast to the capstan. The vessel slowly drew bow on to the sea, and more hands were brought forward to the capstan. In half an hour's time a wire cable stretched between the ships, and the "Miranda" was slowly towing the "Euphrates" into shelter.

They anchored just before sundown in the bay of Nebkhara, where the only sign of life on the low sand hills was provided by a few huts, apparently belonging to fishermen. Captain Colquhoun sent a boat across to the "Euphrates" with his compliments and an invitation for the captain to come on board the "Miranda;" but the answer, delivered in good English, was to the effect that the captain of the "Euphrates" begged to be excused, as he and his crew were exhausted by the unusual labours of the day. He would pay his respects to the captain of the "Miranda" at dawn.

The peculiar effect of this reply was deepened by a communication which the quartermaster made privately to Captain Colquhoun and Mr. Morgan. He had seen naval service in Eastern waters, and the appearance of the "Euphrates" awoke memories. As a result of his communication the "Miranda's" searchlight was switched on, and, after a preliminary sweep of the hills, was focussed on the hull of the "Euphrates."

What the Searchlight Saw

The deck of the vessel was swarming with the men who were so exhausted that they could not thank their rescuers. Many of them were carrying burdens, and, as the glare of the searchlight fell upon them, they stood for a few seconds as if arrested by a lightning stroke. Then a sharp order was heard, and they disappeared with magical rapidity behind bulwarks and deck gear. The change was so

swift and so complete that the observers could hardly believe that their eyes had not deceived them in the first vision of the men.

"Damned fine salvage," said the captain abruptly.

"Oh, I know what they are," exclaimed Miranda. "They are gun-runners. How perfectly lovely!"

"Your comment verges on the absurd," remarked Mr. Morgan. "Captain Colquhoun, will you oblige me by calling Binney?"

Binney's position on the "Miranda" was a sinecure. During the many months of the voyage he had had little to do but listen for X's, and he had been obliged to while away the time by reading Hallam's "Constitutional History," and Gibbon's "Decline and Fall," varied by *faute de mieux* flirtations with the stewardess and the two ladies' maids who had been considered by Mr. Morgan as essential for his daughter. This call to action surprised him as much as the kiss must have startled the princess who had been asleep for a hundred years.

Mr. Morgan's first words to him surprised him still more.

"Mr. Binney, be good enough to signal the nearest British warship."

"The what?" gasped Binney.

"I think my instructions were perfectly clear. And even if I asked you to signal to Mars, I expect my orders to be obeyed without demur."

Binney spent the whole night "tickling the ether," as he described it to the stewardess when she crept up to him with a consolatory cup of tea. It was not until an hour before dawn that the tickle took effect. An answer came from H.M.S. "Nestara," a very sceptical answer, the answer of a man who profoundly suspects a practical joke. Binney had hard work to make the "Nestara" believe that he was the "Miranda," owner the Hon. Percy Morgan, long. E. 55, lat. 25°15', with a gun-runner at anchor within a quarter of a mile. The signals became faint with the approach of dawn before he had completely converted the sceptic.

Mr. Morgan's Diplomacy

Mr. Morgan, it must be confessed, handled the situation like a born diplomatist. He perceived that his best plan was to prevent the "Euphrates" repairing the damage or realising that her trade was suspected. It was necessary, that is to say, to maintain the *status quo* until the "Nestara" should arrive. Something must be done to remove the impression created by the searchlight, which had never been far away from the "Euphrates" all night.

Accordingly he sent a letter at dawn to the captain expressing his hope that he and his crew were rested, and craving leave to present two cases of wine for the refreshment of the crew. At the same time he begged the captain to do him the honour of breakfasting with him.

"Miranda," he said, as he observed the boat returning, "I have invited the captain of the 'Euphrates' to breakfast. You will please make yourself particularly amiable to him. I want to lull his suspicions as far as is possible, and induce him to remain comfortably at anchor for another day or two."

"Oh," remarked Miranda, "then I am glad I put on my Indian muslin."

She stood well back to give the Indian muslin every chance as the captain stepped on deck. She was a little daunted, however, by his appearance. His manner with her father and Captain Colquhoun was easy, if not gentlemanly, but he wore no collar on his cotton shirt, his grey suit was stained with tar and dust, and his boots gaped. For all his upright bearing and his new-shaven face, he certainly looked like a man who had just escaped shipwreck.

Miranda must have revealed her feelings in her expression as Captain Ingarfield stepped forward and was presented to her. His eye twinkled as he looked steadily at her.

