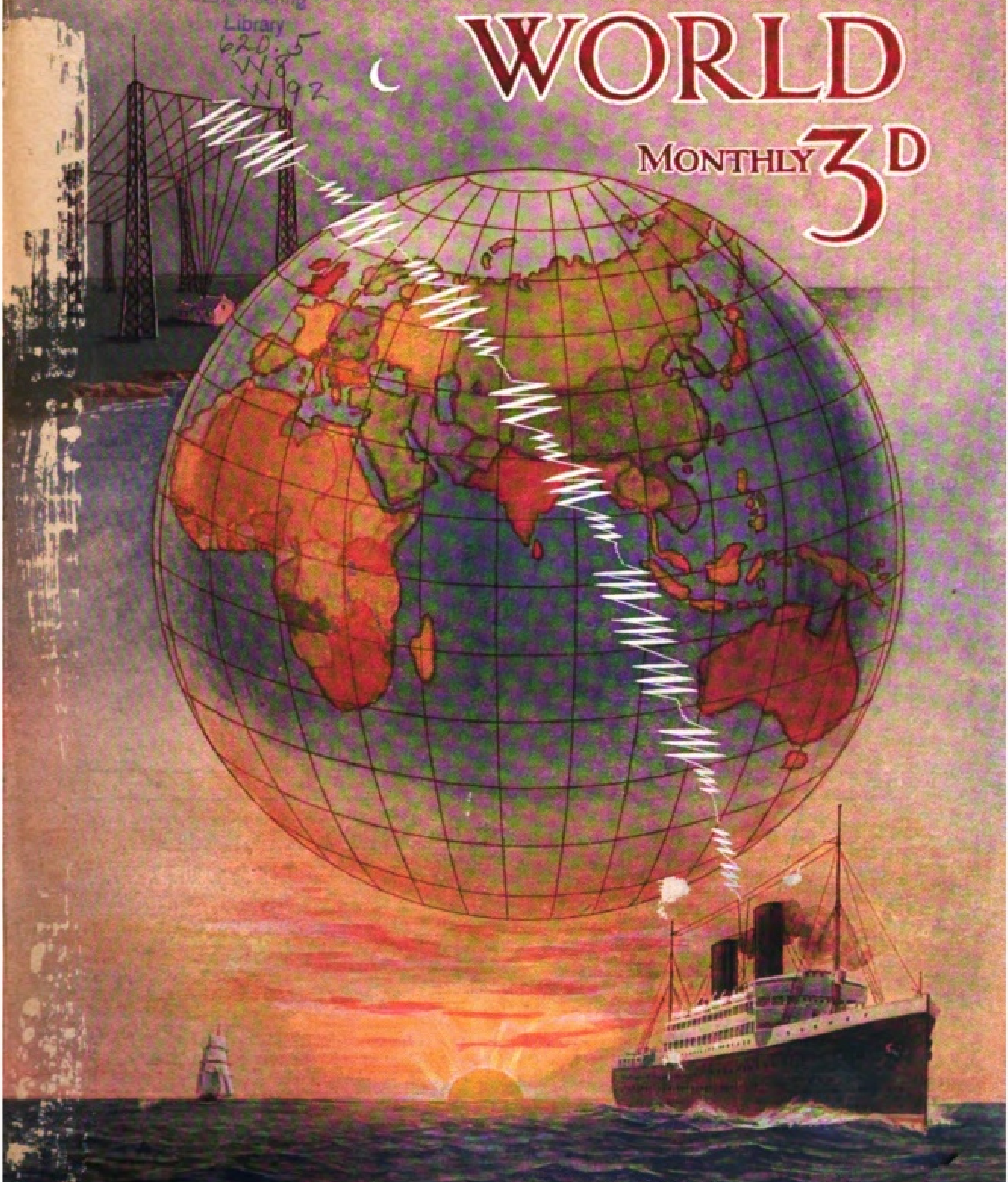
WIRELESS WORLD

MONTHLY 3D



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THE WIRELESS WORLD

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High-Speed Wireless Telegraphy

IN answer to a question in the House of Commons on May 13th the Postmaster-General made the following interesting announcement: "A successful demonstration of wireless telegraphy at 100 words a minute was recently given by the Marconi Company between Chelmsford and Letterfrack (Galway), and it is proposed to adopt this method of working between a station which I am about to establish near Stonehaven and an existing Post Office station near Newcastle-on-Tyne, as a stand-by in case of the interruption of the overhead lines."

High-speed transmission and reception is rapidly becoming essential to the efficient working of commercial wireless telegraph stations. By the use of such a system several telegraphists can be employed in punching the tape to feed one transmitter, and thus all the messages can be got through without delay, and the traffic capacity of a station increased many times.

Another important application of high-speed working is in time of war, when a vessel can get a long message through in a short interval between the enemy's "jamming." Moreover, it will be impossible for an enemy to "tap" messages sent in this way unless provided with suitable high-speed receiving apparatus.

The Marconi Company have standardised two systems of high-speed transmission: (1) The electrically operated signalling switch in conjunction with a relay, and (2) the switch operated by a pneumatic engine. Both types of switches are operated primarily by a Wheatstone automatic transmitter, using the ordinary perforated Wheatstone tape, or "slip." The electrically operated switch is suitable in cases where a speed of transmission of not more than sixty words a minute is specified, and it has the advantage of not requiring any special plant for its operation, the station battery supplying the necessary power. For speeds up to 150 words per minute the compressed air engine-switch is used. In both cases the switch (or switches, if the power employed is too great to be handled conveniently by one switch) is placed in the high-tension lead from the transformer. The compressed-air switch will work perfectly uniformly and regularly for long periods with no attention save lubrication, the burning of the contacts being remarkably small. For transmitting with either of the switches a standard Wheatstone transmitter is used.

For high-speed recording (a necessary accompaniment to high-speed transmission) a recording phonograph is employed. The signals are magnified by valves and relays, and a record of them is taken with the wax cylinder of the phonograph running fast. The record is then transferred to another machine running at such a speed as to be comfortably readable by the operator, and he writes down the message in the usual way, the phonograph head-piece leaving both hands perfectly free.

This method has a very great advantage over such visible recorder methods, in that the ability of the human ear to discriminate between a musical note and atmospherics is to a great extent retained and utilised; for though the received note is reduced in pitch when reproduced at the lower speed, it still retains the characteristics of the musical spark of a disc discharger.

MR. FRANCISCO SETUAIN

Personalities in the Wireless World

FRANCISCO SETUAIN

Director of the Compañia Nacional de Telegrafia sin Hilos

THE impending opening of the Anglo-Spanish wireless service affords a fitting opportunity for introducing to our readers Mr. Francisco Setuain, a Macaenas of wireless telegraphy, whose distinguished services on behalf of the Compañia Nacional de Telegrafia sin Hilos has helped to raise that company to the proud position of participating in a development which marks a distinct stage in the advance of commercial wireless telegraphy.

That development is a reminder to the world that in connection with naval operations and ordinary marine communication wireless telegraphy has by no means reached the limit of its applications—vast and important though those applications may be, as has been again and again demonstrated by the aid which it has rendered in saving life at sea, and in this connection our thoughts hark back to Mr. Marconi's memorable achievement of bridging the Atlantic and establishing commercial communication across it by wireless telegraphy, which was the forerunner of many notable developments now on the eve of completion.

Like others to whom we have had occasion to refer in these columns from time to time, Mr. Setuain has brought to the Compañia Nacional de Telegrafia sin Hilos a mind matured in the domain of commerce; accustomed to and capable of conceiving and executing bold and extensive plans; constructing and bringing to bear on a mighty object a complicated machinery of means, energies, and arrangements and thereby accomplishing great effects.

The early years of Mr. Setuain's commercial life were passed in the service of the Compagnie Générale Transatlantique, one of the great shipping companies who have placed France in the forefront of the maritime nations of the world, and whose early recognition of the value and utility of wireless telegraphy has helped it to its present unique position as a means of marine intercommunication. It was in France that Mr. Setuain received his education, and this fact probably accounts for his association with the Compagnie Générale Transatlantique. It was not long, however, before that company recognised his energetic capabilities and he was offered and accepted an important position on their staff. Fortune continued to favour Mr. Setuain, for he was later appointed the company's representative in Mexico. But he did not stay long in that troubled Republic, for, returning to Europe, he settled in his native country, and continued to serve the Compagnie Générale Transatlantique in Spain.

It is at this period of his career that the particular greatness of Mr. Setuain reveals itself. He became a director of the Banque Transatlantique and also interested himself in the insurance companies "La Union" and "El Fenix Español," of which he assumed the directorship in 1908. Wireless telegraphy also claimed some share of his tireless activity when he became a director of the Compañia Nacional de Telegrafia sin Hilos.

Lest it should be thought that the administration of commercial companies monopolise the attention of Mr. Setuain we must place on record the names of the important public bodies in which he is interested. These include the Assurance Advisory Board, the Higher Council of Emigration, the Chamber of Commerce, and the African-Spanish League.

We think our readers will agree with us in the assertion that these facts speak for themselves.

Distant Control By Wireless

Fog Signals installed in the Firth of Clyde : Future Developments

By H. DOBELL AND COMMANDER C. P. RYAN, R.N.

SINCE the introduction of Marconi telegraphy for the communication of messages without the intervention of wires, inventors have been trying to use the electric waves employed for this purpose to control and direct machinery at a distance.

Wireless Fog Signal at Roseneath Patch (Clyde).

If the dots and dashes of the Morse Code can be transmitted with regularity over thousands of miles, it would seem only reasonable to suppose that, with the help of suitable relays, valves could be turned on and off, helms moved to port or starboard, machinery checked and started, alarums rung—in fact, that a whole multitude of useful operations, each in their proper sphere, could be controlled, at any rate over a few miles, by the electric waves which have proved so amenable to management for the transmission of messages.

So tempting, in fact, has the prospect always seemed that invention has followed invention along these lines. Indeed, the "wireless" torpedo, the "wireless" airship, and a few more devices of the same family, have turned up from time to time —at any rate in the newspapers—with as much regularity as the sea-serpent and the giant gooseberry. The fact, remains, however, that very little seems to have come of these brilliantly-heralded inventions. The wireless airship survives as a particularly ingenious music hall "turn," but the Chancelleries of the world have been thrown into no panic by news of an aerial fleet of such a nature, nor have indignant questions been asked in Parliament as to why the well-known motto "We want eight and we won't wait" had not been applied to the epoch-making wireless torpedo.

So sceptical, indeed, has the serious engineer grown on the subject of such "distant control" by "wireless," that it cannot fail to be of the greatest interest to him—and, indeed, to the world in general—to hear of the results of the steady research along these lines which has been going forward quietly in the Marconi Company during the past year. The first application of the results is in a field which presents what may be described as the extreme limit of difficulty; for in this application the "receiving" apparatus is exposed to all weathers, is left absolutely without attention for week after week, and is subjected from time to time to all sorts and conditions of signals from passing ships which are far more powerful than the controlling signals, but which, nevertheless, must have no effect on the "control."

It was decided long ago that for the safety of ships at sea passing near certain parts of our coast it was desirable to instal fog signals on isolated beacons, these signals to be sounded at intervals of the nature of 30 seconds or so whenever the weather conditions rendered such warnings necessary. The need of some such signals was particularly felt by the Clyde Lighthouse Trust, and the automatic gas gun, the idea of which emanated from Messrs. D. & C. Stevenson, of Edinburgh, Engineers to the Commissioners of Northern Lighthouses, and was developed by Messrs. W. Moyes & Sons, of Glasgow, the sole makers of these guns, provided the Trust with exactly what was needed—a very powerful and regular fog signal which could be left unattended for months on end and which, unlike the wave-worked whistling buoy, would operate equally well in stormy seas or calm.

There are already six of these guns installed at different spots in Scotland, and one has been sent to America; and it is obvious that the service they are calculated to render to shipping in foggy weather is enormous. Such signals not only give a ship the valuable information that it is in the neighbourhood of one of these beacons, but also—since each beacon can have its own particular signal-rate of so many per minute—would help it to locate its exact position along the coast.

Here, then, was an eminently satisfactory acetylene gun fog signal; the only difficulty remaining was to arrange for it to be set going and stopped at will. Once this gun is started it will continue to feed and fire itself—at its proper intervals—until its fuel is exhausted after several weeks. But to leave it in continual action in all weathers would obviously be an extremely wasteful and undesirable proceeding. It might be arranged to turn on the gun, when fog came on, by laying a submarine cable; but not only would this procedure mean a large expense in laying and maintaining the cable, but also a cable, laid on such a bottom, would be very liable to breakdown at a critical moment. If a telegraph cable breaks down in a storm, the worst that can occur is a great deal of inconvenience pending its repair; but in the case of these fog signals, failure of the cable would mean failure of the gun, with the possibility of serious consequences. The Trust had already erected a very powerful acetylene light at Garroch Head, which is unattended and yet gives its flashing light with perfect regularity every night, turning itself down automatically during daytime and up at night; but a device which automatically decided for itself when a fog signal was necessary would be far too complex to be really reliable.

Everything, therefore, seemed to call for "wireless," and the matter was taken up by the Marconi Company at the suggestion of Messrs. D. & C. Stevenson, who had already succeeded in turning on a jet of gas and lighting it at short distances, day in and day out, an arrangement which they wished to make applicable to a fog gun.

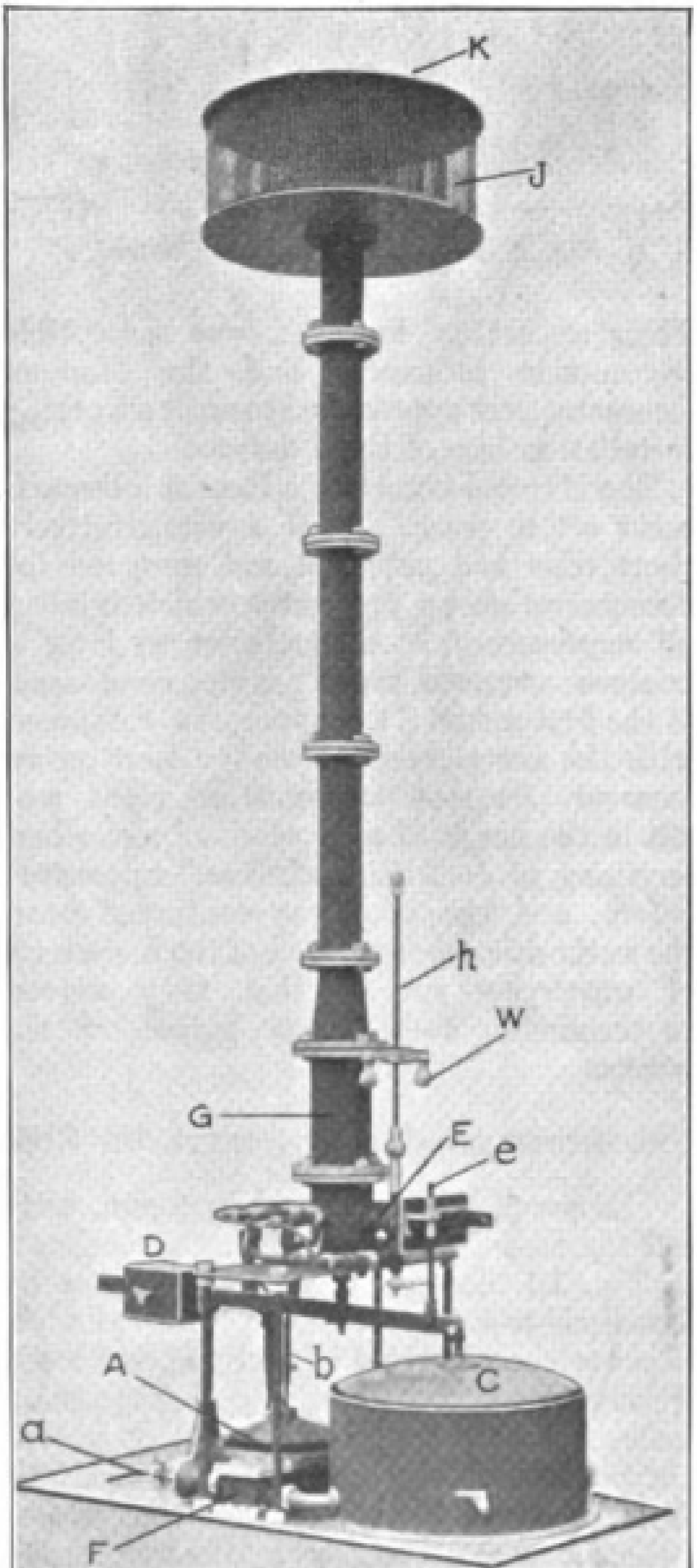


Fig. 1. The Stevenson-Moyes Gun.

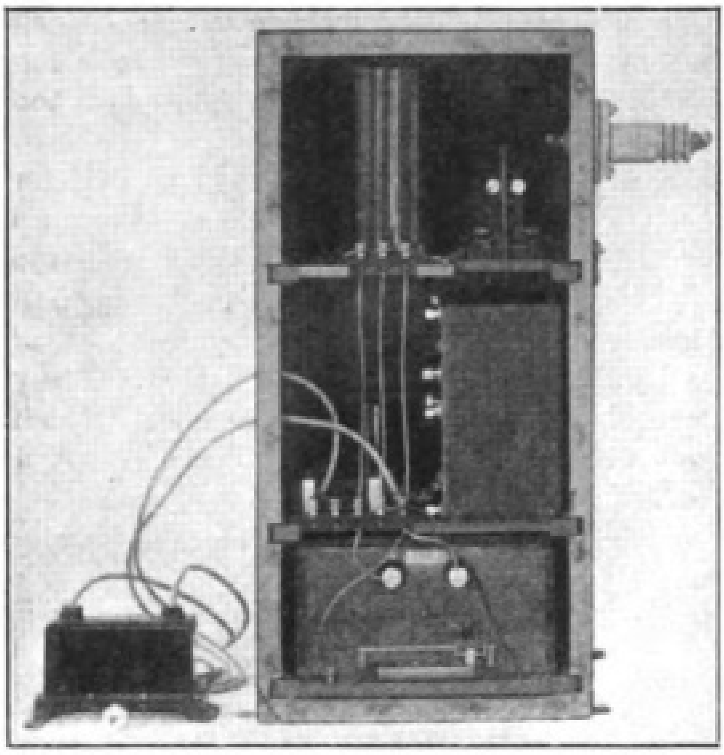


Fig. 2. Marconi Wireless Control.

Their apparatus, however, was susceptible to outside influences and the Marconi Company were approached to erect a working installation free of these defects.

The Marconi Company's Research Department set to work, and in a comparatively short time had patented and prepared for demonstration an apparatus which fulfilled all requirements. A month or so later a trial was arranged, under working conditions, of the first model; the apparatus, combined with the acetylene gun, was put out on an exposed pier, the transmitting plant was left in the hands of men who had never had anything to do with "wireless" apparatus before, and the trial was continued until the authorities were so tired of the monotony of unvarying success that they agreed to terminate it—after a period of six weeks.

THE STEVENSON-MOYES ACETYLENE GUN.

The complete Stevenson-Moyes gun, without the actual acetylene generator, is shown in Fig. 1. The gas is generated either by a carbide-to-water plant, or from cylinders of acetylene dissolved in acetone, and is led through the stop-cock, *a*, into the expanding bellows, A. As the gas enters, it opens out the bellows, driving up the rod, *b*, and with it the inner container, C, of the air-gasometer (which is counterbalanced by the weight, D), thus drawing air in through the air-box F. As C rises it drives upwards the rod, *e*. which performs two functions. The first is to wind up, against the action of a spring, an emery wheel in the ignition-chamber, E, which leads into the base of the gun, G; the second is to actuate a trip-gear which suddenly, when the container, C, has reached the correct height, closes the gas-admission valve and opens another valve which allows both the charge of air in C and the charge of gas in A to flow together into the gun, in which they form an explosive mixture, correctly proportioned by the respective volumes of A and C (about 1 : 15). At this moment the rod, E, releases the emery-wheel, which gives a vigorous half-revolution. Pressing against this wheel is the end of a rod of a special sparking-metal, *h*, forced down with a uniform pressure by the two weights, *w*. As the emery-wheel gives its half-turn against the end of this rod it throws off a stream of sparks which fire the explosive mixture in the gun.

The muzzle of the gun opens into a chamber, J, whose walls are composed of several concentric layers of metal net, each layer being spaced about half an inch from the next. These layers of net serve to keep the spray, even in the heaviest seas, from entering the muzzle, whereas they allow the sound of the explosion, reflected by the thick metal disc, K, to pass out in all directions. The position of K above the muzzle is of importance, and an adjustment is provided by which this position is regulated and the gun properly "tuned."

As soon as the charges of gas and air from A and C have been passed together into the gun, connection with the latter is automatically cut off and the gas-admission valve into A is opened, so that the whole process is repeated. The time occupied by each cycle depends on the rate at which the gas is allowed to enter, so that the number of signals fired in a minute can be regulated in this way.

It is clear that this process will go on repeating itself with perfect regularity until the supply of gas is exhausted—which would be in two, three or four weeks' time, according to the size of the generator. But by the installation of the wireless control gear, the supply of gas can be turned on and off whenever desired, and the gun is, therefore, capable of being left for many months without attention, being set firing whenever the weather conditions render it advisable, and stopped as soon as its warning is no longer required.

This brings us to the

MARCONI COMPANY'S WIRELESS CONTROL.

Fig. 2 shows, on the left, the Marconi gas-admission valve, which is introduced between the gas generator and the stop-cock, *a*, in the photograph of the gun. This is a needle-valve controlled by two electro-magnets, so arranged that when the first magnet is energised the valve opens wide and allows the gas to pass freely, while, when the second magnet is energised, it shuts the valve firmly so as to be gas-tight even against a pressure of 20 lb. per square inch—a value considerably exceeding the maximum pressure in use with this gun.

Next to this valve is seen the water-tight metal box containing the wireless receiving gear, the front of the box being removed to show the apparatus arranged on three shelves.

Connection to the receiving aerial is made through the insulator seen projecting on the right; the received signals pass to the "jigger"-primary and thence to earth through a terminal passing through the wall. The jigger-secondary goes to the actual detector—a special form of "coherer"—seen on the right of the top shelf. This detector actuates a special relay—on the left of top shelf—which is so constructed that, although very sensitive, it has quite a large movement, and is therefore capable of keeping in adjustment under all kinds of temperature conditions. This end is further ensured by the provision of counterbalancing springs. This relay is also seen on the right of Fig. 3. On the left of this figure is seen one of the two "synchronisers," which form an essential part of the apparatus, rendering it perfectly immune from the two great troubles of "wireless"—atmospherics and "interference" from powerful signals from passing ships—and enabling the same apparatus to perform two distinct functions—turning "on" the gas valve and turning it "off." These "synchronisers" are seen again in greater detail in Fig. 3.

Each is connected to one of the two electro-magnets of the gas valve described above, so that when one synchroniser is actuated by the relay it energises the one magnet and opens the valve, which remains fully open until the second synchroniser, actuated by the same relay, energises the second magnet and closes the valve.

In the illustration of the complete case the second synchroniser is hidden by an air-tight case containing a clockwork mechanism which runs for six months with one winding. This clockwork performs a useful function every ten minutes: it strikes a sharp blow with a hammer which gives a shake to the relay contacts, gets rid of any "stickiness" which might develop after several months, either in the pivots or at the contacts themselves, and at the same time causes a momentary current to pass through the de-coherer.

The lower shelf contains the battery of dry cells which provides the driving power for the whole receiving apparatus.

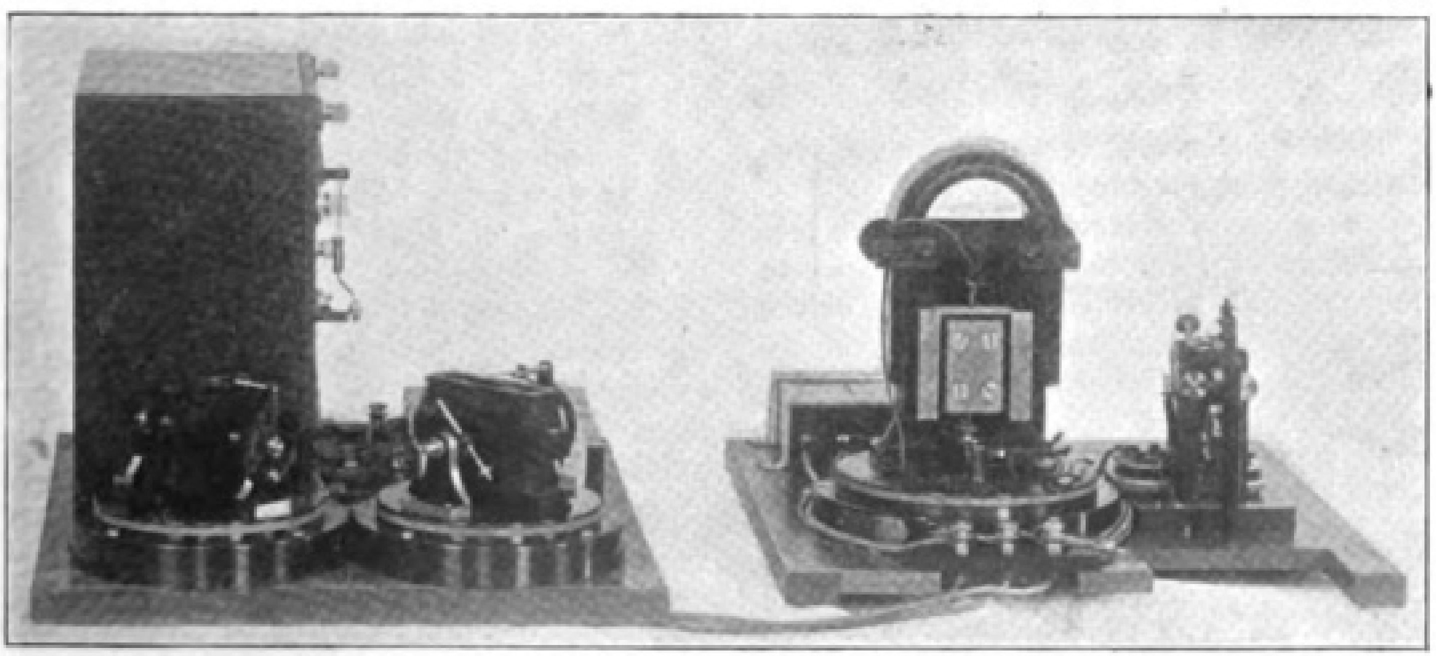


Fig. 3. Marconi Control Apparatus. The relay is shown on the right.

A small 4-fold aerial, supported from a short mast (about 14 feet high) completes the receiving apparatus.

The transmitting apparatus, installed on shore and under the charge of the Coastguards, is simplicity itself. For short distances—such as four-mile communication—it consist of a 10-inch coil driven off accumulators, a transmitting jigger and condenser, and the transmitting "synchronisers" corresponding to those of the receiving set. For greater distances the same apparatus will serve, provided that a greater aerial-height is available; failing

Beacon and Fog-gun at Fort Matilda (the Clyde).

this, a small alternator serves to provide the additional power required.

Of the apparatus just described, two sets are now working on the Clyde. Roseneath Patch, situated nearly in the middle of the Firth of Clyde, has one—erected on an isolated beacon and operated from the Coastguard Station at Gourock; Fort Matilda has the other; and by this action of the Clyde Lighthouse Trust another very important step towards the safeguarding of life at sea has been taken. Other sets will follow shortly, and so large a field is laid open for this particular application of the Marconi wireless control that the Marconi Company is busy designing sets suitable for greater distances.

But this is only one small application of the Marconi "Distant Control" inventions. It is also, probably, the most difficult. On all sides one can see opportunities for the employment, with magnificent utility, of such apparatus—and opportunities which present only a fraction of the total difficulties which have already been surmounted.

Putting aside for the present those applications which may be classed under the heading of "Warfare," and keeping close to those which deal with the preservation of life, we may first turn to the application of the scheme for

SAFETY IN MINES.

A small box, which could be carried by the miners as they progressed into out-of-the-way cuttings, in combination with a few feet of insulated wire as aerial, would keep them in constant touch with the surface; so that, if the master-alarm at the pit-head were set going, the alarm would reach every remote part of the mine at once; or, if desired, any selected gallery could be cleared without disturbing the workers in the rest of the mine.

But perhaps an even more important application—certainly one which appeals with greater force to the general public—is in connection with Safety in Railway Trains.

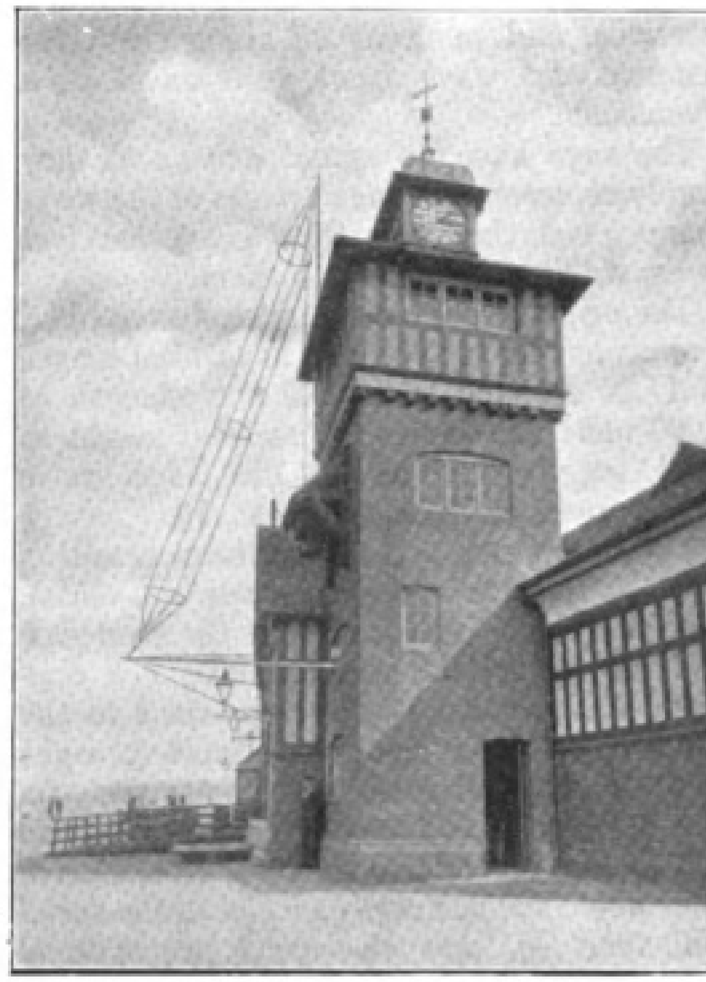
There may be, perhaps, two opinions as to the wisdom of substituting mechanical control for human control in the normal running of a railway system; but there cannot be two opinions as to the desirability of providing some kind of *emergency control* by which a human error can be prevented from leading to a disaster; and this is precisely what is offered by the simplest application of the "control" apparatus under consideration. The installation of such a "receiving" set on every train, with its corresponding "transmitter" at the various signal-boxes, would enable any signalman to control the trains on his particular section (either "up" or "down") in such a way that he could remedy any mistake—whether made by himself and perceived too late or made by a driver and perceived by him—and thus prevent the terrible results which only too often follow the slightest derangement in the intricate machinery of train organisation.

This is only one of many ways in which the apparatus could be applied for the safety of trains. Another very simple arrangement would be for every train to carry in its guard's van both a "control" receiving set and a very small transmitter in constant action; by this means if a train got within a certain distance of another train *on the same line*, a hooter or some other form of alarm would be set going in the van, and would attract the guard's attention to the necessity for caution. In the event of a train having to stop in the middle of a run, for lack of steam pressure or for any other reason, such an arrangement would form a very superior substitute for the "flare" which is at present the only safeguard provided.

We have mentioned a few of the many applications which lie open to the Marconi distant-control apparatus. Fresh ones present themselves on every side; operations in blasting on a large scale would be rendered much safer and more certain if controlled by such apparatus instead of by time fuses, with their element of risk and uncertainty; alarm signals for ships in fog, worked on a separate small aerial, and in no way affecting the ordinary "wireless," would infallibly call the attention of the captain of a ship to the presence of another ship within a distance of, say, four miles, in a fog which may deaden the carrying power of the syren, and which might be accompanied by sufficient breeze to cause any audible alarm-signal to miscarry; selective call-signals for systems of private stations in outlying places, such as the farms of Australia or South Africa, would form, as it were, an automatic "Exchange" which, unattended, would call up whichever farm was "wanted;" as calls for ships fitted with the new Marconi wireless telephone; all these form a mere fraction of the possible applications which present themselves to this invaluable piece of apparatus.

To celebrate the completion of the Carnarvon Wireless Telegraph Station (Cefndu transmitting station) Mr. G. Marconi was entertained to a public banquet by the Mayor of Carnarvon on May 20th.

A board of naval officers, consisting of Lieut.-Commander Arthur J. Hepburn, of the Bureau of Steam Engineering; Mr. Carl A. Carlson, of the Bureau of Yards and Docks, and Lieut. Edwin H. Dodd, now in command of the torpedo flotilla of the Pacific Fleet, have completed the selection of a site for the high-power naval wireless telegraph station on the Pacific Coast, United States. The other stations of the chain are the one at Arlington and one now being constructed in the Canal Zone, together with those to be erected later in Hawaii, Guam. and the Philippines.



Wireless Controlling Station at Gourock Pier.

The Postmaster-General has granted 20 licences for private wireless installations in different parts of Australia. This makes a total of 423 stations—194 in New South Wales, 177 in Victoria, 8 in Queensland, 20 in South Australia, 15 in West Australia, and 9 in Tasmania. In each case the station is merely for experimental purposes by students. The licences granted do not permit them to use the stations for more than experimental purposes.

Aerials and their Radiation Waveforms.—III.

By H. M. DOWSETT.

IF the Marconi directional aerial has an appreciable capacity the best method to follow to draw its wave form is to represent the travel outwards of the wave energy by a number of rays starting from the wave source and spaced at equal angular intervals, and to mark off along them the distance the wave front will travel in a given time.

The rays have no actual existence, they simply represent the mean paths of the wave energy, and the wave front must therefore be drawn at right angles to them.

The original Clifden directional aerial had a mean height of 180 ft., a horizontal length of 1,000 ft., and a natural wave-length of 4,000 metres; that is, its ratio of height to total length was about 1 : 6, and ratio length to wave-length about 1 : 10.

Fig. 1 represents the wave form resulting from a quarter wave in such an aerial. Consider a ray starting from the source P and travelling along the aerial. For one-sixth of this path it travels normal to the earth and then it suddenly bends at right angles and travels parallel to the earth. Its angular direction has altered from 90° to 180°, and its angular aperture with the earth has doubled. The rays external to the aerial will tend to have the same proportional change in direction. The ray starting at 10° inclination to the earth will be bent out of its path another 10°; the ray starting at 20° after a quarter wave travel will end at about 40° and so on. The bend in the ray will commence in each case at about one-sixth of its length, but will be gradual owing to the nature of the medium, and not sudden and complete like the bend in the aerial. For this reason the angular apertures of the rays external to the aerial will be only approximately doubled.

The lengths to be given to the rays are the next thing to be discussed. The quarter wave-length in free space is 2½ times the length of the aerial, and if the earth is a perfect conductor and the aerial has negligeable capacity the wave front will have travelled this distance along the earth in the direction 0° when the wave has reached the end of the aerial. The aerial, however, has a considerable capacity, but the greater part of it is distributed towards the earth in the direction 180°. The travel of the first quarter wave, therefore, in the direction 0° will not be as far as in free space, but nearly so. As the difference is small it is not shown in the diagram.

Now, as the wave front grows simultaneously out of both earth and aerial the

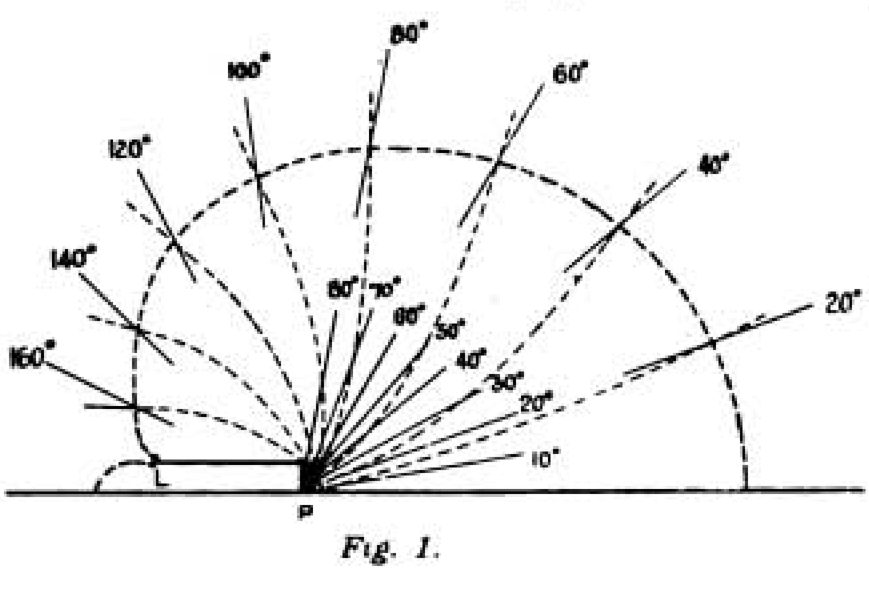


Fig. 1.

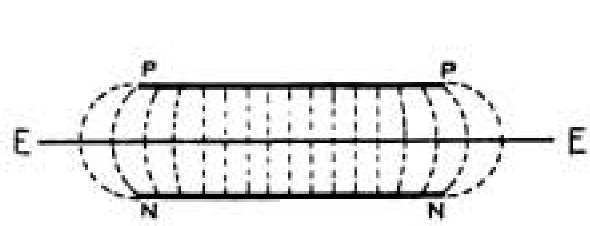


Fig. 2.

intermediate rays should have lengths proportional to their angular positions.

Thus the ray which commences at 0° will have a length, say, of 15; then the ray which commences at 10° will have a length, say, of 14; 20°, 13; 80°, 7; 90° (the aerial), 6.