"Good morning, Miss Morgan. I look like a tramp, and I feel like one. But, you see, I have just stepped off a tramp vessel."

Miranda flushed at his polite impertinence. Then her look changed.

"You are the man who climbed the rigging yesterday," she said quickly.

"Exactly," he said, "and the ten minutes up there did more damage to this suit than all the wear it has had in the ten years since I brought it second-hand in Ratcliffe Highway."

She felt that he was making fun of her, but before she could frame her resentment in a retort, the gong sounded for breakfast. Mr. Morgan was well aware that a bugle-call was the correct thing on board ship, but he preferred the gong, as it was more decorous and solemn.

When Captain Ingarfield heard the sound, his head went up and his eye shone.

"Dear old England!" he said, looking at Miranda with so frank an admiration that she was in doubt whether to accept it for herself, or for England, or merely for breakfast.

A Gentleman Gun-Runner

Before the meal was over Miranda had convinced herself that Captain Ingarfield was a gentleman. Consequently he was a ne'er-do-well, since no self-respecting English gentleman would be found commanding a gun-runner. And being a ne'er-do-well he was a fit object

of feminine compassion and solicitude. Handsome, in spite of his clothes! And courtly in his manners. Moreover, she always found his gaze resting upon her when her glance returned to him. The evident effort which it cost him to move his eyes away from her was a subtle and impressive compliment.

It was Mr. Morgan's policy to let his guest talk; and he talked with perfect freedom on every subject except the "Euphrates." Leading questions were parried so skilfully that Mr. Morgan himself forgot about them, and found himself immersed in a discussion on the proper treatment of subject races. He was surprised to find a man whose knowledge of the Empire and its mission was almost comparable with his own.

The Imperial conversation was resumed on deck, and continued uninterrupted until Captain Ingarfield happened to glance skyward and noticed the aerials stretched between the masts.

"The greatest invention of the age," remarked Mr. Morgan.

Captain Ingarfield appeared to be wrapped in contemplation of the strain insulators.

"Yes," continued Mr. Morgan. "I place Mr. Marconi next to Archimedes, Newton and Watt. I expressed myself in these words to him at a meeting of the Royal Society, and he appeared to be extremely gratified. I have one of the very latest types of apparatus on board. One never knows, you see. . . . There is my operator, Mr. Binney."

Binney Yawns

Binney passed them with a very alert expression, but at the door of the operator's cabin he yawned preposterously. Captain Ingarfield observed him from the corner of his eye.

"Mr. Binney does not sleep well at nights," he remarked, turning to Mr. Morgan.

Mr. Morgan flushed. "His duties occasionally interrupt his slumbers," he explained.

"In the Persian Gulf?" asked Captain Ingarfield.

"He was trying to get into touch with the station at Aden—" chimed in Miranda. "He is always experimenting that way, and it is easier to send messages in the dark."

"Is that so? But when I was at Aden——"

Captain Ingarfield stopped. Binney had left the door of the cabin open, and the *zip, zip* of the spark could be clearly heard. Mr. Morgan, aware that the conversation had taken a dangerous turn, started on the Imperial track again, and talked steadily with what he knew to be absorbing eloquence. Captain Ingarfield was certainly absorbed; he lay back in his deck chair with his eyes half-closed, smoking slowly in the manner of a man whose mind is fully occupied.

At the end of an hour Binney reappeared and signalled to Mr. Morgan, who rose and went aft. Miranda, left alone with Captain Ingarfield, noticed him smile.

"You are amused, Captain Ingarfield?"

"At life's little incongruities. Yesterday and to-day, for instance. To-morrow may be just as different from both as each is from either. Who knows? And in the East, who cares? Wireless telegraphy will never be popular out here, Miss Morgan, because it means that somebody is fidgetting about what is going to happen to-morrow. It is as out of place in the Persian Gulf as a searchlight itself."

"A searchlight?" queried Miranda, innocently.

Captain Ingarfield rose and looked at her steadily.

"Miss Morgan," he said slowly, "you are the only woman I ever met with eyes exactly like those of my mother."

Before Miranda could recover from this attack, Mr. Morgan returned and asked Captain Ingarfield if his duties would permit him to return for dinner that evening.

"Neither my duties nor my wardrobe," replied Captain Ingarfield.

"I would ask you to remain for the afternoon," added Mr. Morgan, "but it is my invariable custom in these latitudes to rest for three hours."

"Admirable! I am sorry that the accommodation on the 'Euphrates' will not enable me to return your hospitality. I do not know that I could offer you so much as a cup of tea."