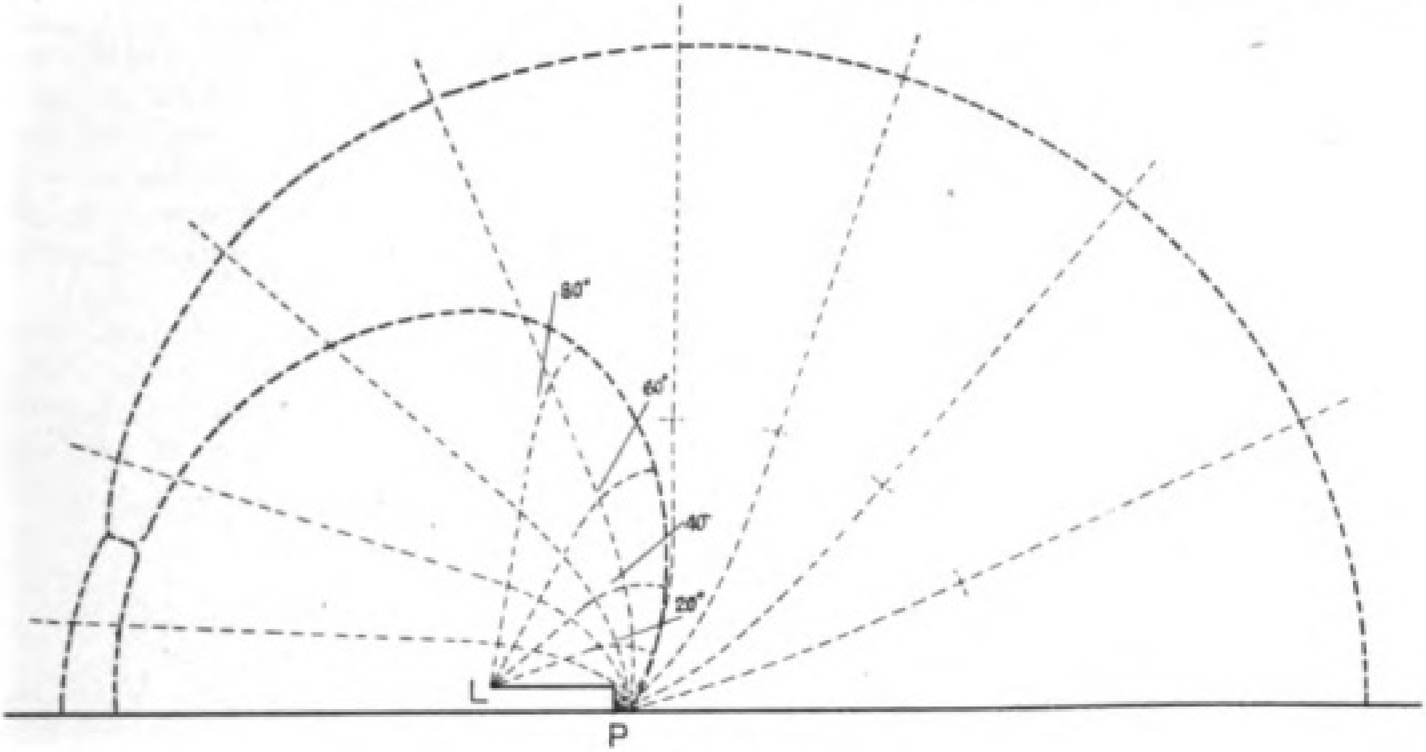


Fig. 3.

That part of the wave front which travels along under the aerial remains to be considered.

If PP and NN, Fig. 2, are two plates of an air condenser the lines of force will be parallel to each other in the middle, and not parallel at the edges. If the surface of the plates is large compared with the distance between them, nearly the whole of the field will be parallel. The neutral plane EE relative to the top plate PP, corresponds to the earth relative to the horizontal aerial. Where the lines which cut EE are parallel, the rate of travel of the electric strain along EE will be the same as along PP. Where they diverge, the rate of travel will be greater. It is clear that the rate of travel of the wave front along the earth immediately under the aerial will not be much greater than along the aerial itself. The height of the aerial added to its total length is a fair figure to allow.

Fig. 3 shows the expansion of the wave in Fig. 1. The rays in Fig. 1, after a quarter wave travel outwards, are well away from the influence of the aerial, and have therefore reached a settled direction. To obtain the wave front in Fig. 3 the rays have all been extended an equal amount—the length of the quarter wave in free space.

The wave back is drawn in a similar way to the wave front. Part of the energy is radiated from L as a point and travels practically at free space rate in the directions 180° and 90°; but part travels back between 90° and the aerial and also along the aerial. and lags in consequence. The rays correspond as regards length and proportional curvature with those drawn at similar angular positions to obtain the wave front, except that the bend in them occurs near the end instead of near the beginning.

Fig. 4 shows a second wave just free from the aerial, and indicates the method used to obtain the wave back of the leading wave, by extending all the rays which fix the wave back of the second wave by an equal amount, and in the direction they were then travelling.

The peak of the wave under the aerial is shown dead against the peak of the wave above the aerial. The actual tendency—not shown in the diagram—is for the two waves to expand into each other. The lower wave due to its greater intensity, probably does expand somewhat into the top one. After travelling a certain distance the peaks part company, or in other words the apex of the wave opens. This occurs when the wave back has expanded sufficiently to cut away the flattened peaks and they are left pointed.

What are the special characteristics of a bent aerial ?

(1) It is directive, but the energy which fails to go in certain directions is not unfortunately deflected in the direction of strongest signals, it is wasted. The nearer the aerial is brought to the ground, the less energy is radiated in the best direction.

(2) The difference between the height of the supporting steel masts, the length of their guys and the length of the aerial causes less inductive loss per mast, but the total loss due to the greater number of masts may be as much as from a vertical aerial.

(3) If the aerial is sufficiently long the cost of several small masts will be less than the cost of two high towers. There is also a practical limit independent of cost to the height of the towers.

(4) Owing to the practical limit of height for the supporting masts it is the best form of transmitting aerial for getting distributed capacity and inductance in the aerial circuit for very long wave-lengths. Distributed capacity and inductance is most essential for efficient radiation.

(5) The base of the wave travelling along the earth dissipates energy in the earth chiefly as surface currents ; the body of the wave travelling above the earth mostly keeps its energy in store. It is clearly an advantage for long distance transmission for a wave to have a large body compared with its base—the outlet for its energy. This advantage is possessed by the bent aerial wave. But only a small ratio of height to length, say 1 : 2, need be used for this purpose alone, for as the wave energy travels normal to the wave front the larger the ratio the greater is the proportion of top wave energy which is wasted, because it travels in the wrong direction. Considered as a whole, the energy in a vertical aerial wave which has less body but greater intensity, and is all travelling in the right direction, is much more useful.

(6) The next point is of some importance. If we consider only the small fraction of the wave which is available for affecting the receiving aerial, the fraction of the wave front and of the wave back, we find that the greater the ratio height to length of the transmitting aerial, the more the part of the wave which travels in the direction 0° along the earth approaches a sine wave in character. The advantages of a sine wave form are well recognised.

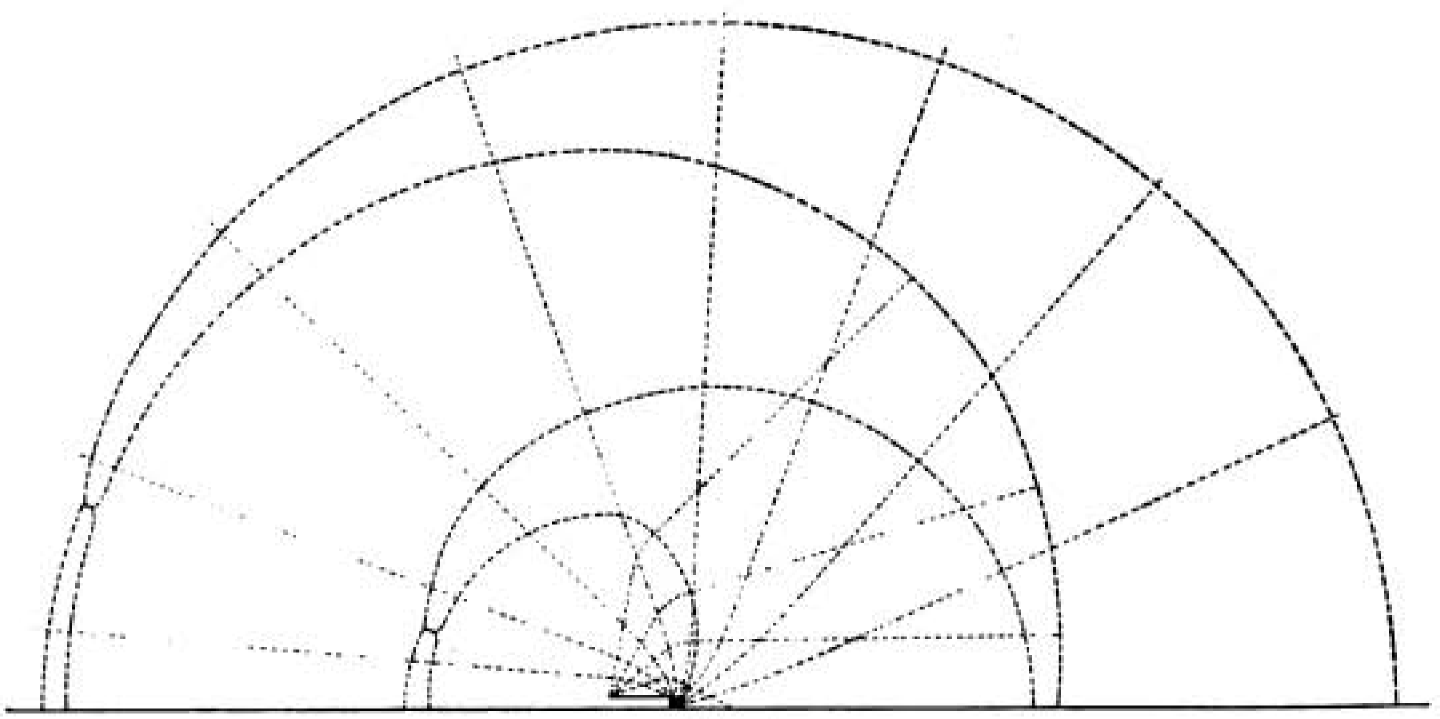


Fig. 4.

It is usual to represent electromagnetic waves in space, and those travelling along the earth as sine waves.* This is very nearly the case along a parallel beam of free waves sent off from an undistorted source of distributed capacity and inductance, but as regards the bound waves of wireless telegraphy, it would be more accurate to say that they are *never* sine waves, and the

* J. A. Fleming, "Principles of Electric Wave Telegraphy & Telephony," p. 408, Fig. 23. G. W. O. Howe, "The Nature of Electro-magnetic Waves, etc." British Association, 1918.

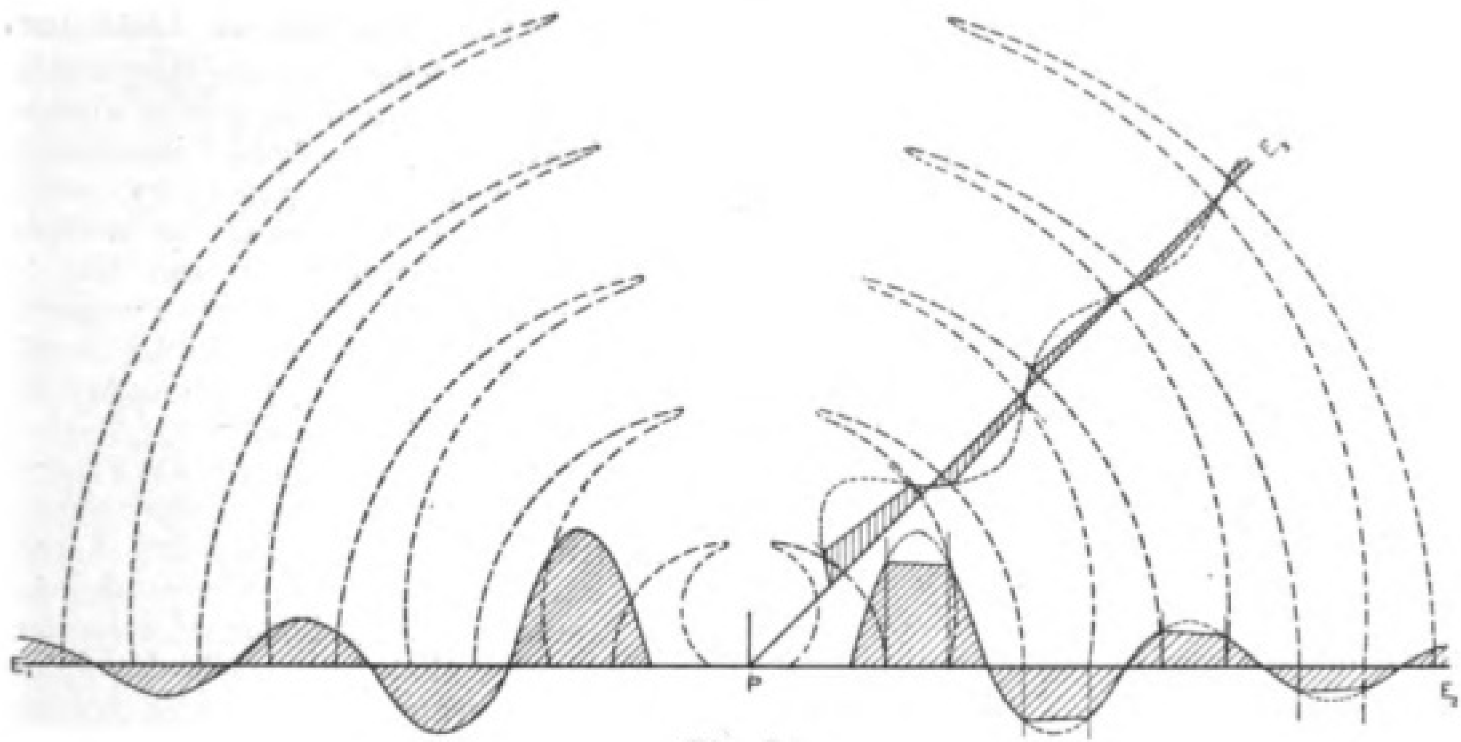


Fig. 5.

fractions of them which affect the receiving aerial may not have as good a form as the waves taken as a whole. The wave form which approaches nearest the sine in character is sent off from the Marconi directional aerial and then only in the direction 0° and just above the earth. In general, the waves per unit of height are flat topped. To have a true sine wave form, the growth and decline of the wave must coincide exactly with the period of the wave, and therefore in diagram the wave front of any wave should coincide with the wave back of the one immediately in front of it. This it tends to do more nearly at the foot of the wave leaving an earthed aerial than at the peak of the wave, for the impulse reaches the top of the aerial last and is completely away from it first.

A true sine wave with decreasing amplitude is shown in Fig. 5 along the earth line PE 1. If the wave loses no energy in its expansion, the P.D. from the earth to the peak of the first wave, must be the same as the P.D. from the earth to the peak of the second wave; but the length of wave front has been doubled, and the P.D. per unit of

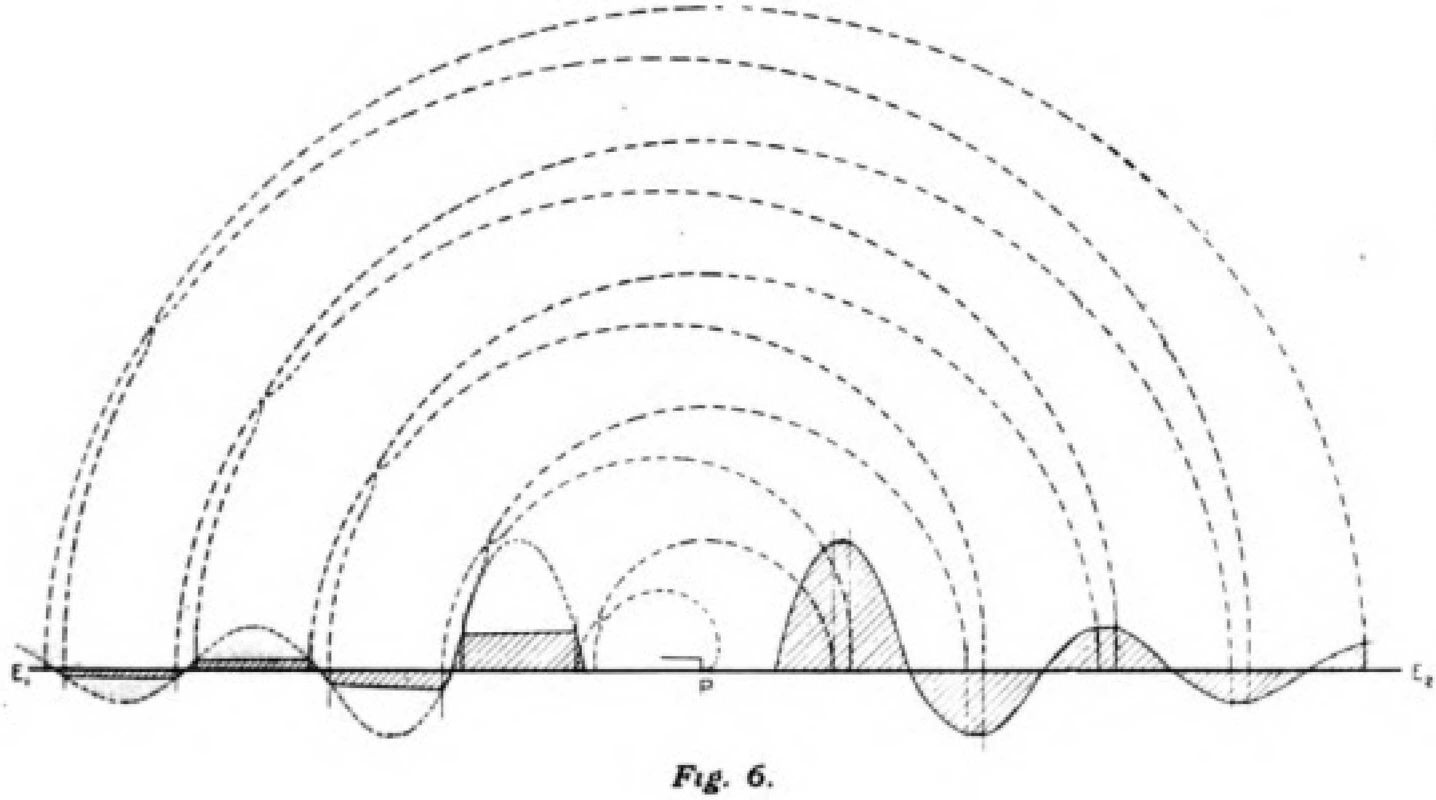


Fig. 6.

length must therefore be halved. Then the amplitude will be inversely proportional to the distance from the origin P. The true potential curve for the wave from a vertical aerial having a ratio length to wave-length of 1 : 5 such as is shown in Fig. 5, and taken along the earth, is the flat-topped curve drawn on the line PE 2. The wave back of any wave has the same sense as the wave front of the one immediately behind it, and the potential per unit height in the space between this wave back and wave front, must be subject simply to a straight line fall due to its expansion from one surface to the other. But from the wave back to the wave front of the same wave, the potential follows a sine curve of positive fall and negative rise or *vice versa*. The flattening of the potential wave becomes much more pronounced at an angular elevation above the earth. A line has been taken from the foot of the aerial, and at 45° to the earth, Fig. 5, PE 3, to illustrate this. The maximum potential compared with the maximum at ground level will be proportional to the ratio of

$$\frac{\text{angular aperture of wave—angle of elevation}}{\text{angular aperture of wave.}}$$

If, for instance, the wave peak from a vertical aerial reached 90°, and the angle of elevation were 45°, the maximum potential at 45° would be half that at 90°. Then, supposing there is a tendency for the waves to bend forward after travelling a distance, the potential waves affecting the receiving aerial, are likely to be flatter than those originally sent off along the ground line from the transmitting aerial.

Fig. 6 shows a simple directional aerial, ratio height to length of 1 : 3, and ratio length to wave-length 1 : 5, and the potential curves along the earth in the directions 0° and 180°. Their different character is very noticeable, and it is seen that the curve in the direction 0° is very nearly a true sine curve.

(7) Finally, considering the bent aerial as a receiving aerial, it is less influenced by atmospherics than an equivalent vertical aerial. This is partly due to its lower height, which reacts equally in reducing the strength of the bound waves of transmitted signals travelling along the earth, and partly to the fact that the aerial is much less in the field of the free waves generated in the atmosphere above the earth.

Characteristic Curves of Detectors.

Mr. Coursey defends in the May number the "Table" referred to in the abstract —published in our April number—of his Physical Society paper by saying that no attempt was made to compare the various detectors with the Marconi magnetic detector in the matter of sensitiveness, the magnetic detector being merely employed as a means of *calibrating* the apparatus on each occasion.

Unluckily, we have no copy of his Paper at hand, but from the fact that in the abstract, in referring to the table, the words "showing the relative sensitiveness of various detectors" are put in inverted commas, we cannot help thinking that some such description must have been applied to the table, in which case Mr. Coursey would—however unintentionally—lead, at any rate, the casual reader to suppose that he could take the table as representing roughly the comparative sensitiveness of all the detectors.