He looked appealingly at Miranda as he spoke; and before he left the ship Miranda found an opportunity to whisper to him that tea was at four o'clock.

Miranda Plays Traitor

He returned an hour before that time, and sat on deck with her, talking steadily. For the time being she was Miranda in the fascination which this unknown Ferdinand exercised upon her; for the rest she was Desdemona at the feet of Othello. He talked of England, of school, of Oxford, of his first voyage, his shipwreck, his fighting in South America, his experiences as a prospector in Mexico, his wanderings on the shores of the Mediterranean, his final yielding to the magic of the East. Miranda listened, and thrust out of her mind the thought of the cargo which lay in the hold of the "Euphrates," and the vision of the "Nestara" flinging the foam from her bows as she raced over the miles which lay between her and Nebkhara.

Mr. Morgan, emerging from his invariable rest, noticed them together and retired with a diplomatic smile. Captain Ingarfield did not say good-bye until the sudden night had fallen. As he turned to leave her she whispered his name sharply.

" You called me ? " he asked.

Her face, visible in the reflection of a deck light, showed acute distress.

" Yes. I have no right to tell you, but I must tell you—to—to beware."

He came close to her, and her eyes sank under his look.

" Why do you tell me this ? "

She put her hands out to him appealingly. He caught them and held them.

" I have a message for you," he said slowly. " It is this : be afraid of nothing—and *wait*."

He released her hands and walked quickly to the gangway. She did not move until the boat had returned from the " Euphrates."

The Search

Next morning the dawn revealed the " Nestara " at anchor close to the " Miranda." Mr. Morgan surveyed her with a proud consciousness of duty performed, of the power of the Empire, and of the marvels of wireless telegraphy. He watched the lowering of a boat and its passage to the " Euphrates " ; he watched the short colloquy on deck, and waited with carefully concealed impatience for the reappearance of the search party. After a full hour the bluejackets emerged again, tumbled into the boat and rowed towards the " Miranda."

Mr. Morgan had carefully prepared, and had rehearsed again and again, his neat speech to the captain of the " Nestara," politely deprecating any idea of thanks and declaring his pleasure at having been the humble instrument of serving the Empire.

The captain, however, had a brow like thunder and an eye like lightning. For the first few minutes of their interview all that he could say was, " Not a damned rifle, and not a damned cartridge, in the whole damned hulk."

Mr. Morgan was destined to hear these words in his dreams for many a night afterwards.

A Reception, and Another

Six months later, however, he had recovered sufficiently to carry out his intention of holding a magnificent reception in London as the climax of his tour. Magnificent, because it was at once huge and select. More than one duke was present; peers were plentiful; the Cabinet was there to a man ; and the cream of the diplomatic, social, scientific and artistic circles of London had been whipped for the occasion.

It was towards the end of the great event, when most of the guests were departing, that Sir Thomas Knaresby asked permission to introduce his son. Mr. Morgan turned languidly to shake the hand of a tall young man whose face seemed familiar and suggested something obscurely unpleasant. He was surprised to see his daughter turn pale at sight of this stranger ; he was still more surprised when Miranda consented to take the arm that young Knaresby offered her. They walked away together.

" That's my young rover come back again," said Sir Thomas proudly. " If ever you want a secretary who knows the world inside out and back again, Harry is your man."

Mr. Morgan grunted unsympathetically. There was something very puzzling and very annoying about that young man's back.

Harry led Miranda straight to a seat in the conservatory. But she did not sit down. She turned towards him, her head high, her eyes full of pride struggling with surrender.

" Tell me the truth ! " she cried.

" I love you," he answered.

" I know that."

" And you will marry me."

" A gun-runner ? " Her voice became almost hysterical for a moment.

" Even that," he returned.

" Yet you are not that. No one could ever make me believe that you are that."

" But even if I were, you would still marry me."

He persisted, beating down her opposition and her questioning with a deep gaze which showed the glint of humour she remembered so well. She gave him her hand at last, and they sat down together.

" Tell me at once," she said, " the whole story."

" I told you it all that glorious afternoon—all but the last chapter. I came on board the ' Euphrates ' by the merest chance. One night at Aden I got mixed up in a scrimmage. Some Arabs were belabouring another native ; no doubt he deserved it, but I went in on his side. It was as good as a football match for about five minutes ; and then the native and I had to fight a rearguard action, to put it mildly. All the scum of Aden seemed to be upon us. He was no coward, because he could have bolted and left me to the wolves. But he sang out that he had a boat handy, and he stuck by me until we were near the beach. For the last fifty yards it was a question of revolvers, and you can imagine I was glad to find myself in the stern of a ship's boat, being rowed like fury away from the furies.