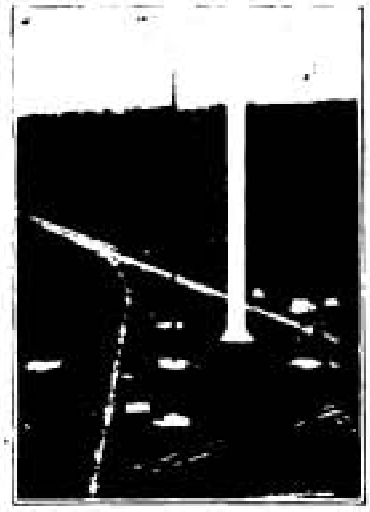
With regard to his remark that the use of 2,000 ohm telephones about represents the conditions which obtain in an average amateur's station, surely the average amateur reads THE WIRELESS WORLD and knows that if he wishes to use his high-resistance telephones with a magnetic detector he must rewind his detector to a suitable resistance ?

But the real quarrel we have with this table is on account of its inconsistencies. The behaviour of a detector is surely only quotable in a table of this kind when it is acting properly; whereas a Fleming Valve, which is only equal to a magnetic detector (and a magnetic detector, let it be marked, in combination with a 2,000 ohm telephone), surely has something seriously wrong with it; while as for that first piece of carborundum . . .

One last word. With regard to Mr. Bickford's letter, which Mr. Coursey quotes in connection with carborundum, we firmly believe that there is hardly an amateur in England who is using carborundum under the proper conditions—that is to say, in a properly-designed circuit. Also, though Mr. Bickford's method of choosing a good crystal is, perhaps, better than nothing, it cannot possibly take the place of the proper use of the testing potentiometer, which gives, at one slide of the handle, a complete indication of the characteristic curve.

The Hudson Bay Route

Wireless Telegraph Stations facilitate the Opening up of the Route



No. 1 Mast at Le Pas Wireless Telegraph Station.

THE construction of wireless telegraph stations at Port Nelson and Le Pas, and the equipment of vessels navigating the Hudson Bay, have contributed in no small degree to the development of a hitherto barren region, and have added to the safety of navigation in dangerous waters.

The scheme for the development of the Hudson Bay Territories, which the Canadian Government have carried out, has for many years been the pet dream of the Western farmer. The chief obstacle to the earlier development of that scheme was the presence of ice in the bay during the greater part of the year in such quantities that it would make navigation extremely dangerous, so that the running of wheat ships to and from Europe would be a venture too perilous to pursue. Now that has been overcome, the benefit to the farmer is obvious. With the exception of Montreal, Halifax and St. Johns, there are no large ports on the East coast of Canada, while the two last named, both opened during the winter and doing considerable business in grain export, are at the same time so far from the source of production that the cost of railway haulage makes it unprofitable for the farmer in the interior to ship through them, and, as we have already seen, Montreal is too overcrowded with business to guarantee expeditious export.

No other satisfactory outlet presents itself until we come to the broad mouth of the Nelson River in the south-west corner, and strike on Port Churchill, 120 miles to the north. Here we have reached a good port, and one nearly in the centre of Canada, some 500 miles north of Winnipeg, which is the metropolis of the Canadian grain-growing districts. Close by is Port Nelson, so that we have reached the spot singled out by the Canadian Government for the opening up of the Canadian-European route. Compare this distance, 500 miles, with the 2,000 miles which must be covered by train before Montreal is reached, whilst the distance to St. Johns or Halifax is even greater. The estimate that under the proposed route the cost of haulage will be reduced by 50 per cent. will then be readily appreciated.

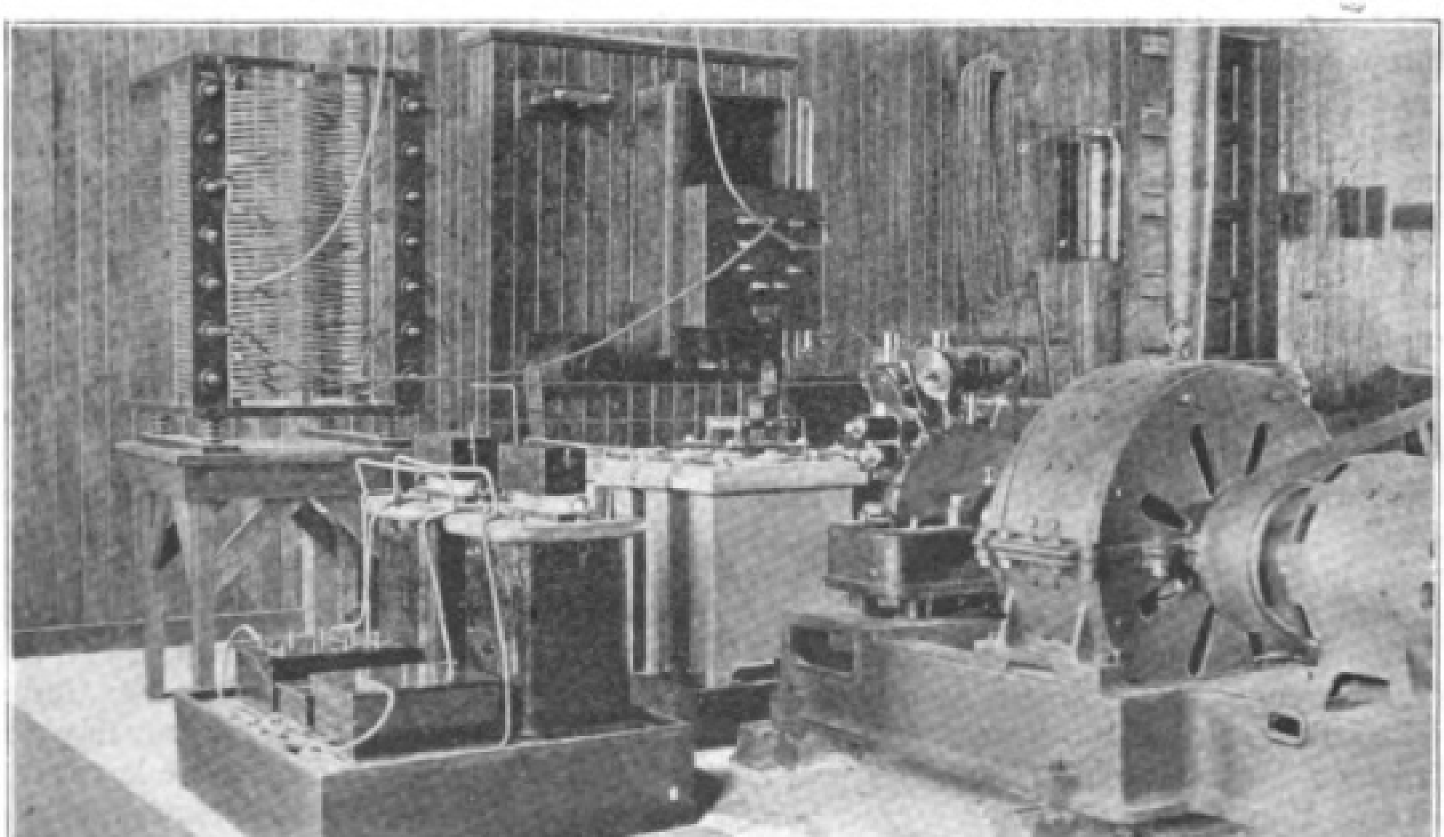
A Canadian farmer, discussing the project with an Englishman, perhaps put the matter as concisely as it can be, in the following words :—

> "Taking Regina," he said, "as the centre of the wheat belt, let us send our two cargoes of wheat to Liverpool, one *via* Fort William, the other *via* Port Nelson, by the Hudson Bay route. Before the cargo travelling to Fort William has reached salt water, the other *via* Port Nelson has reached Liverpool, which means a saving of eight to ten days in time, and from 12 to 15 cents per bushel in cost of freight rates. The wheat would only need to be passed through a single elevator, which is a great consideration as any grain expert will allow, for it means in technical language that its "identity" is better preserved and its "grade" retained, so that in open market it would fetch an increased price per bushel, while the tolls of the middleman would be dispensed with."

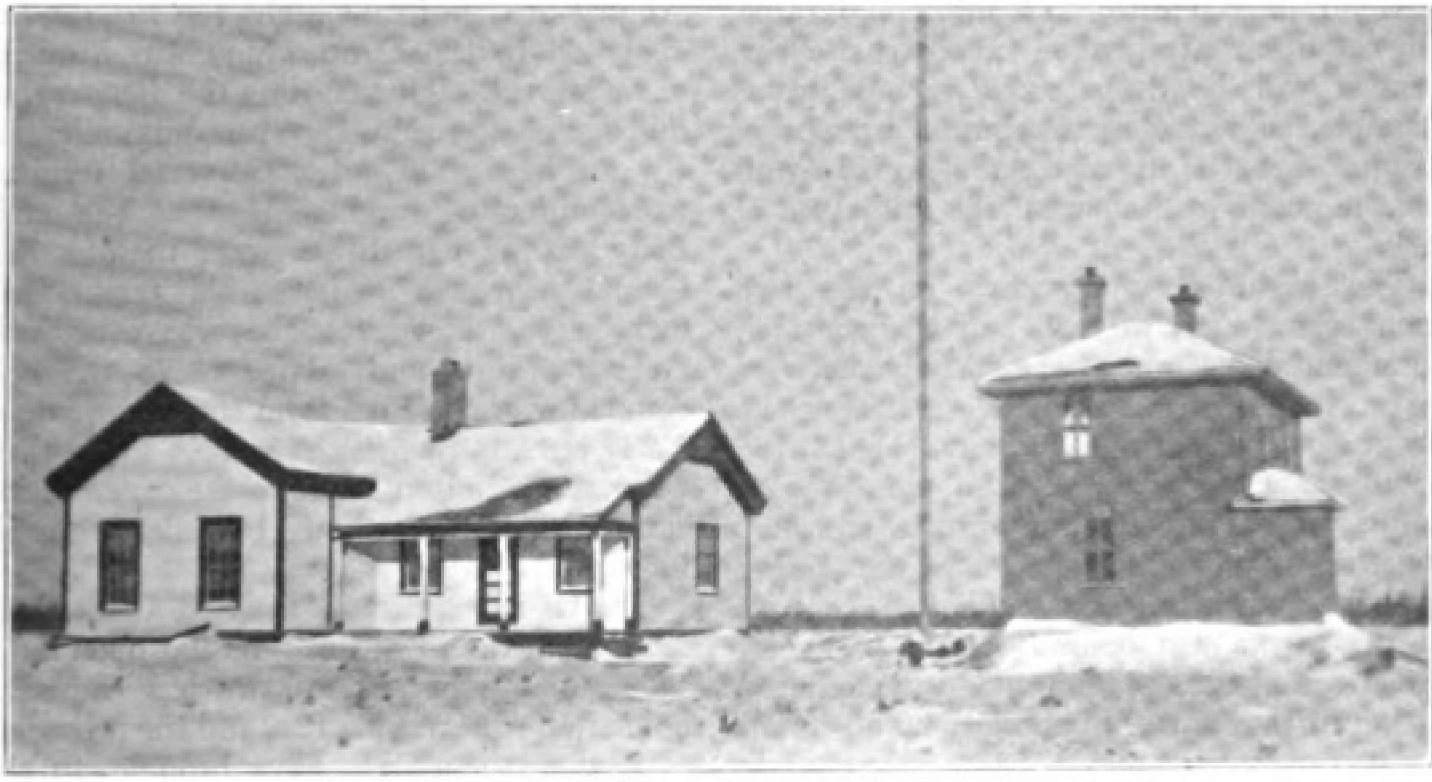
Now for the difficulty of the floating ice in the route, and the solution which has been found. Port Nelson, owing to its geographical situation, will only be open to ocean-going trade for about two or two and a half months in the year—namely, during August and September, and possibly the first half of October. This, as we have seen, is due to the enormous quantity of ice, which collects in the bay, for the pressure from the accumulated masses is so great

Fisher Avenue, the main street in Le Pas.

that should a ship happen to get wedged in between two floes, she stands a great risk of being crushed to pieces. Boats especially constructed for the purpose can navigate the bay from June to the latter part of November, but from November till the following June the route is impracticable even for these, so it means that if the port is to remain effective the export trade must be handled to a nicety; the earliest possible opportunity for opening the route must be seized upon, and the trade continued briskly till the severe weather sets in; for this reason the wireless stations have been built. The work they will do will be both arduous and responsible, for they will regulate the traffic, report conditions of the ice, and generally play the part of signalman

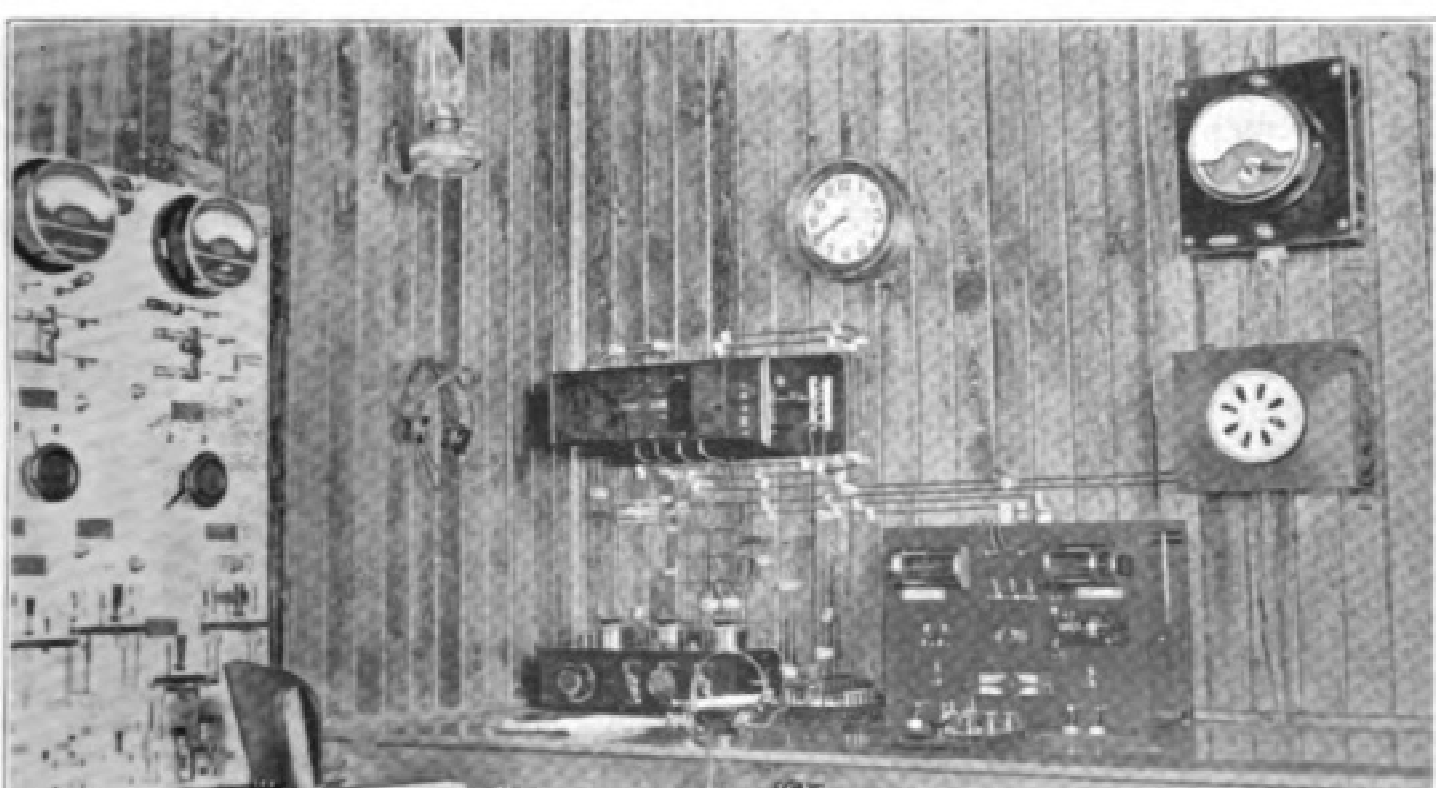


Transmitting Plant at Le Pas Station.



In the Grip of Winter. Le Pas Station Buildings.

to the whole of the grain trade in these parts. But the question arises—how will they obtain sufficient knowledge of ice conditions? The Canadian Government has provided for the supply of accurate intelligence to the stations in question. For this purpose they have chartered two sealers, the *Bonaventure* and *Bellaventure*, belonging to Messrs. A. Harvey & Co., of St. John, Newfoundland, and have added a schooner and a tug, the *Neophyte* and *Kathleen* respectively, to assist them. Both the *Bonaventure* and *Bellaventure* have been fitted with Marconi wireless (1½ kw. and emergency sets), and the work they will do is to act as sentinels against the ice floes throughout the trade season. Every day they will communicate the conditions of the ice to the land stations, who will in turn inform the harbour authorities, so that if any risk should be anticipated for a ship taking the voyage she can be detained in



The Operating Room at Le Pas, showing Receiving Instruments.

harbour until conditions are more favourable. On the other hand, when the coast is clear, vessels will be despatched as quickly as possible, so that the maximum amount of produce may be exported, and every available moment utilised with the minimum of risk.

The preliminary journeys of the two scout vessels, as we will call them, which commenced on June 21st of last year, were undertaken with a view to establishing the proposed land stations. They carried the engineers and workmen who were to be employed in the erection of the stations, together with provisions for the party during the months that would be occupied in the work. On board was the engineer, Mr. H. E. Penrose, who superintended the fitting of the Marconi installations on board the two vessels, and he has some graphic descriptions to tell of his experiences:

"On June 21st, 1913, the two scouts set sail from St. John for Halifax, where they took in their cargo; then, after coasting to North Sydney, they set out on the 2,000 mile trip to Hudson Bay, the *Bonaventure* towing the *Neophyte*, and the *Bellaventure* the *Kathleen*.

"On the 10th the party entered the Strait of Belle Isle, and passed their first iceberg, and for the next seven days steadily proceeded on their way, except for occasional spells of enforced idleness when the white fog, which is the inevitable accompaniment of melting ice, obliged them to 'go slow.'

"On the 15th Button Island and Cape Chidley were rounded, and then the real work of cutting a way through the pack-ice commenced. Finally the vessels were obliged to stop already, as the pressure was becoming somewhat too heavy for the *Neophyte* to engage.

"Nelson Roads were reached on Tuesday, August 5th, and that night the *Bellaventure* signalled to the camp which was awaiting their arrival. All this time the *Bonaventure* and *Bellaventure* had kept up communication by wireless. The advance vessel received the comforting intelligence that the main body of the expedition were making safe headway through the floes; this was largely due to the fact that she was constantly receiving hints and advice as to the best course for her to take from the *Bonaventure*. Early on August 6th the vessels made their way up the Nelson River to the construction camp, which was about 15 miles from its mouth."

The Le Pas station is situated about three miles from the town itself, on flat open land. The building of the railway has caused a boom in business in Le Pas, and the prospects of new opportunities have brought to the place hundreds of people in pursuit of the mighty dollar, and the settlement has, so to speak, in a night become a town laid out on systematic lines, and is likely to develop into an industrial community of considerable importance in the near future. Many of the new comers are gold prospectors, the precious metal having been discovered at several points near Le Pas, and hundreds of claims have already been staked.

Communication with the site from Le Pas was provided by means of a special siding from the C.N.R. Depot, and the material being safely received and the necessary labour available, the erection of the masts and buildings went apace, and the station was completed on December 15th, the first signals to Port Nelson being transmitted on that date.

A Portable Store and the means of Transport.

On account of the special conditions prevailing at Port Nelson it was not possible to get to work on the wireless station as early as was anticipated. The site of the town but a few months beforehand was practically a virgin wilderness; and, to give an idea of the work necessary before labour could be obtained for the wireless construction, it must be mentioned that locomotive and freight tracks had to be erected, warehouses, pens for livestock, and permanent quarters to accommodate labourers had to be built. Further the construction of temporary cargo docks, quays, etc., had to be undertaken. Whilst this gigantic undertaking was proceeding ten ocean-going vessels successfully navigated the Straits, landing their cargo at Port Nelson, and two of the vessels returned for a second voyage. This speaks volumes for the feasibility of the new route.