" You can also imagine," he went on, " that I was glad to stay *perdu* in Saladin's ship—

we'll call him Saladin—while it meandered round the coast of Arabia. He had saved my life, in a sense ; and I was bound to say nothing when I discovered that he did not trade in innocent Brummagem goods and the products of Persia. That was the situation when the storm smashed us up. Saladin thought the 'Miranda' was a cruiser, and was ready to scuttle the ship. That was why I could get nobody to lend a hand in the towing business. My kindly host begged me to get him out of the scrape by pretending to be captain, under an assumed name. During the first night we were busy getting the cargo ready for taking ashore, when the searchlight struck us.

"Heavens, the oaths—in every Mediterranean tongue. I thought you must have heard them and been scarified. We did not move a limb all night, except to creep further out of sight. Then in the morning I had to find out how much you knew or suspected. The wireless performance told me everything. I spelled out every word the ingenious Binney sent to the 'Nestara.' Your father, of course, never dreamt that I knew a letter of the Morse code. But while he talked I found out just how many hours we had before we would be searched."

"You played us a trick ? "

"Yes, and such a simple one ! On the second night, while your searchlight played on our starboard side, we were busy at the port side of the lower deck sinking the cases silently one by one. If there had been a real seaman on board the 'Miranda' he would have noticed that in the morning we drew a foot less water than we had done the night before. Saladin took a thousand bearings of the spot, and no doubt he has had the guns up months ago."

"I wonder," said Miranda, with a smile, "if you really behaved as a loyal British subject ? "

"I doubt it," replied Harry cheerfully "Once or twice, during breakfast on the 'Miranda,' I was tempted to give Saladin the slip and go back with you. It was the bacon and the marmalade that did it. But as soon as I heard the wireless go *zip*, I felt that I had to uphold the sacred rights of hospitality and get Saladin out of the mess. Was your father very angry ? "

"He will never forgive you."

"Well, the father's forgiveness does not seem to matter much in these days of eugenics, and anarchy, and revolting females, and——"

"And wireless telegraphy," she added.

But their subsequent communications, being at extremely short range, did not involve that form of Hertzian wave action.

Brevities

". . . A Marconi has been of more use to Italy and to the world than a second Raffaello or a second Michelangelo could have been."—Richard Bagot in *Gens Italica*.

The opinion of experts was only useful for the purpose of prophecy. When the experts said they could do a thing, it was desirable to wait until they had done it before their views should be accepted.—COMMANDER LORING.

"At a dinner of the Musical Association, Dr. Cummings said he hoped that in future they would have higher and better branches of the art to investigate, and in this connection referred to the great developments in wireless telegraphy. This is a direct incitement to Dr. Richard Strauss to write a syntonic symphony, in four-sevens time."—*Electrical Industries*.

At a dinner given by the Authors' Club, in honour of the Lady Sybil Grant, Mr. Walter Emanuel read some amusing telegrams purporting to convey regret of celebrated absentees from the function. Amongst them were the following :

Mr. Lansbury (the rejected of Bow and Bromley) : "Thanks for offer of a seat, but it is in the wrong place."

Mr. G. Bernard Shaw, in reply to query whether he was coming, wired : "You never can tell" ; while Mr. G. K. Chesterton answered : "I am not Shaw."

Mr. Marconi : "I consider it an insult to ask me to send you a wire."

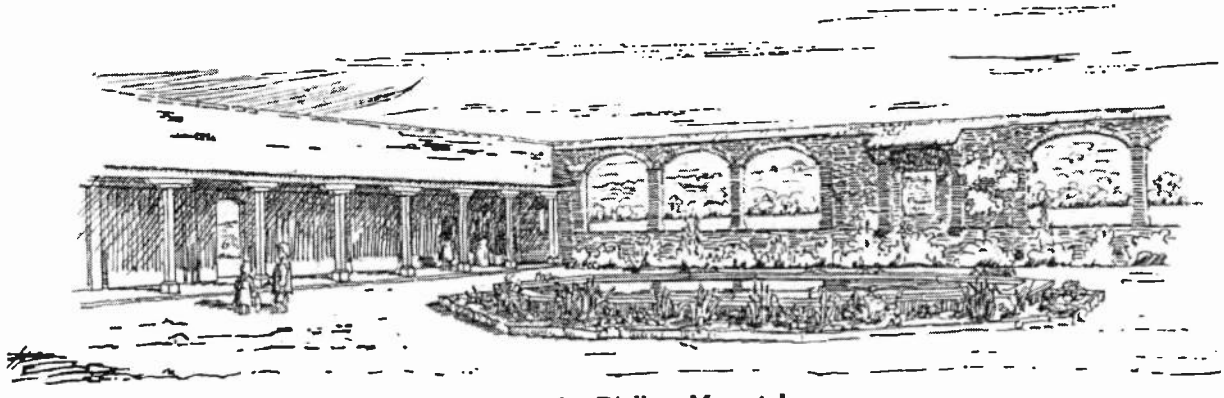
Often passengers who run short of ready cash send wireless messages to their bankers in New York or London for a remittance. The money is advised to the purser, who advances it to the passenger. This system, apparently, is not always an advantage to the passenger of gambling propensities, and the following may be cited as a warning : A certain gentleman lost all his ready money at cards in two days after the vessel left New York. As soon as he could he got a wireless advice from his bankers for £150, but ere the voyage was over he only had a five pound note left. He confessed to the operator before leaving the ship that he would never send a wireless message for money again.

A conference has been called in Russia in order to draft regulations for the Government supervision of wireless stations and the use of wireless on foreign ships in Russian waters.

The Phillips Fund

THE committee of the Phillips Memorial have now issued an appeal for further help to complete the scheme of a cloistered square looking out on to one of the most beautiful views of meadow and wooded hill that is to be found near Guildford. Accompanying the appeal is a sketch of the cloister as it will appear when completed, and this is herewith reproduced by kind permission of the committee. It shows the greater part of one of the three cloistered sides, and of the fourth wall to the south-east, which is pierced with arches to the right and left of the Memorial Panel. In the foreground is a large water-lily tank, which is to be bordered with a wide flower-bed.

If the amount subscribed permits the adoption of the scheme, Godalming—the birthplace of Phillips—will be provided with a beautiful and fitting memorial to its brave townsman.



Design for Phillips Memorial

This sheltered spot will afford an opportunity of rest and quiet recreation to many; particularly as the enclosure is not intended to be a children's playground, or a spot for noisy merry-making, for a green playground adjoining provides ample space outside for noisier pastimes. It is connected with the Phillips cloister by a door in the eastern wall (shown to the left of the illustration), so that in the case of a sudden storm the occupants of the meadow may have easy access to the shelter of the cloister.

The total amount subscribed to the fund is £430, and the estimated cost of the completed scheme is £700, leaving a balance of £270 yet to be obtained. The Mayor of Godalming and many members of the Memorial Committee have expressed their willingness to receive subscriptions, while copies of the appeal will be forwarded immediately on receipt of an application to Mr. T. Percival Whately, the Town Clerk, Godalming.

A Clearing House for the East

IN the course of an article drawing attention to the continuous presence in the harbour of vessels fitted with wireless, the *Straits Times* of Singapore appeals to the local shipping agents to co-operate with the Government in receiving messages from ships expected, announcing the approximate time of arrival, the quantity of bunker coal, water or fresh provisions required, and similar information whose early receipt would economise time and facilitate the working of the ship's business generally. The Government is providing itself with legislation giving it control over the working of wireless installations on board ships within the jurisdiction of the port authorities. The inference from that would be that the Master Attendant's Department would be the proper agency to receive and distribute such messages as might arrive from ships in the China sea making for Singapore, and be picked up by the wireless installations of ships in the roads or at the wharves. Our contemporary suggests that this could be done in the following way: A list should be kept of all ships equipped with wireless running to Eastern ports. When one of these arrives in port, a circular from the shipping office might notify that the master attendant would receive and distribute any messages from ships in the China Sea, any weather reports, reports of derelicts or wreckage, or reports of ships out of control, with engines broken down, or it may be on fire and needing assistance from salvage vessels, or otherwise. For each such message picked up and sent in to the shipping office a fee should be payable to the ship receiving the message.

At an exhibition of scientific instruments, held last month under the auspices of the Preston Scientific Society, Mr. J. H. Morris gave interesting demonstrations of wireless telegraphy.