Practically the whole of the wireless material arrived at Port Nelson by the month of October, but it was not possible to proceed at once with the construction of the station, and the stranding of the *Cearense*, which it was first thought would involve the loss of a considerable portion of the wireless gear, did not accelerate matters. By dint of energetic measures, however, almost everything on board this vessel was salved. When the last of the vessels left Port Nelson the energies of the staff could be turned to the work in hand ashore. The men allotted for the construction of the wireless telegraph station at once commenced cleaning the land and constructing the concrete foundations and anchors for the steel masts. The result was that on December 3rd, 1913, all foundations were completed, and the steel work on one of the masts was erected to a height of 70 feet. Progress on this work was hampered by the extremely cold weather and the shortness of the arctic day. Full advantage was taken of every mild spell, and the masts were finally completed to a height of 253 feet on January 10th, 1914. It is interesting to note that the temperature during these so-called mild spells averaged about 25° below zero, and the hardships endured by the steel-workers at an altitude of 250 feet at this temperature can well be imagined.

The Canadian Government further proposes to build wireless stations at Cape Chidley, Wolstenholme, Churchill, and probably smaller stations will be erected at intermediate points, so that every facility for the navigation of the Straits bay may be afforded the traders. During the four months that the Marconi engineers were at Port Nelson they particularly noted the absence of "freaks" in the wireless service. The chief atmospheric difficulty was due to disturbances caused by the Northern Lights. On nights when the aurora was particularly bright X's were very troublesome, but only on two occasions was it found necessary to close down completely, and then the obstruction only lasted an hour or so.

There is no doubt that all boats trading between Nelson or other ports, whether with or without passengers, will find an equipment of wireless an essential, the ships which are already employed on this coast having all adopted it; and last year the Marconi Company, besides fitting the *Bonaventure* and *Bellaventure*, installed apparatus for the Canadian Government on board their steamships *Beothic* and *Arcadia*, while the trading vessels *Alcazar*, *Cearense*, *Nascobie* and *Florizel* were similarly equipped.

Wireless for the Blind.

To the Editor of THE WIRELESS WORLD.

SIR,—I have heard with great interest the article "They that Walk in Darkness" in the current number of THE WIRELESS WORLD.

There is no reason whatever why blind persons should not be expert wireless operators. I know of several cases in which blind people act as telephone operators with great success. The ear of the trained blind person is highly sensitive. This I have proved by the ease and rapidity with which blind telephone operators manage their switchboards. I know of several operators who can differentiate between the sounds of the falling shutters, although to the ordinary hearer all are alike.

I think it very likely that we shall instal a wireless station on the roof of our new buildings, with a view to the training of blind persons in an occupation which I believe many of them will prove capable of carrying on with great success.—Yours, etc.,

C. ARTHUR PEARSON.

The National Institute for the Blind,
London, May 12th.

Digest of Wireless Literature.

ABSTRACTS OF IMPORTANT ORIGINAL ARTICLES DEALING WITH WIRELESS TELEGRAPHY AND COMMUNICATIONS READ BEFORE SCIENTIFIC SOCIETIES.

High-frequency Ammeters.—A detailed report of an investigation into the behaviour of high-frequency ammeters by J. H. Dellinger, of the United States Bureau of Standards (Washington), is now available. Some of the conclusions reached are that most of the errors of the commonly used high-frequency ammeters are due to mutual or self-inductances of parts which were supposed negligible. The use of high-resistance metals in the working parts, keeping them of very small cross-section, eliminates errors in most cases. In hot-strip ammeters if the strip be kept thin enough the observed errors depend entirely on the current distribution in the terminal blocks, and can be eliminated. An instrument free from theoretical objections consists of current elements arranged equidistantly on a cylindrical surface, and fed from the middle points of the ends of the cylinder; but in practice the fine wires or strip may vary in hardness or in cross-section, and the instrument may read correctly at high frequency, and not at a lower frequency, or *vice versa*. The only reliable instrument over the range of frequencies used in wireless telegraphy is that in which a single hot wire is used; but two wires in parallel immersed in an oil-bath are nearly as reliable, and may be used to measure currents up to 10 amperes. During the tests it was observed that the changes of current distribution in instruments whose working parts were of low-resistivity metal all occurred within the range of radiotelegraphic frequencies (100,000 to 1,500,000).

Radiation of Electric Waves.—Two methods are developed by W. Esmarch in *Annalen der Physik* which express the secondary waves generated by the passage of plane waves in a medium laden with electrons. The superposition of the primary wave on those sent out from these electrons gives a progressive wave whose extinction and phase velocity agree with the known values on the ordinary dispersion theory. The reflected wave arises at all places in the medium traversed by the incident wave and not only in the neighbourhood of the limiting layer.

Energy Transferred by Electromagnetic Waves.—The result of some experiments made between Göttingen and Strassburg and Cologne—quoted by M. Reich in the *Physkalische Zeitschrift*—substantially corroborates Hertz's theory of electromagnetic radiation. The discrepancies between the theoretical and the experimental values of the energy transmitted are found to be attributable to the fact that transmitter and receiver are not placed on perfectly conducting ground, also to an absorption of energy by the intervening landscape. The absorption of energy is the same for damped and undamped waves, and increases strongly with decreasing wave-length. The absorption amounted to 57 per cent. in transmitting a 2,000 m. wave from Cologne, 58·7 per cent. from Neumünster, and 54 per cent. from Strassburg, where the Rhine favours transmission. On mounting a single wire 37 m. in effective height at Göttingen, a sending current of 15 amps. at Cologne gave a received current of $4{\cdot}34 \times 10^{-4}$ amp. at Göttingen. The value calculated on the basis of previous results was $4{\cdot}2 \times 10^{-4}$.

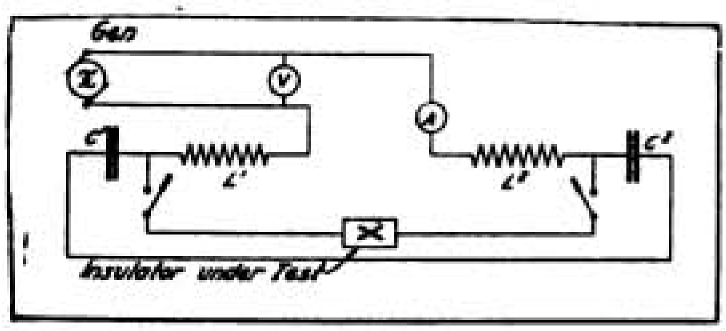
Method of Extinguishing Arcs.—The quenching property manifested by suitable metals when used as electrodes for short spark-gaps has been applied by W. Burstyn to the problem of the sparkless interruption of electric circuits. The method is described in a paper read recently before the Elektrotechnische Verein in Germany. It is shown that with such electrodes if there be superposed on the current to be broken another, equal in amplitude and opposite in direction, the current interrupted, falling only momentarily for a short space of time to zero, is completely quenched by the action of the electrodes. A simple scheme of connections by which switching may be effected is as follows. The switch arm connected to one main normally bears against an upper contact which leads, through the motor or other apparatus to be controlled, to the other main. The lower contact leads to the latter main through a high resistance. The two contacts are shunted by a condenser in series with an ironless inductance. A switch having 16 quenching gaps in series is said to be capable of dealing with 35 amps. at 10,000 volts; the maximum opening of the switch contact is ½ mm. Interrupters capable of breaking currents representing several kw. up to 1,000 times per sec. are said to be obtainable in this way, suitable for use with tone-wheel wireless transmitters, induction coils, etc.

Receiving Aerials.—

In a paper on "The Effect of a Parallel Condenser on the Receiving Antenna," read by L. W. Austen at the March meeting of the Institute of Radio-Engineers (New York), it was brought out that the practice of using a variable condenser in parallel with all or part of the inductance in the receiving antenna to receive longer waves is convenient, inasmuch as it does away with the necessity of small inductance steps and reduces the total amount of inductance required, but is usually found to be less efficient than pure inductive tuning. Tables showing the effects of different values of parallel capacity for two sizes of artificial antenna were shown. The readings were made with a galvanometer replacing the telephone. As the capacity was increased and the inductance decreased the galvanometer deflection decreased. Replacing one-half the inductance by capacity decreased the deflection about one-third. Practically the same results were obtained with the real antenna.

A High-frequency Transformer.—

Mr. E. F. W. Alexanderson described, in a paper before the Institute of Radio Engineers (New York), a transformer designed by him to operate on 100,000 cycles (from a high-frequency alternator) and to transform up to 100,000 volts. An important requirement in the design of such apparatus is that the losses should be so low as to be quite negligible beside the losses through hysteresis in the dielectrics under test. The final form in which it was built had 0·3 per cent. losses. Hysteresis losses were reduced to a minimum by the elimination of iron (an air core was employed), and by the use of "pancake" coils wound in a peculiar manner with bare wire separated by layers of cotton. The type on which the whole transformer was based was not of the ordinary "primary secondary" construction, but was an oscillation transformer, in which high potentials were produced at certain points of the circuit. The connections in the transformer are shown in the accompanying diagram.



The high-frequency generator G is connected to the inductances L^1 and L^2 and these to condensers C^1 and C^2. In the apparatus these condensers were shields around the transformer to prevent losses by radiation. They consisted of copper wire spirals which in themselves had sufficient distributed capacity to act as condensers. The condensers and inductances of the circuit were in resonance so that there would be no energy component in the circuit when the current was flowing other than that caused by losses in the insulator under test. The different current which passes through the circuit when the dielectric to be tested is connected as shown is then that caused by losses in the dielectric. Thus by noting the ammeter and voltmeter readings before inserting the dielectric, and keeping either current or voltage constant after inserting the dielectric, the difference in readings will show the energy consumed by the specimen tested; this may then be expressed as a power factor introduced by the specimen from the generator's "characteristic" curves.

Some of the results obtained by Mr. Alexanderson are as follows:

Dielectric	Power Factor
Oil	0·70 per cent.
Glass	1·25 ,,
Mica (built up) ...	6·00 ,,
Paper	6·50 ,,
Fibre	10·00 ,,

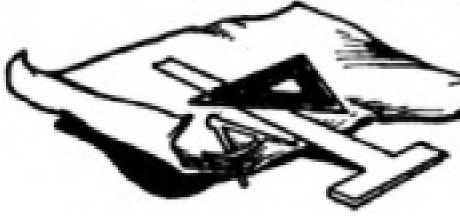
It was also found that the losses were, as a rule, independent of the applied voltage, but depended inversely on the frequency.

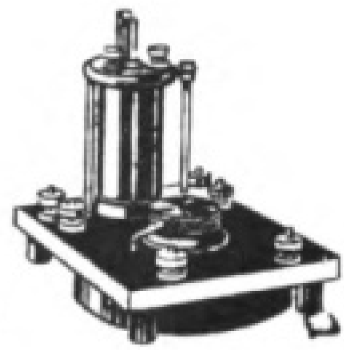
The Tone Wheel Detector.—A mechanical detector for electrical waves is described by Rudolf Goldschmidt in the *Electrician* by which undamped continuous waves can be received as a musical note and the pitch of the note adjusted at will on the receiving station. The author has made experiments with an asynchronous frequency-transformer, using his high-frequency machine for this purpose, but he prefers other means for the transformation of frequency. A toothed disc form of commutator is described; this is run asynchronously, a "notched" alternating current being produced, of frequency equal to the difference between the received current frequency and the number of interruptions at the commutator. In the transatlantic communication between Eilvese and Tuckerton the tone-wheel found its first practical application, and proved satisfactory. Among most important advantages are: (1) Damped waves (such as those emitted from spark stations) are not heard as a note, only as a noise. (2) Stations with small differences in wave-length are heard with different notes. If the tone wheel, for instance, is giving 39,000 interruptions and the station to be received is sending with 40,000 periods, this station will be received with a note of 1,000 periods. Another station using, say, a 2½ per cent. shorter wave—*i.e.*, 41,000 cycles—gives a note of 41,000—29,000—2,000 periods. It is therefore easy to distinguish one station from another. (3) The tone is clearly distinguishable from atmospherics. (4) The pitch of the received note may be adjusted to suit the telephone in use. Records are reproduced of the signals received both when using an ordinary detector and the tone-wheel with an Einthoven galvanometer. The tone-wheel records appear as dots and dashes as with the ordinary inker. The sending key is reversed, so that normally the galvanometer string is vibrating at, say, a frequency of 1,000 per sec. The sensitised paper does not show this vibration. A dot or a dash interrupts the transmitter energy; the string becomes stationary and a clear image appears on the tape.

Frequency Changing for Static Transformers.—In a paper read before the Birmingham section of the Institution of Electrical Engineers, Mr. A. M. Taylor described a method which he has developed for obtaining currents at a higher frequency than that of the supply by the use of static transformers only. He referred to work done in the same direction by Joly, Vallauri, and Spinelli, the first two of which inventors convert a single-phase supply into one of triple or double its frequency respectively, while the last gives a single-phase triple-frequency current from a single-phase supply. All these methods depend in some way on distorting the supply wave away from the true sine form by utilising the difference in the behaviour of magnetically-saturated and unsaturated cores of the transformers forming different parts of the apparatus. Mr. Taylor's method, however, converts from three-phase to single-phase. The primary current is passed through a winding on a choking coil with a saturated core. This is passed through an unsaturated transformer, in which the flux responds to the distorted current wave, and in consequence two impulses of back E.M.F. are generated, one at the commencement and end of each half cycle of the fundamental electromotive force, thereby absorbing part of the fundamental electromotive force received from the mains at the instant, and producing in its secondary an E.M.F. wave of partially complete triple frequency. By the use of all the three phases in this way the incomplete half waves of the three cycles come in rotation, so that their effect cancels out, and a symmetrical triple frequency wave is the result. In combining the three phases, the three saturated choking coils have separate cores, and are mesh-connected, but the unsaturated transformer has a single core carrying all the primaries and the single secondary.

One of the fields which the author suggests for the apparatus is wireless telegraphy.

The ENGINEERS Note Book





[Under this heading we propose to publish each month communications from our readers dealing with general engineering matters of various kinds in their application to wireless telegraphy, and we would welcome criticisms, remarks and questions relating to the matter published under this heading. We do not hold ourselves responsible for the opinions and statements of our contributors.]

Notes on Tools for Lathes and Similar Machines.

By B. P.

THE angles to which tools are ground are usually known in the shops as top rake, cutting angle, clearance, and side rake; the cutting angle being that formed by the two faces meeting at the cutting edge of the tool, rake and clearance being the angles between either face and lines drawn horizontally or vertically through the centre of the work.

Theoretically, the amount of material acted on by the tool when cutting is contained in the angle formed by the face of the tool and a line at right angles to it; practically, this angle is more than a right angle, owing to the friction between the tool-face and the cutting. If lubrication is provided, the increase in the angle becomes less and a tool with a greater cutting angle can be used.

* * *

The cutting angle of tools varies with the material in the machine. When turning wrought iron, the tools should have plenty of top rake and a good supply of lubricant, such as oil or soap and water, otherwise the metal jams on the tool face and the surface of the work is torn. Cast-iron is more brittle, so that a greater cutting angle can be adopted; lubricants only form a species of mud which clogs the tool, and are therefore never used, except when a supply is available at a sufficiently high pressure to wash out all chips, and even then only for special work. If the tool has too much top rake and a heavy cut is taken, the surface of cast-iron becomes torn, and minute black specks are shown, which require a light finishing cut and burnishing to ensure their removal. Brass requires very stiff tools with little edge surface, otherwise the face of the work becomes wavy. Similarly formed tools give the best results with ebonite. Aluminium also calls for tools of this description, and turpentine should be used as a lubricant on fine work, such as screw-cutting, especially if the metal is very nearly pure and not an alloy containing an appreciable amount of copper or zinc. Roughly, the approximate cutting angles in general use are 60° for wrought-iron, 70° for steel, 75° for cast-iron, and 80° for brass, although these can be varied within wide limits to suit the different grades which occur in the same class of material, also, in many cases, to suit the fads of the workmen.

To remove more material in a given time, when roughing, it is preferable to increase the traverse of the tool rather than to increase the speed, assuming that the correct speed has been chosen in the first place. If the speed is increased under these conditions the energy required is increased in direct proportion and the tool does not retain its edge so long.

The Effect of Salt on Concrete.

The following further communications have reached us with regard to the subject of salt water for concrete mixing:

J. N. W. writes:

"Sea-water has been and still is being

used for mixing concrete on many important contracts. Provided care is taken to see that the sea-water is not drawn close to a sewer outfall, or any place where it is likely to be contaminated with sewage or other organic matter, the only effect will be a slight retardation of the setting and hardening of the cement, so that the strength of the concrete may not be quite so great at early dates. This effect will not be sufficiently appreciable to seriously delay 'Anglo-Indian' using his foundations. In addition there may be traces of efflorescence on the surface of the concrete; this, however, is of no moment for foundations and similar work.

"As regards the use of sea-sand, the principal objection to this is that it is usually very fine. Also, unless taken from well below high-water mark it may contain an excessive proportion of salt owing to the water being evaporated and leaving the salt behind. It may be that the saving in expense by using a proportion of sea-sand with some other coarser material would be nearly sufficient to justify 'Anglo-Indian' using a little more cement with his concrete—the richer mixture serving to counteract any slight reduction in strength due to the use of the sea-sand."

* * *

L. G. R. also agrees to the use of sea water as well as sea-sand. He states:

"The concrete will be a little slower in setting, but not much, and will probably be harder when set than if pit sand were used. One advantage in using sea-sand is that it is quite clean and free from loam or vegetable soil, which is distinctly harmful. Sea-water or sea-sand should not be used, however, in the building or plastering work, as the salt is affected by changes of humidity in the atmosphere and will come out in the work in damp patches. I can say from personal knowledge that concrete made with sea-sand and beach shingle results in a very strong and hard concrete. Salt is sometimes added to the water used for mixing concrete for use during frosty weather."

* * *

BETA writes: "The only disadvantage of using salt water, or sand from the sea shore, is that the setting is delayed, and during the first few months the salted concrete is not as strong as that made with fresh water. At the end of one month the fresh water concrete will be about 25 per cent. stronger than the sea water concrete. After nine months the difference will only amount to about 8 per cent. The ultimate strength of the two concretes will be the same. The use of salt water results in efflorescence on the surface of the finished concrete. This can be removed with a weak solution of sulphuric acid diluted with water.

"In cold climates the use of salted sand may be an advantage as it lowers the freezing point of the concrete and hence allows the setting to proceed.

"In taking sand from the sea shore, care should be taken that the place from which it is removed is below high-water mark. Otherwise an unnecessary amount of salt will be removed with the sand. All the above remarks apply, whether the salt is in solution in the water or mixed with the sand."

Capping of Wire Ropes.

A correspondent in our May number objects to the white metal method of capping wire ropes suggested by F. E. R., in an article which appeared in April, on the ground that the engineer is not able to inspect the job as readily as is the case with a spliced end, also that the wire may be damaged due to excessive heating.

F. E. R. now replies:

"The casting into which the white metal is run can be knocked back and the whole of the white metal end exposed. As for the wires not being cleaned properly, well, that is what the engineer is there for, to see that they are. In any case a little rust will not do any harm.

"The wires will not be damaged by the heat from the white metal. The recalescence point of the steel which is used for making steel wire ropes is about 1,440° F., and any temperature below this will not have any ill effect on the steel. The melting point of the white metal used for the capping is about 700° F."

CARTOON OF THE MONTH

Wireless Worries

How to Keep Warm in an Arctic Station

NOTES OF THE MONTH

THE mystery of the reported wireless distress calls from the American liner *Siberia* still awaits solution. According to a telegram from Tokyo, the Osezaki wireless station, to the south-west of Nagasaki, received a message in the early hours of Friday, May 1st, reporting that the *Siberia* had met with an accident near Kashoto Island, to the east of Formosa. This message was subsequently amplified into a statement that the *Siberia* was aground and that her wireless calls for assistance were becoming indistinct. A message, purporting to come from the State Department in Washington, was even published stating that the *Siberia* had foundered. The British cruiser *Yarmouth* and the Japanese cruiser *Suma* were at once ordered to proceed to the supposed scene of the disaster, while a salvage steamer was held in readiness at Nagasaki.