Monthly Miscellany

DID any of the MARCONIGRAPH readers wander—or perhaps it would be more appropriate to say lose themselves—in the toyshops of the West End? If they did, there is no doubt they had a bewildering experience. The cult of the child has surely reached a maximum, for half humanity appears to have employed itself in scheming and devising all sorts of fantastic toys and queer games to delight the minds of the juvenile. That is without counting the books which appear in their hundreds, splendidly bound, and lavishly illustrated, not by middling spirits, but by the most skilful artists and cunning craftsmen of the times. And how excellent all this is! The child who is brought up—educated, if you like—on the best, ought to turn out a finer creature than he who was only thought of in leisure moments, or was given anything that "would do" to keep him quiet. But to return to our subject, the most striking feature of all this display was the toy wireless set—a clever little piece of apparatus, and a gift that would fascinate any boy, and bring down his benediction on the giver. Those who made themselves responsible for the pleasure of young England were quick to recognise this fact, for quite early in the season, so the toymen assure us, the demand for this wireless set was abnormal, and it was soon recognised that wireless was to be *the* Christmas toy of 1912, and *the* youthful pastime of 1913. Nor have the results been disappointing; in fact, the trade has been hard put to it to meet the demand. This new toy—though it is really more than that—is made specially under a Marconi licence. It is complete in every detail, and has a really wide receiving range. Its purchase price is £6 10s., but there is another, a little larger set, costing a mere trifle of £10 10s., which can do wonders. It has a complete transmitting and receiving station, with a range of 400 yards, and can be fitted from the drawing-room to the summer-house, from the library to the stable, or in any other position that its owner may think fit, and it is possible to combine a large amount of utility with entertainment. For say the pony is wanted immediately; it is a matter of a few moments to rush to the apparatus and set the transmitter at work. It is understood, of course, that an apparatus capable of being put to such a use as this would need to be supplied with an automatic buzzer. This addition might mean a slightly increased expenditure, but its advantages are obvious. Oh, happy youth with such a wonder-working toy!

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There is a curious and distinctly gratifying sequel to Mr. Marconi's unfortunate accident near Spezzia. This, it will be remembered, took place at a shady turn called the Berghetto Corner, near the village of Borghetti di Vara. Since then the peasantry of the district have taken to calling it "Marconi Corner," and the Municipality of Borghetti has decided to record the event by a marble tablet, which will be inserted in the wall of a neighbouring farmhouse.

* * *

The *Evening News* is to be warmly congratulated on its happy idea of providing London's slum children with dolls and toys so that they might remember Christmas, which, but for this kindly forethought, would *mean* nothing at all to these unfortunate little *ones*. As it is, one hundred thousand dolls have made their appearance in quarters where the coming of a doll is an event. And such dolls, too! Their clothes take on and off, and they are clad in purple and fine linen such as their little owners could never hope to wear. How excellently the whole scheme has been managed, and what numbers of hands have assisted to bring this gigantic scheme to so happy a conclusion! Help has come from everywhere, and not least from passengers on some of the great Atlantic liners, who were willing to employ such of the leisure time of the sea voyage on this good work. This doesn't sound as though it had anything to do with wireless telegraphy, but to presume such a fact would be to come to a too hasty conclusion, for the Marconi Company offered their services in the transmission of news about the doll dressing by wireless, free of charge. Bulletins were sent by passengers to inform the *Evening News* of the progress made by workers, who in turn were informed of the daily increase in the number of dolls received. You can imagine the interesting conversations which took place at that time between the ships speaking to each other as they passed in mid-Atlantic—"How many dolls have you dressed? We are on our second hundred."

* * *

A Marconigram will often contain in its curt phrases the suggestion of a comedy, or the outline of some dramatic situation. Of such a nature is the message telegraphed not so very long ago by an Austrian Lloyd steamer to Trieste. It seems that the "Graf Wurmbrand" (for this was the name of the vessel) had on board that redoubtable Albanian leader, Ismail Kamail Bey, who is a keen adherent of Turkish rule. The Greek naval base had got wind of the whereabouts of the chieftain, and two torpedo boats were sent in hot pursuit of the "Graf Wurmbrand." They caught her up just outside Durazzo, and without more ado proceeded on a tour of inspection over the

unfortunate vessel. But smart as the Greek sailor may be, on this occasion he was not smart enough; for despite a very thorough investigation, Ismail Kamail Bey was nowhere to be found. Sore perplexed, the search party withdrew to nurse the disappointment, which was the only result of their wild-goose chase. Why they failed was explained in the last few words of the Austrian captain's wireless message, wherein he complained of his treatment to the sympathetic friends at Trieste: "Ismail Kamail Bey, with his followers, had landed a little prior to the visit of the Greeks." How delightful for the escaped chieftain! Let us hope that a strong wave of wireless imagination enabled him to appreciate the humour of the situation, and gave him the opportunity of waving—at least in metaphor—his pocket handkerchief *en salut d'ironie* at the nonplussed and retreating warships.

* * *

How fast news travels by wireless, and how varied its nature! Every day the newspapers report information which has reached them by this invisible means. To-day it is a tragedy; yesterday it was the tale of a gallant rescue; to-morrow it may be a report of war—or of peace? Let us hope the latter. Amongst the more recent events notified in this way is the loss of the "Oravia." The circumstances of the disaster afford another instance of the efficiency of wireless in life saving. The vessel was wrecked off the Islands on November 12th, 1912. She struck a rock about half-a-mile from the lighthouse at the entrance to Port Stanley, at ten o'clock at night. Blinding snow and intense darkness made it impossible to see anything. That no life was lost was due only to the fact that the wireless apparatus immediately dispatched distress signals, which were responded to by five whale boats. These arrived on the scene of the disaster only three hours after the ship had struck, and not only were the passengers and crew saved, but the mails and baggage were safely conveyed to the rescue vessels. Nevertheless, the work of rescue was none too quickly accomplished, for shortly afterwards the "Oravia" broke in two and sank.

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Surely some of the saddest news wireless telegraphy ever dispatched was that which was sent out to Mr. Ogden Mills Reid, who was travelling on board the "Kronz Princessen Cecile," to inform him that his notable father had passed away.

The Training of Operators

THE announcement in the November MARCONIGRAPH that evening classes were to be established at Marconi House for the training of telegraphists to take charge of wireless installations on board ship, has brought shoals of inquiries from intending candidates. Applications have been received from all parts of the United Kingdom, but as the evening classes must obviously be limited to young men who reside in London or within easy reach of the metropolis, the field of selection was limited. But the announcement goes to prove that a very large proportion of young men, who find themselves at present in occupations which do not offer very alluring prospects for future advancement, are willing to enter the wireless service, and take advantage of the favourable opportunities which are open to men of undeniable ability and character.

The evening classes commenced on Monday December 16th last. These classes meet three times weekly—Mondays, Wednesdays, and Fridays—from 7.30 to 10 p.m. During the first hour and a half, instruction is given in Falkland ordinary telegraphic work, such as the Morse alphabet and simple sending and receiving. The last hour, from 9 to 10, is devoted to elementary instruction in electricity and magnetism, and this course has been arranged to equip the candidates with a sufficient knowledge of the subject to enable them to understand the application of electricity to wireless telegraphy. The students have the advantage of receiving instruction from tutors who have had considerable practical experience over the whole range of wireless telegraphy, and by assiduous attention to the work of the classes they should be able to pass the necessary examinations within a short time. The period of tuition must necessarily depend upon the capacity of the student, but young men between nineteen and twenty-four years of age, possessing even average ability, should be able to pass the Postmaster-General's examination in wireless telegraphy in less than twelve months. Students who have succeeded in passing the necessary examination will immediately join the Marconi Company, and will be drafted for service at sea, and the total fee paid during the period of instruction will be refunded. As we have already stated, the classes commenced on December 16th with sixty-three students. The accommodation of the school, however, is for about twice that number, but the number of applicants by far exceeds the accommodation, which will soon be taxed to its utmost capacity.

Football

Since the last issue of this Magazine the Marconi Football Club (London) have not met with much success. They were at home to Ellison on Saturday, November 23rd, and sustained their first defeat in the Western Suburban Alliance, the visitors gaining a victory by three goals to one. On the following Saturday the Palmer Tyre Club visited the Acton enclosure in an Alliance match, and were rather lucky to escape with one of the points. A goalless draw was the result, and the faulty shooting of the home forwards, combined with an excellent display by the visitor's goalkeeper, saved the Palmer Tyre from defeat. On December 14th North Paddington paid a visit to Acton, and defeated the home team by three goals to nil. Playing Wembley away from home on December 21st the Marconi club were defeated by five goals to three.

To compensate for the indifferent performances of the first team, the reserves were at home to Ealing Y.M.C.A. on December 7th, and after a good match gained a victory by three goals to one.

Personal

Mr. E. Blake, operator-in-charge of the station at Soller, has obtained leave to proceed to England to be married.

Mr. James Gill, who has been appointed resident inspector for the Marconi International Marine Communication Co., Ltd., in New Zealand, left London by the s.s. "Turakina" on November 28th.

Mr. H. Caswall, of the engineering staff of the Marconi Wireless Telegraph Co. of Canada, was married on December 7th at Folkestone (England), to Miss E. Bluett. Before leaving Montreal, Mr. Caswall was presented by his colleagues with a cabinet of cutlery. Mr. and Mrs. Caswall returned to Canada at the end of December.