* * *

The *Siberia* was bound from San Francisco to Manila, and was reported by Lloyd's agent at Yokohama "about April 27th." The steaming distance between Yokohama and Manila is 1,768 miles. The vessel arrived at Manila at 11 a.m. on May 2nd, or five full days after leaving Yokohama, so that assuming she did not call at Hong-kong she probably steamed about 350 miles a day. The ordinary route pursued by vessels bound from Yokohama to Manila is nowhere near Formosa, but lies many miles to the east. If the *Siberia* ever was within stranding distance of Formosa, she was very much out of her course. The distance, as the crow flies, from the southernmost point of Formosa to Manila is 560 miles. Even steaming at 18 knots the *Siberia* could not have covered this distance between the morning of Friday and her arrival at Manila on Saturday

It seems obvious, therefore, that however or wherever the "S.O.S." signal arose it cannot have come from the *Siberia*, since she was at that moment 150 or 200 miles at least south-east of Formosa. The Japanese Department of Communications hope to provide the key to the mystery as the result of the inquiry which is now being held. Not only does the operator at the Osezaki wireless station profess to have received a signal of distress, but a steamer of the Nippon Yusen Kaisha is said to have received one at the same time. There is also the curious fact that for almost 24 hours a number of merchantmen, warships, and wireless stations were trying in vain to get into touch with the *Siberia*. The only explanations suggested are either that the original message was misread or that some error was made by the wireless operator of the *Siberia*, from whom nothing has yet been heard that might help to solve the problem.

* * *

There have been numerous attempts to furnish some solution of the mystery, but it would be wiser to stay judgment until the result of an official and thorough investigation has been made known. The report is generally attributed either to an error in transmission or a mischievous attempt to mislead. It is also believed by some that the Osezaki station intercepted a message from the *Siberia* to the Austrian Lloyd liner *Persia*. whose call letters are MBS, which, if repeated, might be mistaken for the distress signal S.O.S. Whatever may be the origin of the unfortunate report, and we hope that the efforts to discover it will be successful, we are pleased to note the entire absence of any suggestion of sinister motive or heartless practical "joking" on the part of the operators—a body of men who, as far as we know them, are proud of the knowledge that the work in which they are engaged has added so enormously to safety of life at sea, and whose zeal and discipline, whose freedom from abuse and serious error, have spread the growth of public confidence in wireless telegraphy.

* * *

Although Great Britain has hitherto taken no very prominent part in the organisation and maintenance of an international wireless time service, there are signs that the subject is beginning to arouse some public attention. Mr. Charles Bathurst asked a number of questions in the House of Commons on April 21st with a view of eliciting information. He pointed out that as the result of the International Conference on wireless time signals, which took place in Paris, in October, 1912, which was attended by four delegates appointed by His Majesty's Government, and of the establishment of an executive body known as the Bureau Internationale de l'Heure, with headquarters in Paris, a preliminary list of high-power wireless stations organised to transmit time signals at stated hours had been issued. Although this list contained stations in every other part of the world, it contained no station in any part of the British Empire. With one-fifth of the world's territory under British rule, and in view of the preponderance of British shipping interests, Mr. Bathurst wanted to know if the Government would co-operate with other nations in perfecting the international wireless time signal scheme discussed at and approved by the conference.

* * *

Mr. Churchill, who replied, admitted that the facts were as stated by Mr. Bathurst, "but," he added, "the British delegates at the Conference made certain recommendations for the establishment of time signals at wireless stations in the Dominions and Colonies which would have the effect of greatly increasing the value of the scheme, and I understand that these recommendations have been brought to the notice of the Governments concerned." He suggested that further questions on this point might be addressed to the Colonial Secretary, and we hope that the suggestion will be followed. The official report of the Conference that met in Paris in October last has not yet been published, and this delay is causing no little confusion, as it is known that the Conference decided upon a new partition of hours and a new scheme of signals, the details of which are anxiously awaited.

* * *

The genial contributor to the "Office Window" in the *Daily Chronicle* is evidently a diligent reader of THE WIRELESS WORLD, though we fear his conversion to that laudable habit is of comparatively recent date, otherwise he would have discovered that the word "wirelessed" which he so cordially commends to the compilers of the Oxford Dictionary appeared in these columns long before last month. In the following paragraph, which was published on May 8th, he writes:

> "The coadjutors of Sir James Murray in the compilation of the Oxford English Dictionary are, one is aware, 'constant readers' of this column in their search for new words or new meanings. Unless they have already met it they will be happy to be introduced to 'wirelessed' as a term for sending a wireless message. It occurs in an article describing the sealing disaster off the Newfoundland coast in the current issue of THE WIRELESS WORLD. 'The same day her captain wirelessed the following message to St. John's.' We already have 'wired' as a synonym for telegraphing, and the new word seems to fill a hiatus in the language."

Let us hope that Sir John Murray and his coadjutors have also been "constant readers" of this magazine, for the practical applications of scientific discoveries are responsible for the introduction of many new words (not always happily chosen) of which the layman has generally little idea of the sense or meanings.

* * *

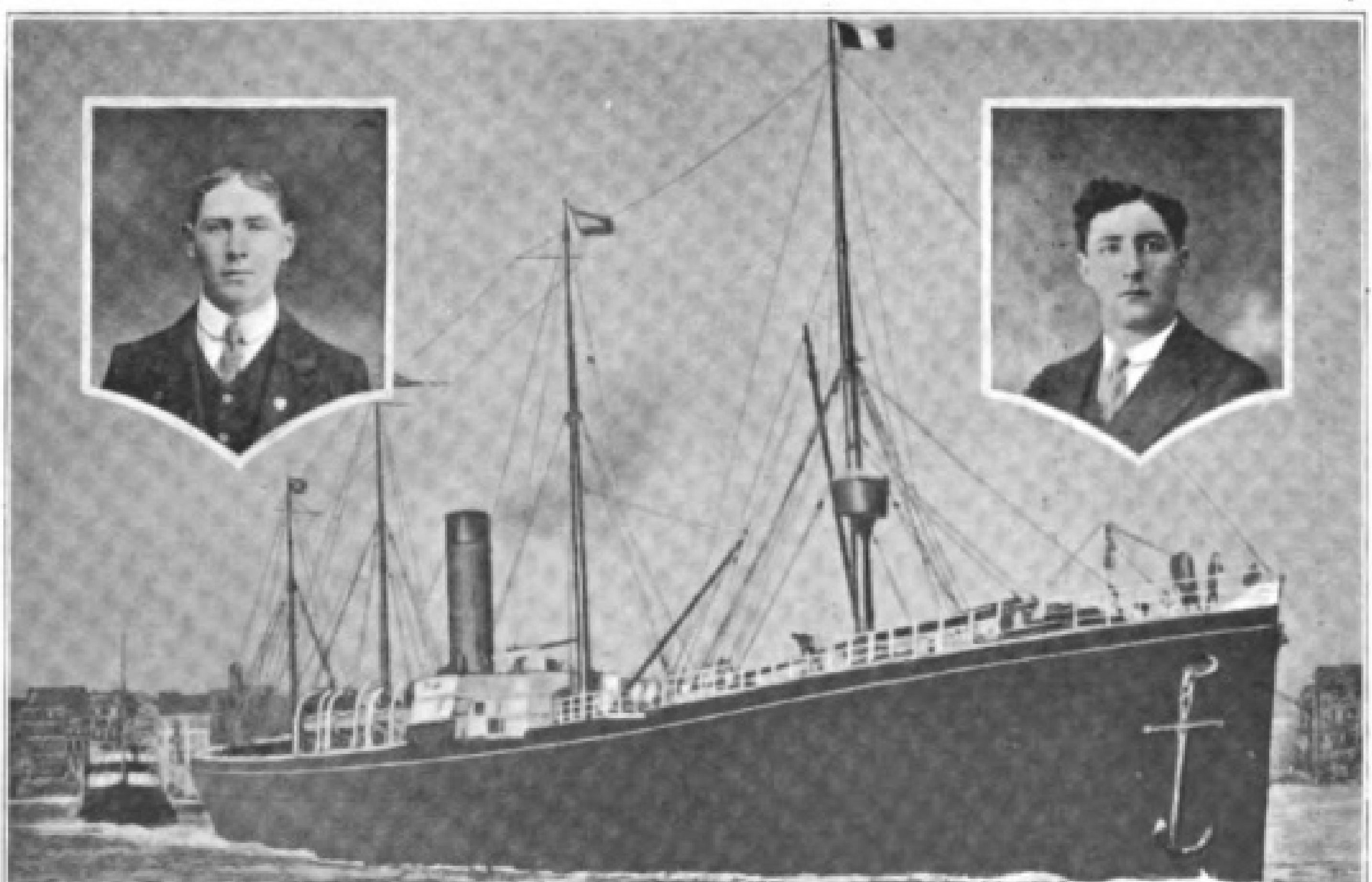
We would draw our readers' attention to an inset in this number announcing the names of the candidates who passed the examination in wireless telegraphy, which was open to members of the Territorial Force, Cadet Corps, Boys' Brigade, Church Lads' Brigade, the Boy Scouts' Association, etc. Entries were received from all over the country, and the examinations were held in London and at different local centres on May 15th and 16th. A full report will be published next month

Maritime Wireless Telegraphy

ON May 5th public interest was aroused by the news that an unknown steamer was on fire off Sable Island, and had sent out an urgent message for help. The German liner *Seydlitz* was the first to receive the call, but could get no answer in response to her inquiry as to who and where the vessel was. The distressed vessel ultimately turned out to be the Leyland liner *Columbian*, bound from Antwerp to New York, and the reason for her silence was that the fire had already attacked her wireless apparatus and rendered it useless. For a time, however, intense excitement prevailed, and a number of ships in response to the call of the *Seydlitz* organised a search in the locality whence the message apparently emanated.

It was a splendid quest that the vessels engaged in, for they sacrificed their own interests and prolonged their journeys indefinitely, all because a voice had been calling to them from space for help, and it is a tribute to modern gallantry that they should be found ready to take up such a forelorn hope as the search for an uncharted vessel on the strength of a confused message which there was every probability might turn out to be a *canard*. In the end, however, their gallantry was amply vindicated.

The first wireless message that was instrumental in organising the search came, as we have stated, from the *Seydlitz*. This vessel immediately made her way in the direction from which the wireless call had come to her, and on May 5th she sent the following message to the North German Lloyd Company at New York: "Large steamer burning all over passed close by. Convinced she abandoned. Name unrecognisable. Foremast and funnel overboard. Position 41° 27′ North 59° 07′ West." This notification was transmitted to all other ships in the vicinity, and amongst those that received it were the *Franconia*, *Sachem*, *Olympic*, *Brandenburg*, *Manhattan*, *Haverford*, *Georgic*, and *Marengo*.



The ill-fated "Columbian." Inset (left), Chief Wireless Operator Michael Burke. Inset (right), Second Operator James Drohan.

On May 6th the Cunard steamer *Franconia* picked up one of the *Columbian's* boats with 14 men aboard—13 living and 1 dead—and later the *Manhattan* picked up a second boat containing Captain Macdonald, the master of the *Columbian*, and 13 others. No trace has been found of the third boat, which carried 19 souls, while two men are known to have met an untimely fate before the *Columbian* was abandoned; one of these, an engineer, was killed in the explosion which preceded the fire, and the other was drowned in getting away from the burning vessel. This accounts for the whole of the crew, which numbered 49 men.

The captain of the *Franconia*, as soon as the circumstances of the disaster were known, despatched a wireless message to the Cunard Company, which is so excellent and detailed a report that we print it in full:

"Received wireless from steamer *Georgic* 11.24 a.m., May 4th, '*Seydlitz* passed in 41° 27′ North 59° 07′ West large steamer burning all over. Hull high out of water, foremast funnel gone, no people aboard.' At same time wireless from Sable Island requesting me endeavour identify steamer should I pass close. At 1.15 p.m. from Associated Press, Boston: 'Great alarm over *Seydlitz* reports of big ocean liner on fire, rescues by *Franconia*. Please send brief despatch.'

"At that time rumour of rescue not true. On receipt of *Georgic's* message, changed my course to cross given position of burning steamer; arriving there 3 p.m. could discover no trace of wreck, but decided, owing false report of fire, and fearing influence on other possible rescuing steamers, to encircle position at six miles, and at 3.30 p.m. sighted boat starboard bow. Being already prepared occupants thereof were taken on board in few minutes. Heavy swell running at time, so took precautions to put out sea-boat to cover their embarcation.

"Boat contained 13 men and a corpse lying awash in bottom boat. Survivors had used trouser leg from corpse on end of boathook as distress signal. Survivors were in state of extreme exhaustion and mental collapse. Some had been burnt by fire. They state had been adrift 40 hours. Six put under doctor's care in hospital, and others given brandy and soup, bathed hot water and put bed, when they immediately fell asleep. Little information could be obtained from them.

"Carpenter says ship was *Columbian*, sailing from Antwerp about 12,000 (?) tons register. He asleep, but heard alarm of fire, was coming along deck and had arrived about midships when explosion occurred under his feet which blew him overboard. Was picked up by boat. Lamp-trimmer's son states his father was coming forward for him when deck blew up and lamp-trimmer fell into burning hold.

"Quartermaster says Captain Macdonald, chief engineer, chief officer, and several others got third boat out when explosion took place; does not know if occupants of boat saved. Second officer got away with about 24 men 10 minutes before boat we picked up.

"All agree fire started midnight Sunday, cause unknown. First reported by outlook man, who saw smoke coming up No. 4 hatch. Half-hour later whole ship forward and amidships in flames, with constant violent explosions. Wireless apparatus wrecked. Am carrying to Boston remains of chief steward, who was frightfully injured by explosion and was delirious soon after boat got away. Died Tuesday midday. Our doctor certified death due shock and exposure.

"After picking up boat made another detour searching for other boats, and deeply regret could not find them. But many other steamers hastening scene of disaster, and trust if not already picked up following steamers will rescue them.

"Have Marconied ships to look out for two missing boats.

"Received reply from *Manhattan*, *Haverford*, and *Marengo*.—MILLER."

Captain Macdonald, the master of the ill-fated vessel, has telegraphed from Sable Island that the fire broke out at midnight on Sunday, May 3rd, in No. 1 hatch. The alarm was immediately given and the hose turned on the burning hatch, but a terrific explosion occurred a few minutes afterwards, which burst the hatches and the skylight, wrecked the engine-room and destroyed the Marconi equipment.

There is one certain conclusion to be drawn from this tale of disaster at sea, which is that but for wireless telegraphy not one soul of the *Columbian's* crew of forty-nine would have been saved

Among the Operators

[This section is devoted to recording items of particular interest to wireless telegraph operators.]

Mr. A. Stocker has been appointed for duty on the new Canadian Customs cruiser *Margaret*, which is shortly leaving Messrs. J. I. Thornycroft's shipbuilding yard for special duty on the Canadian coast.

Mr. C. S. Gordon, Mr. F. L. Dennis and Mr. E. Blake have recently returned from duty at the Santander, Vigo and Soller stations respectively. They have been in the service of the Spanish Marconi Company for the past two years, and are now on leave.

Mr. M. A. Preston, of the *California* (P.S.N. Co.), Valparaiso, who was operated on for appendicitis at Callao, is now convalescent.

Heartiest congratulations to Mr. J. R. Binns, who, we learn, is to be married early in June at New York. Mr. Binns, the wireless hero of the *Republic* disaster, proposes to leave New York on June 6th, proceeding *via* the West Indies to Cherbourg on the *Danube* and spend a honeymoon touring the Continent and Mediterranean.

The Australian Government have appointed the following wireless telegraph inspectors at ports named: Messrs. D. MacDonald, Melbourne; G. J. Weston, Sydney; L. E. Tilney, Perth; W. G. Clarke, Townsville; J. M. Martin, Darwin; W. M. Sweeney, Perth, Broome; F. J. Burgoyne, Adelaide; G. A. Scott, Brisbane.

Mr. G. W. Smythe and Mr. B. A. Carter have been appointed to foreign service in India, and have signed on for a period of three years. Mr. Smythe is proceeding to Calcutta on the *Malda*, and Mr. Carter is proceeding *via* the *Massilia* and will transfer to the *Baroda* upon his arrival in India.

Mr. T. H. Hodge, who has been employed on foreign service in India for the past twelve months, and who is at present on the *Chilka*, will return home on the *Malda*.

Operator H. J. Perkins, who has just returned from the West Coast South American service, thanks all his friends at home and abroad for the kind wishes which they accorded him on the occasion of his marriage with Miss E. Tuey at St. George, Tufnell Park, London, on April 20th last.

We regret to announce the death of Mr. F. R. Collier, on May 8th, 1914, and Mr. E. Foran, on March 23rd, 1914. Mr. Collier joined the company in September, 1911, and had served on many of the principal liners fitted with wireless telegraphy. Mr. Foran joined the company in February, 1913, and also served on various steamers, including the *Cymric* and *Tunisian*.

We regret to record the death, after a short illness, of Mr. Siebe F. Wynbergen, one of the operators in the employ of the Société Anonyme Internationale de Telegraphie Sans Fil of Brussels. Deceased was twenty-eight years of age. He entered the service of the Belgian company as learner-telegraphist on January 16th, 1911, and was appointed telegraphist on April 1st of that year. He obtained the Government's wireless licence (first-class Dutch) on July 6th, 1911. The funeral took place at Amsterdam, and was attended by a representative of the S.A.I.T. and several telegraphists, who also sent wreaths to mark the esteem in which the young man was held. The late Mr. Wynbergen, whose untimely death is greatly regretted by all who knew him, gave great promise of having a successful career in the wireless service.

A correspondent informs us of a long-distance record made by the wireless on board a warship recently. When in St. Lucia (West Indies) the vessel got into communication with the naval station at Pembroke in South Wales, a distance of approximately 3,700 miles. Signals have been heard from Poldhu when lying at Vera Cruz, but the Cornish station could be quite distinctly read at Bermuda.

Freak communications are not an unknown experience among operators, and the following record of such communications reported recently might be of interest:—

When sailing from Glasgow to New York the *Caledonia* (Operators, R. Fraser and W. M. Stewart) reports the following:—

March 23rd, 11 p.m., exchanged signals with Malin Head, 650 miles; signals strong.

March 26th, 1.3 a.m., exchanged TR's with Cape Race, 733 miles.

April 10th, 1 a.m., exchanged TR's with s.s. *Columbia*, 700 miles.

April 10th, 3.15 a.m., exchanged traffic with Land's End, 1,050 miles.

April 10th, 2 a.m., exchanged TR's with Malin Head, 950 miles.

The operators on board the *Saturnia* (H. Munro and J. D. Morrison) report the following on the voyage from Glasgow to Montreal:—

March 19th, 1.44 a.m., exchanged signals with Malin Head, 922 miles.

April 8th, 5.40 a.m., exchanged signals with Land's End, 836 miles.

The *Mauretania*, sailing from Liverpool for New York on March 30th, at 3.5 a.m., exchanged TR's with Cape Race, 1,300 miles east; and at 4.15 a.m. the vessel exchanged traffic with Land's End, 1,170 miles west.

Mr. F. H. Waters has returned to London after completing 15 months' service with the Italian Agency of the Marconi International Marine Communication Company, during which time he sailed as Operator in Charge on the SS. *Mendoza*, *Savoia*, *Europa*, *Bayonne* and *Splendor*. After spending three weeks on foreign service leave Mr. Waters was appointed to the s.s. *Englishman*.

Commemorating a Deed of Courage

Jack Phillips' Memorial Unveiled at Godalming.

WEDNESDAY, April 15th, was selected as the date for the opening of the cloister which has been erected at Godalming to the memory of Jack Phillips, a native of the town, who was the chief wireless operator on board the *Titanic*. The ceremony was performed by the High Sheriff of Surrey, Mr. J. St. Leo Strachey, who paid an eloquent tribute to the memory of Phillips. He said:

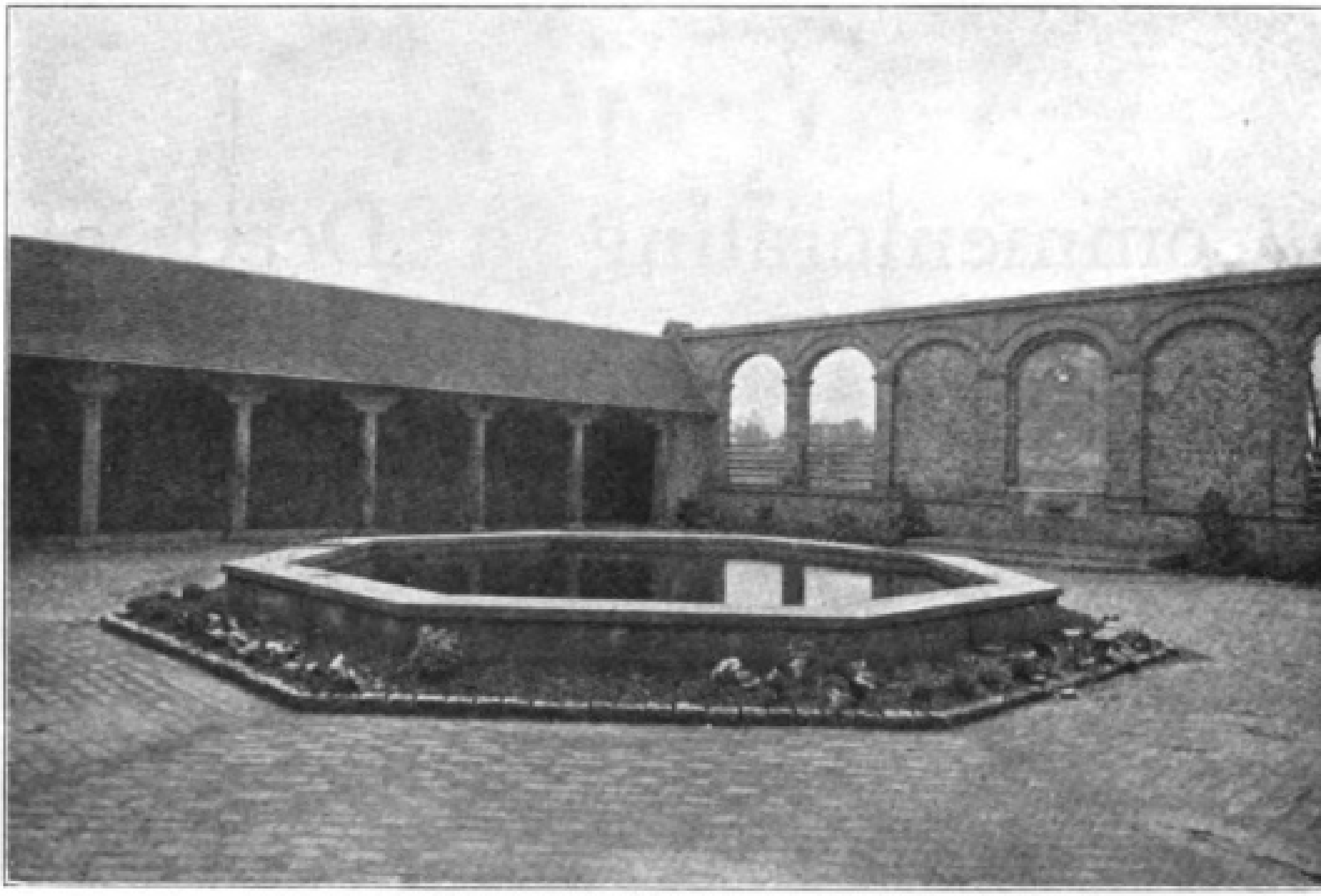
"I shall never forget, I do not think any Surrey man or woman will ever forget, the feeling of intense relief and of thankfulness which they experienced when during the agony of the *Titanic* disaster the story of Phillips' heroism blazed out like a star. It would be doing wrong to the many men and women who acted a brave part on the *Titanic* to speak as if Phillips' act was the only heroic deed then done. There were plenty of others worthy of our admiration. But I think we may claim that there was something specially splendid, something specially great, in the way in which Phillips died and did his duty. No man could have called him coward or thought of him otherwise than as a brave and a good man if, when the captain released him from his work in the wireless cabin, he had abandoned his efforts to call aid across the waters to the sinking ship. Instead, Phillips stuck to his post and disdained to say even to himself: 'I have done all that is required of me, all that any man can expect me to do, and I may now fairly look out for myself.' He did not reckon like that. He kept no ledger account with Duty. He drew up no moral balance sheet with its nicely calculated less or more. He spent himself fully and without reserve in the service of his fellow-men. Therefore, we are right to honour him in this haven of rest—a place as quiet as, on some halcyon day of summer, is that expanse of blue Atlantic water which is his noble tomb. Of a death such as this we can truly say:

> Nothing is here for tears; nothing to wail;
> Or knock the breast; no weakness, no contempt;
> Dispraise or blame; nothing but well and fair,
> And what may quiet us in a death so noble.

"The simplicity, the nobility that brought us this quiet, this relief, in the passion, the disturbance and the discouragement of the great disaster, is reflected in the work of two Surrey artists, Mr. Thackeray Turner and Miss Jekyll. We owe to our noble dead all that is highest in the world of beauty, all that is appropriate to a deed of courage done with perfect unconsciousness of self, and perfect sincerity. These are the qualities that marked the deed. These are the qualities which are held sequestered in this gentle garden cloister. Let us hope that Phillips' example and Phillips' memory may become a part, as it were, of the building—a spell to bind the spirits of those who enter here. May no man or woman who seeks rest in the cloister leave without an inspiration towards that high courage which is in truth the liberator of souls.

SPIRIT OF THE ENGLISH-SPEAKING RACE.

"Few of us are ever likely to be called upon to face death in so appalling a form as that in which Phillips encountered it. But that need not in the least cut us off from communion with him. We can share his sacrifice on a lower plane. We are told of deeds that won the Empire, and hear of great battles by sea or land, or great transactions of statecraft and politics. These



View of the Cloister; on the right is the Memorial Tablet.

are often worthy in themselves no doubt. But, after all, the real deeds that won the Empire were deeds of the spirit, deeds such as that of Phillips. In the last resort the Empire was won and the Empire will be sustained by the spirit of the English-speaking race, and that spirit rests on the sense of duty. As long as Englishmen feel and obey the call of Duty without question and without stint, so long, and no longer, will the nation and the Empire survive. Let no man be disheartened by the thought: 'How are we to define the word "Duty"?' None of the greatest things in the world —Time, Space, Death, Birth, Love and Life itself—are capable of definition. Nevertheless, we know what they are. In the same way we know what Duty is. One of the Early Fathers of the Church was asked what Time was. He replied: 'I know when you do not ask me.' So we may say of Duty. We know when we are not asked, when we do not try to find a definition. In the abstract we may discuss and find great difficulty in deciding what it may be our duty to do in this or that circumstance. When the moment for action comes we know in an instant what we ought to do, though we may not always have the courage to do it. Duty once accepted becomes an exaltation of the spirit. Many a man has been dejected and unhappy because he realises that he has not done his duty, or, again, before he has done it. While doing his duty he

> Is happy as a lover, and attired
> With sudden brightness like a man inspired.

"The *Titanic*, on the tablet which I am about to unveil, is called 'ill-fated.' I have no quarrel with the word. It is a natural and reasonable phrase, and represents the universal thought as to that poor ship and the end that came to all her strength and her majestic beauty. But never can we think of Phillips as 'ill-fated.' He died for his fellow-men, and followed the great, the Divine example, which we have just commemorated in our Easter prayers. He was happy in his death. He fought a good fight. He is now God's soldier.

"On behalf of the subscribers I now unveil the memorial tablet and hand over the memorial to the Mayor of Godalming on behalf ot the town. May Phillips' example be an inspiration to her citizens for all time."

The Mayor of Godalming (Mr. H. Colpus)

made a short speech, accepting the memorial on behalf of the town.

The cloister occupies an area of about 80 square feet, near Godalming Parish Church, and has three cloistered sides and an arcaded wall, from the arches of which charming views are obtained of river, meadow, and wooded hill. In the centre is a pond of water-lilies. The cloister has been erected at a cost of about £700, subscriptions having been received not only from residents of Godalming but from most parts of the British Isles, and from Europe and the United States. Around the memorial the ground has been laid out as a garden and has been planted with shrubs and flowering and other plants by Miss Gertrude Jekyll, the well-known authority on horticulture.

In the cloister there are large tubs of agapanthus (the African lily) and a border of evergreens and flowering plants along the arcaded wall. The roof is supported by oak pillars. In style the structure suggests the older Surrey farm buildings—the bricks having a touch of blue in their colouring. Seats will be placed in the cloister shortly. It is thought that the walls may be used for tablets celebrating brave deeds by other natives or residents of Godalming.

A small fountain provided by the Postal Telegraph Clerks' Association has also been placed in the cloister, and above this is a memorial tablet, surmounted by the Godalming borough arms and bearing the following inscription:

> S.O.S.—This cloister is built in memory of John George Phillips, a native of this town, chief wireless telegraphist of the ill-fated S.S. *Titanic.* He died at his post when the vessel foundered in mid-Atlantic on the 15th day of April, 1912.

The provision of the memorial has been in the hands of a committee including members of the Godalming Corporation and Lady Chance, Mrs. G. F. Watts, Mrs. Horne (wife of Mr. W. E. Horne, M.P.), and the Hon. Mrs. Arthur Davey. The memorial was designed by Mr. Thackeray Turner and Miss Gertrude Jekyll.

Phillips' portrait in oils has also been presented to the corporation by past and present scholars of the Godalming Grammar School, where he was educated, and a brass tablet has been placed in Farncombe Church, where he was formerly a chorister.

"He spent himself fully and without reserve in the service of his fellow men."—
Mr. J. St. Loe Strachey's tribute.

Administrative Notes.

Stations Opened and Closed.

WE learn from the Italian Ministry of Posts and Telegraphs that the stations Centopozzi (ICM) and Brindisi (ICE) have now been opened for public service in place of stations at Santa Maria di Leuca (ICL) and Taranto (ICT), the latter to be used exclusively for military purposes in future. Centopozzi station (41° 42′ N. 15° 56′ 45″ E.) has a range of 160 nautical miles, and Brindisi a range of 270 nautical miles. Both have 300 and 600-metre wavelength (the latter being the normal), and Centopozzi is open between sunrise and sunset, while Brindisi will carry on a day and night service.

A station has been opened at Cartagena. The following are particulars of the station:—Call letters, CTG; normal wave-length, 600 metres; hours of service, 6 a.m. to 10 p.m. (these hours will be extended when necessary); coast station tax, 5d. per word (without minimum; land line tax to Columbia and Ecuador—in Spanish language 1d. per word, minimum 10d.; any other language than Spanish, 2d. per word, minimum 1s. 8d.

The Chatham Islands Coast Station, call letters VLC, has been opened for public correspondence. The hours of watch are as follows:—9 a.m. to 1 p.m., 3 p.m. to 5 p.m., 7 p.m. to midnight, New Zealand mean time (Sundays and holidays inclusive). The rate on messages between New Zealand stations and Chatham Islands is sixpence (6d.) per word. The coast station charge for a message accepted on board ship and destined for Chatham Islands transmitted to the Chatham Islands Station is sixpence (6d.) per word. The charges on a message accepted on board ship addressed to a place in New Zealand, and transmitted *viâ* the Chatham Islands Station to a New Zealand station, are as follows:—Ship charge, 4d. per word; Chatham Islands relaying charge, 4d. per word; New Zealand coast station charge, 6d. per word; total, 1s. 2d. per word.

British Warships.

ORDERS have been issued by the Admiralty directing that if any of H.M. ships observe a ship to be in distress which is not herself fitted with wireless telegraphy, and it appears that the presence on the spot of any merchant ships in the vicinity is likely to be of assistance, a wireless message to that effect is to be sent without delay to the nearest wireless coast station (open for general public correspondence) if the ship is in the neighbourhood of one, or, if not, as a general call to all ships in the vicinity. Similarly, if H.M. ship or ships concerned are able to render all the assistance required or when sufficient ships for that purpose have arrived on the spot, a message is to be sent to the coast station that it is unnecessary for further ships to go out of their course to assist. This procedure is to be followed in addition to and not in place of any action in calling up H.M. ships or naval store stations which may be deemed advisable.

* * *

Classification of United States Ship Stations.

THE classification of vessels as given in the United States *Regulations for Radio Apparatus and Operators on Steamers*, and *Regulations Governing Radio Communication*, have been amended to read:

First Class.—Vessels having a continuous service.

There shall be placed in the first-class vessels which are intended to carry 25 or more passengers:

(1) If they have an average speed in service of 15 knots or more;

(2) If they have an average speed in service of more than 13 knots, but only subject to the twofold condition that they have on board 200 persons or more (passengers and crew), and that, in the course of their voyage, they go a distance of more than 500 sea miles between any two consecutive ports.

Second Class.—Vessels having a service of limited duration.

There shall be placed in the second class all vessels which are intended to carry 25 or more passengers, if they are not, for other reasons, placed in the first class.

Third Class.—Vessels which have no fixed periods of service.

All vessels which are placed neither in the first nor in the second class shall be placed in the third class.

The grade of operators required on vessels of each class are prescribed in the London Convention Service Regulations, Article X. A continuous watch may be maintained by one commercial second-grade operator and one cargo grade operator on cargo steamers.

Vessels voluntarily equipped, and maintaining "Constant Service" will be entered in the first class.

* * *

Australian Regulations.

THE following statutory Rule (No. 18, 1913) has come into operation.—"Ocean forecasts sent by the Commonwealth Meteorologist will be transmitted from radiotelegraph stations owned, operated, and maintained by or on behalf of the Postmaster-General to vessels at sea, and weather reports received at such radiotelegraph stations from vessels at sea, and addressed to the Commonwealth Meteorologist, will be transmitted, on payment of the following charges: For each communication not exceeding 20 words, 2s.; for each additional word, 1d.; plus the ordinary land line charges." The following fees for licences have been established by Statutory Rule, No. 263, 1913: For a General Licence for ship stations or for any renewal thereof—Five shillings for each ship included in the licence.

For a Supplementary Licence for ship stations or for any renewal thereof—Five shillings for each ship included in the licence.

For an Experimental Licence for land stations—Twenty-one shillings for each year or part of a year the licence is in force.

Regulation 21 of Statutory Rules, 1913, No. 351, has been repealed and the following inserted in its stead:

21. (1) Every ship station in respect of which a general licence is issued must be operated by a person or persons holding a certificate of competency or certificates of competency issued by the Postmaster-General after examination, or by the Postmaster-General of the United Kingdom.

(2) Certificates of competency shall only be issued to natural-born or naturalised British subjects, and shall be of two classes, namely:—

(*a*) 1st class—issued to persons capable of working up to the speed of 20 words per minute; and

(*b*) 2nd class—issued to persons capable of working up to the speed of 12 words per minute.

(3) A fee of five shillings shall be paid by the candidate on each occasion on which such candidate is examined. A certificate of competency shall be issued, without charge to each candidate who satisfactorily passes the prescribed examination, but a fee of two shillings and sixpence each shall be paid for any copies of such certificate.

The following Coast Stations are advised by the Berne Bureau as having been opened recently:

—	Call Letter.	Normal Range in Nautical Miles.	Normal Wave-length.	Nature of Service.	Hours of Service.*
RUSSIA: *					
Cape Mare-Saale... ...	RTM	150	600	General Public	See footnote.
Waigatz	RTV	150	600	" "	
Yugorski-Schar	RTU	150	600	" "	

* A description of these stations and an account of the nature of their work appeared in the December 1913 number of THE WIRELESS WORLD and a further reference appeared in April last. The stations are open for service from 8 a.m. to 10 a.m., noon to 2 p.m., 8 p.m. to midnight (St. Petersburg time, which is two hours in advance of Greenwich time). The coast charge is 0.60 fr. per word, but for correspondence with Russian ships that charge is reduced to 0.13 fr. per word.

Contract News

Arrangements have been completed whereby the Marconi Company will equip the following vessels for Messrs. Elders & Fyffes with ½ kw. installations: S.s. *Manistee* (call letters, MLR), s.s. *Manzanares* (call letters, MLS), s.s. *Tortuguera* (call letters, MMO), s.s. *Miami* (call letters, MLU), s.s. *Barranca* (call letters, MLL), s.s. *Aracataca* (call letters, MLB), s.s. *Chirripo* (call letters, MLP), s.s. *Matina* (call letters, MLT), s.s. *Nicoya* (call letters, MLV), s.s. *Pacuare* (call letters, MLY), s.s. *Reventazon* (call letters, MMI), s.s. *Gent* (call letters, MMP). Messrs. H. B. & A. Gonley have also decided to have their general cargo vessel *Hatumet* equipped with a ½ kw. Marconi installation.

Orders have been received during the past month to equip the following vessels with Marconi Apparatus.

Name.	Owners.	Installation.
Candia	P. & O. Steamship Co.	1½ kw. and emergency
Socotra	" "	" "
La Marguerite	Liverpool and North Wales Steamship Co. ...	" "
Euripides	Aberdeen Line	" "
City of Vienna	Hall Line	" "
S.Y. Erin	Sir Thomas Lipton	" "
Rufford Hall...	Hall Line	½ kw. and emergency
Ricardo a Mestres	Andrew Weir & Co.	1½ kw. and emergency
City of Exeter	Ellerman and Bucknall S.S. Lines	" "
Steamships Nos. 465 & 466	Glen Line	" "
City of Winchester	Hall Line	½ kw. and emergency
Ebro	The Royal Mail Steam Packet Co.	1½ kw. and emergency
Essequibo	" " "	" "
Three new vessels for— ...	Furness, Withy & Co.	" "
King Orry	Isle of Man Steam Packet Co.	" "
City of Rangoon	Hall Line	½ kw. and emergency
City of Madrid	Bucknall Line	" "

Vessels Fitted with Marconi Apparatus since the last issue of the "Wireless World."

Name	Owners.	Installation.	Call Letters.
Viking S.Y.	Viking Cruising Co.	5 kw. and emergency	MVK
Aquitania	Cunard Steamship Co.	" "	MSU
Karamea	Shaw, Savill & Albion Co.	1½ kw. and emergency	MSB
San Melito	Eagle Oil Transport Co.	" "	MRZ
Barpeta	The British India Steam Navigation Co.	" "	MPR
Mongara	" " "	" "	MSF
Tanda	" " "	" "	MSH
Bamora	" " "	" "	MST
Varela	" " "	" "	MSR
Poona	P & O. Steam Navigation Co.	" "	MSO
Otaki...	New Zealand Shipping Co.	" "	MRP
Hororata	" " "	" "	MRF
Alcantara	Royal Mail Steam Packet Co.	" "	MRR
Brodvale	The Blue Star Line	" "	MRB
Borata	Pacific Steam Navigation Co.	" "	MIJ
Knight of the Garter... ...	Green Shields Cowie & Co.	" "	MSQ
Melania	Anglo-Saxon Petroleum Co.	" "	MPP
Trafford Hall	Hall Line, Ltd.	" "	MSL
Lake Michigan	Canadian Pacific Railway Co.	" (refitted)	MLH
Montezuma	" " "	" "	MLK
San Francisco	Isthmian Steamship Co.	" "	MIB
Bolton Castle...	Lancashire Shipping Co.	½ kw. and emergency	MAQ
Genesee	Anglo-American Oil Co.	" "	MIT
Reindeer	The Great Western Railway...	" "	MSD
City of Vienna	Ellerman City Line	" "	MSK

JAMMING.

THE *boná-fide* experimenter has been seriously disturbed by the amount of interference between amateur wireless stations, and the Wireless Society of London have taken steps which, it is hoped, will put an end to a preventable nuisance.

The Committee of the Society have drafted the following by-laws:

(1). In the interests of the small-power transmitting stations, the owner of any station using 50 watts or more may be called upon to refrain from transmitting at certain times not exceeding seven hours per week.