Movements of the Engineers

(London)

F. E. Burrowes has returned to London from the Falkland Islands, and is now on foreign service leave.

H. B. T. Childs, who has been superintending the erection of steel masts for the Canadian Marconi Co., is now on his way back to England.

R. G. Kindersley has returned to London from Broomfield, and is now at the head office engaged in special work.

R. K. Rice left London for Malta on December 21st to superintend the erection of a 1½-kw. Marconi land station for the Eastern Telegraph Co.

W. S. Entwistle has arrived in London from special leave in South Africa, and is at Marconi House.

H. Longton has been transferred from the company's Broomfield technical school to the head office telegraph training school for further instruction.

(Canadian Company)

W. A. Appleton, assistant engineer of the Newfoundland Labrador, has left for Montreal after the closing of the Labrador stations.

J. O. G. Cann, engineer in charge of the Labrador stations, who has been engaged in superintending the closing of Point Rich station and the overhauling of Point Amour station, has now left the Straits for the winter.

E. E. Richards, having completed the inspection and overhauling of the Gulf of St. Lawrence and Eastern stations, has returned to Montreal.

(Spanish Company)

Messrs. Sauvé and Hughes, of the Compañia Nacional de Telegrafia sin Hilos, are engaged on erection at Finisterre and Santander stations. Mr. Walsh is in charge of the erection of the Santander station.

Mr. Johnson, of the Compagnie de Télégraphie sans fils, has proceeded to Malaga.

Movements of Operators

L. G. Hosking, from the Clifden Station to the "Saxon."

T. Knox, from the "Parisian" to the "Caledonia."

S. P. Lewis, from the "Arcadian" to the "Ionic."

S. W. Lewis, from the "Oravia" to the "Desna."

H. T. Little, from the "Highland Brae" to the "Highland Warrior."

S. A. Ludlow, from the London School to the "Avon."

C. T. Massey, from the "Garth Castle" to the "Avon."

J. Mather, from the "Himalaya" to the "Maloja."

H. Matthews, from the "Carmania" to the "Empress of Ireland."

P. Mattock, from the "Caronia" to the "Teutonic."

C. V. Maudsley, from the North-Eastern Counties Exhibition to the "Caledonia" (P. & O.).

G. N. McCormack, from the "Munster" to the "Dakar."

J. M. McKenna, from the "Lake Champlain" to the "Pomeranian."

T. W. Murray, from the "Lusitania" to the "Worcestershire."

W. Murphy, from the London School to the "Franconia."

P. R. Norwood, from the "Cedric" to the "Bohemian."

C. S. C. Nixon, from the London School to the "Dongola."

D. O'Sullivan, from the Liverpool School to the "Cedric."

E. Overall, from the London School to the "Pomeranian."

R. H. Packer, from the "Minnewaska" to the "Simla."

K. W. Page, from the "Winifredian" to the "Bohemian."

R. V. Patrick, from the "Kenilworth Castle" to the "Edinburgh Castle."

A. E. Perfect, from the "California" to the "Mongolian."

C. W. Perkin, from the "Hildebrand" to the "Runic."

C. Peters, from the "Hyacinthus" to the "Ivernia."

R. Plummer, from the "Minnewaska" to the "Mayaro."

G. Plummer, from the "Mayaro" to the "Minnewaska."

W. Raw, from the "Empress of Britain" to the "Hilary."

C. Robertson, from the "Milwaukee" to the "Zealandic."

J. Ralphs, from the "Bohemian" to the "Atahualpa."

C. T. Sanders, from the "Amazon" to the "Arlanza."

R. C. Scott, from the "Ausonia" to the "Corinthian."

W. H. Silvester, from the "Gaika" to the "Dunvegan Castle."

H. J. Stanley, from the "Majestic" to the "Iroquois."

A. W. Stephens, from the "Avon" to the "Carisbrook Castle."

A. E. Shorter, from the "Majestic" to the "Rohilla."

D. H. Sinclair, from the "Ausonia" to the "Corinthian."

S. C. Summerlin, from the "Columbia" to the "Hesperian."

J. L. Salmon, from the London School to the "Scotian."

A. F. Smith, from the London School to the "Ionian."

E. G. Terraneau, from the "Belgic" to the "Hyacinthus."

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

R. W. Tymms, from the "Akabo" to the "Belgic."

B. W. Tinker, from the London School to the "Aragon."

J. Vincent, from the "Bohemian" to the "Desna."

C. B. Vaughan, from the London School to the "California."

G. P. Wakeling, from the "Gloucester Castle" to the "Elysia."