(2). No transmitting station shall carry on continuous working between the hours of 6 p.m. and midnight for more than 20 minutes, and after such period of working shall cease transmitting for at least another 20 minutes.

At an informal meeting the owners of leading London transmitting stations have agreed to the following arrangement:

No transmission shall take place on Wednesdays from 6 to 9 p.m., Fridays 6 to 9 p.m., and Sundays 8 to 9 p.m.

The stations which so far have agreed to limit the times of their transmission are the following: AJX, BAX, CZX, DXB, DNX, GNX, GXA, IXY, JXX, KXJ, KXM, KXY, MXA, NWX, OXF, OXM, TYX, WXD, WXH, YXU.

Mr. Maurice Child, on behalf of the London Telegraphic Training College, has agreed not to transmit at Earl's Court (ECX) on any day after 6 p.m., except on Tuesdays and Thursdays.

The importance of observing by-law No. 2 cannot be overestimated, as it is nearly impossible to check transmitting stations breaking the usual regulations. Further, as most experimental stations are licensed for low wave-lengths, namely from 150 to 200 metres, the fact of their being tuned sharply to their allotted wave-length, say 200 metres, causes jamming and interference on that wave-length to be more than ever present.

The following is a list of regulations which have been proposed for Transmitting Stations:

1. See that your transmitting apparatus is sharply tuned.

2. Make your receiving apparatus as selective as possible and learn how to use it efficiently.

3. Observe which stations jam each other and use this knowledge when transmitting.

4. Do not transmit at less than *twelve* words per minute except for very short periods or in exceptional circumstances.

5. Observe always Section 64, Operator's Handbook (issued by G.P.O.) concerning (*a*) making your receiving apparatus as sensitive as possible before calling up a station, and (*b*) listing carefully before calling a station to make sure that it is not already engaged.

6. Never carry out testing work with the aerial on that can be done equally well with it off. In cases where aerial must be connected, always let such tests be followed by your call, *and avoid busy times as far as possible.*

7. Always use the *minimum power* with which communication can be comfortably carried on, *vide* Handbook.

8. Stations communicating should carefully tune each other in at the outset, even though no other stations are audible. *This lessens the chance of being jammed.*

9. Use the official abbreviations (QRA, QRB, etc.) where applicable to amateur stations. Keep conversations as short as possible and *sign every message, however short.*

10. When sending a long message, send IMI every 25 words and do not proceed until you get "K" from the receiving station. In the event of the latter being jammed, less repetition will be necessary.

11. Refrain from answering a station that is calling some other station, unless it is to say that the latter is engaged or not working.

12. Remember that nine times out of ten the blame for weak signals lies with the receiving station; therefore *do not increase power until you have his assurance that he is in order.*

13. Listen in for a minute after finishing a conversation to see whether anyone is waiting to call you and indicate your desire to communicate with other stations by adding to SK, KKK.

The Narborough Plate

The Tale of a "Dark Horse," a Muddled Morse Message, and a Wireless Mis(sed)fortune.

By GEORGE J. TRUSTY

I.

IT was early-closing day, and Jack Lauriston, while awaiting his chum's efforts at "shutting up shop," was lamenting the bad state of their present finances, and bitterly complaining of their hard luck in general. They were a pair of scamps, 'tis true, but perhaps they were not entirely to blame.

Sloebury was as good as its name, and these two go-ahead, up-to-date young fellows occasionally found time hang very heavily upon their hands. Was it to be wondered at, therefore, that the "gentleman" of Biblical reputation and classical cognomen should "find some mischief" for their "idle hands to do"?

Lauriston was apprenticed to a Narborough firm of engineers, and boasted his scientific knowledge on all possible occasions. The firm had lately undertaken the manufacture of amateur wireless sets, and in consequence Jack had felt it incumbent upon him to study the science of radio-telegraphy. The knowledge thus acquired was, in course of conversation, imparted to his friend Phil Meynell, while the possession of an amateur set enabled them to put their theories to practical tests. Jack's father was the local scoutmaster, who, having been impressed by his son's arguments for the appointment of a wireless operator in the company, had gone to the expense of a portable set. Jack, of course, had been appointed scout operator.

Meynell, however, was of a literary turn of mind. He was in charge of the Sloebury office of the county weekly newspaper, the *Narborough Standard*, for which he compiled the local news and collected the local advertisements. The post was something of a sinecure, and there was not a great deal to do. Meynell, therefore, did not find it inconvenient to give sympathetic ear to the recital of his chum's occasional woes, for which he was ofttimes able to suggest excellent remedies.

But this afternoon they were both somewhat "down in the dumps." As becomes all up-to-date young men, Phil and Jack were sportsmen, and were not afraid to back their fancies. The previous evening they had had a straight tip from a mutual friend—a trainer in Sir Harry Pacer's stable—as to the merits of Ananite, which was entered for the following Monday's big race at Narborough.

"It's a dark 'orse," so went the information, "an' Squire's doin' it quietly an' gettin' big money about it. Take my tip an' git yer shirts on it, but don't let on as I told yer, for it's more 'en my job's worth."

The boys were full of it, and their temporary financial embarrassment did but make them the more anxious "to have a bit on," despite the fact that the state of the exchequer scarcely permitted any risky investments.

A passing remark from Jack about his wireless set gave Phil a flash of inspiration; he therefore paid little heed to his chum's lament on their apparent helplessness.

"I've got it," he said, and with a bound he was over the counter, closing the shop door before Jack quite realised what was happening.

"Got it!" Jack rejoined. "Got 'em sounds more correct; looks like the first stage of D.T.'s."

"This is no time for base insinuations," replied Phil dramatically. "Away with me unto the inner sanctum; there will I unfold to you the treasures of my mind."

Jack's curiosity was aroused, and he followed his chum into the little room at the back of the shop. Instinctively they drew up their chairs to the fireplace, deposited their heels on the mantelpiece, and lit their pipes. After a long pull Phil took the pipe from between his teeth and said thoughtfully:

"Yes, it's a grand idea; but we'll require a double set."

"A double set of what?" asked Jack sceptically; for at the mention of "set" he had a vision of Phil working the three-card trick or some similar swindle.

"Why, a double set of wireless apparatus, of course," replied he.

"Wireless apparatus! Why, what the dickens would be the good of that to us?"

"Good? I should say about one hundred pounds' worth of 'good' if it comes off. Look here; it struck me that if one of us went to Narborough with the portable set next Monday, he could watch the race and flash back the name of the big winner to the other one here in time to get the money on with old Smith. If so, why not?"

"Great Scott!" ejaculated Lauriston. "What a grand idea! That would make the thing a cert."

"I should just think it would," said his chum. "What d'you say if we go right into it?"

And then the plot began to mature. "Old Smith" was a bookmakers' local agent who took money and paid out the same on behalf of Messrs. Twister & Swindler, commission agents, of a Continental address and questionable reputation. Smith had a very poor opinion of the sporting instincts of our heroes, whom in his lighter moments he was wont to term "the couple o' pies," and, to judge from the net returns for their investments, his opinion seemed to be thoroughly justified. Needless to say, much of the hard-earned wealth invested by the said "pies" rarely found its way to the Continent, but remained in the vicinity of Sloebury, and to the credit of Smith.

Smith was, nevertheless, an obliging agent. He would take into consideration the fact that there was no telegraph office nearer than Hunterford, a market town six miles away, and that his "wires" were usually half an hour late in delivery either way, and as long as ready money was forthcoming he would occasionally accept bets after the hour at which the race was due to be run. You could "do" your fancy for the 1.30 up to about 2 o'clock with Smith, so obliging was he at times. Now, the two "pies," or, at least, one of them, had remembered this, and determined to profit thereby.

This was to be the *modus operandi*. Jack was to borrow from the works temporarily a set of apparatus, which was to be fitted up upon the editorial roof. On the day of the races Jack, as the better acquainted with sending, was to attend the meeting, while Phil would receive from the roof. The latter was to have the money ready and get it on with Smith in the usual way, with the usual excuses for being late. As soon, therefore, as the name of the winner had been passed through, everything would depend upon Phil; but if all went well the boys would find themselves petty millionaires by Tuesday morning.

Such was the outline of the plot, and the necessary preliminary arrangements occupied the conspirators till far into the night. Then they parted—the one to face an angry parent and explain his nocturnal sojourn, the other to retire to his own little bedchamber and "dream dreams" of plutocrean wealth in store.

Before the fateful day of the race arrived Phil spent every moment of his spare time in frenzied efforts to improve a rather weak knowledge of the Morse code, and on the Sunday Jack fitted up the portable set in a little bungalow near the course at Narborough.

II.

It was Monday, and all Sloebury was deserted. Shops were closed, business was suspended, and everyone, with the exception of a couple of barmaids at the local "hotel," old Smith the "bookie," and one or two others of no consequence, had early donned their best attire and taken their departure down the road which led to the light railway; for was it not the day of the races—the Narborough Plate, the one day in the year when Sloebury woke up and realised that it lived? With some of the local celebrities this day ranked as the "day of days," with others it came upon equal footing with the harvest thanksgiving (another exciting holiday), while with all in general it was counted worthy to rank as a bank holiday; and so Sloebury was deserted.

Toddling down the High Street towards

the "Flying Angel," old Smith was amazed to see Phil Meynell standing at the office door.

"What, Meynell," said he, "not gone to Narborough! how's that?"

"Didn't run to it, old man," replied Meynell. "To tell you the truth, I've been expecting a 'sub' from the head office so as to have had a bit on with you, but I suppose, with my usual luck, it'll come just after the bally race is over."

"Got anything in your eye, then?" asked Smith.

"Well, I want to 'do' Ananite if the 'dibs' come in time," said Phil.

"What's it running in?" asked Smith.

"Two o'clock," answered Meynell.

"Well, I'll stand by you till quarter-past if you like; but mind," cautioned Smith, "not a minute later."

"Right, oh! You're a brick! Where shall I find you?"

"At the 'Flying Angel,' bar parlour," replied Smith.

"Good iron," answered Phil, "I'll be there."

With this he went inside the office and closed the door with a chuckle. Smith continued on his way to the "Angel."

Up to the roof Phil made his way to await the trial call from Jack, for it had been arranged that his friend should "call up" Sloebury about mid-day to say how things stood. Punctually on the stroke of twelve, the buzz-buzz commenced.

"Phil, Phil!" came the call.

"Hello!" went the reply.

"Working all right?"

"Seems like it. How's things? Still the same?"

"Yes; Ananite still at a good price. Be on the ready at two prompt."

"Right."

Then silence.

Ananite now stood at ten to one. True, she was the property of Sir Harry Pacer, the rural magnate, but as that worthy, however philanthropic, was not accustomed to leading in winners, very few people were prepared to stand or fall by the Squire's horse, and gave their favour to Pat, the property of a Mosschester Irish brewer.

Time seemed to pass slowly as Phil sat thinking of the fortune they would have made by the morning. The boys between them had mustered a "fiver," which, although due for other things, they were to put on "to win." If, pondered Phil, Ananite kept her price, there would be fifty-five pounds to pick up—fifty-five pounds! Then the tempter whispered, "Why not make a bit more?" Phil reflected that he had quite another £5 of advertisement money in the safe. Why not borrow it? Ah, banish the thought! But the thought would not be banished; it had come to stay, and stay it did. It was not to be wondered at, therefore, that after an unsuccessful wrestling with principles far too utopian for his small soul, Phil went to the safe and added the prepaid advertisement money to his own fund.

Ding-dong, ding-dong; it was the village Big Ben announcing the hour. Boom, boom; two heavy chimes, and the anxious operator knew that over there beyond the hills horses were flying along the racecourse to the excited shouts of the spectators. All his faculties were on the alert to receive the message, and as he waited he saw, in his mind's eye, horses making for the winning-post. He saw the Squire's colours flash out in the sunlight, well ahead; he heard the shouts of thousands of triumphant "backers"—"Ananite, Ananite, she wins, she . . . ." And then——

"Phil, Phil!" came the call.

"Here," went back the reply.

Then slowly the name of the successful horse was sent in Morse through the ether to the impatient operator at Sloebury.

- — (dot, dash). "That's 'A,'" reflected Phil.

— - (dash, dot). "That's 'N.'" And so it was written.

- — (dot, dash). "'A' again! Oh, Jack, you *are* slow! I could have sent quicker myself."

— - (dash, dot). "Another 'N.' Hurry up, you josser; you'll have the quarter go soon!"

- - (dot, dot). "'I.' Why, I do believe . . . ."

— (dash). "'T,' it's the Squire's . . ."

- (dot). "'E.' Good iron!" shouted Phil, as he pulled off the receivers, having hardly awaited the final dot of the message. Seizing his cap, he made for the "Flying Angel" as though he himself were endowed with that happy spirit's means of transit.

In the bar parlour he found Smith, and, not without some little difficulty, he got the "tenner" on to Ananite. Visions of a big haul in the event of a "lose" and of a very nasty letter from the Continent in the event of a win floated before Smith's mind; but the big haul triumphed.

Thoughts of glorious times in store filled Meynell's brain as he made his way back to the office. He ran off in his mind a splendid article for the following Friday's *Telegraph* on the great benefits of "wireless," and made plans for a fine time on the strength of the hundred pound win. The hours passed all too slowly till his chum's return, but at last the train was in, and Jack and he were making towards the editorial offices in deep but eloquent silence.

Not until they were safely within and had locked the door did either venture to speak.

"Did you get the money on all right?" said Jack, opening up conversation.

"What do you think," replied Phil; "but I'd a run for it. How'd it go?"

"Fine," answered Jack. "Winner came up handsome at the last few yards and won by a short head."

"Short head!" said Phil. "I thought she'd have the field to herself."

"She! The winner was a 'he.' Everybody had money on it, so the odds are not great," laughed Jack.

"Not great! I thought it was a ten to one chance."

"Ten to one!" said Jack. "Why, he was favourite!"

"Favourite! But I thought . . . didn't you send? . . . Here, what did you send me?" came from Phil in fits and starts.

"What did I send?" replied Jack, surprised. "Why, the winner, of course! Pat!"

"But I got Ananite."

"Ananite! Why she was nowhere. I saw that . . . Here, I say, don't forget that's not yours, you know." This to Phil, who, at the name of the winner, had commenced to handle the apparatus very roughly.

"Not mine!" he exclaimed. "I know it's not; I wish I'd never seen the bally thing. You sent me Ananite, you know you did; I've got it in black and white. I even waited for the final 'e' before moving. Anyhow, I got all we had on to Ananite and a bit of somebody else's as well, that's all."

"Eh, what! Holy Moses!" ejaculated Lauriston.

And they sat down to think things out. Phil blamed Jack for bad sending, and showed how he had received:

· — — · · — — · · — — · · · —

A N A N I T E

But Jack proved that it all came about through Phil's bad reading and forgetfulness of the V E territorial signal which they had arranged to send as a blind at the end of the message, for what he had actually sent was:

· — — · · — — · · · · — ·

P A T, V E

Next morning Phil left for the metropolis carrying a small parcel, ostensibly special "copy" for the head office. It was noticed, however, that on the following Sunday Phil wore his week-day suit and that Jack no longer sported his fine gold watch. That week the *Narborough Standard* printed an anonymous but lengthy contribution which was little more than a violent diatribe on wireless telegraphy, which, the writer pointed out, had become the craze of a public bitten with a mania for novelty. The inefficiency of its service was commented upon, and the writer concluded with a passionate appeal for the support of the older but more accurate series of line wires and cables.

But among the correspondence was a letter from the scoutmaster of a neighbouring village troop informing the editor how a scout operator had picked up a call on the day of the races, two minutes after the finish of the big race, announcing "Pat" as the winner.

Sloebury readers found these two contributions somewhat conflicting, and even the local wireless experts, when consulted, could offer no solution of the problem. Old Smith thought he knew, but he said nothing.

INSTRUCTION IN WIRELESS TELEGRAPHY

(Second Course)

(II) The Staying and Erection of Portable Masts

[The article in the March number completed the first course of instruction. The present is the second of a new series of articles, which will deal chiefly with the application of the principles of wireless telegraphy. Those who have not studied that series are advised to obtain a copy of "The Elementary Principles of Wireless Telegraphy," which is now published, price 1s. net, and to master the contents before taking up the course of instruction commencing with the present article. An announcement concerning the second examination will be made shortly.]

IN the May article we considered the various stresses which the masts supporting wireless aerials are required to withstand, and we showed how the strength of the mast could be economically increased by staying it at suitable intervals, and by making the mast hollow and increasing its diameter.

MAST STAYS.

707. The material of which the stays are made depends entirely upon circumstances. For portable masts the stays must be very flexible, as they have to be coiled up on to drums when the mast is dismantled.

For masts up to 30 feet in height rope stays are the most suitable. For masts higher than 30 feet, however, it is better to use metal stays, because rope shrinks badly when it is wet and stretches again when dry, the result being that if a mast has been erected when everything is dry a shower of rain will shrink a long stay sufficiently to pull an anchor peg out of tho ground and allow the mast to fall. If, on the other hand, the stays are adjusted when they are wet they will stretch as tney get dry and allow the mast to buckle badly and perhaps break.

For long stays, then, metal should always be used and phosphor bronze is found to be the best metal for the purpose, although somewhat expensive. It has very nearly the same tensile strength as steel, and will not corrode or rust when exposed to the atmosphere. Steel can, of course, be galvanised to stop rusting, but this reduces its strength very considerably, more especially in the case of finely stranded wires such as would be used.

In order to make the metal stays flexible they are made up of many strands of fine wire.

708. When metal stays are used they must be carefully insulated from the earth, otherwise oscillatory currents will be induced in them on account of their proximity to the aerial, and they would thus absorb a large proportion of the transmitted energy, and thereby reduce the range of the station.

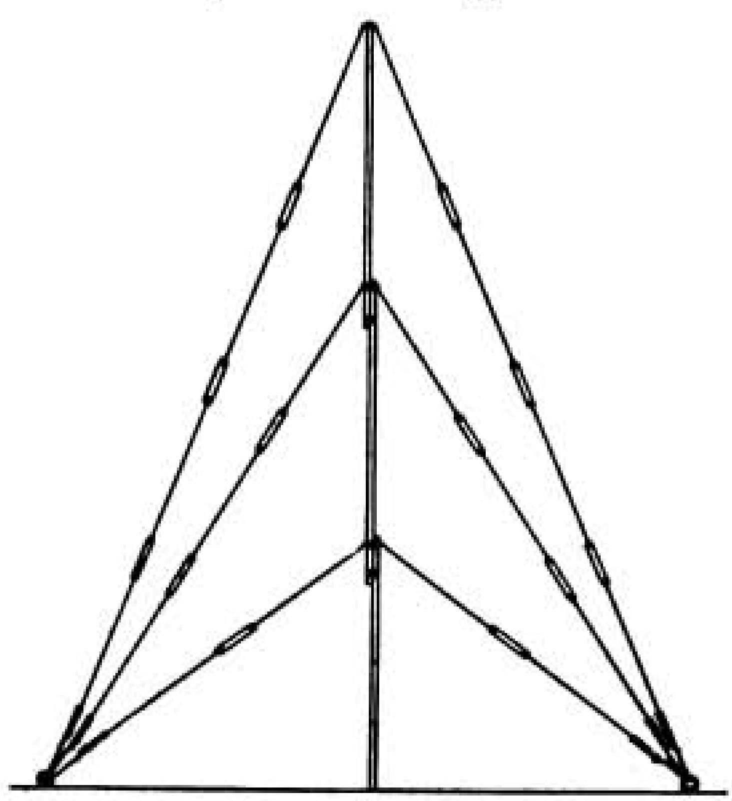


Fig. 1.

The insulation of stays does not, however, require to be of a very high order, a short length of rope being in most cases quite sufficient; for even when wet its resistance will be sufficiently high to stop any oscillatory currents in the stays. Although in this case there will be a certain amount of leakage to earth, the energy thus absorbed would not be sufficient to affect the efficiency of the station to any appreciable extent.

709. In tall masts of 200 feet upwards, where the stays are necessarily long, it is usual to divide the stays into two or more sections with rope lanyards, as shown in Fig. 1.

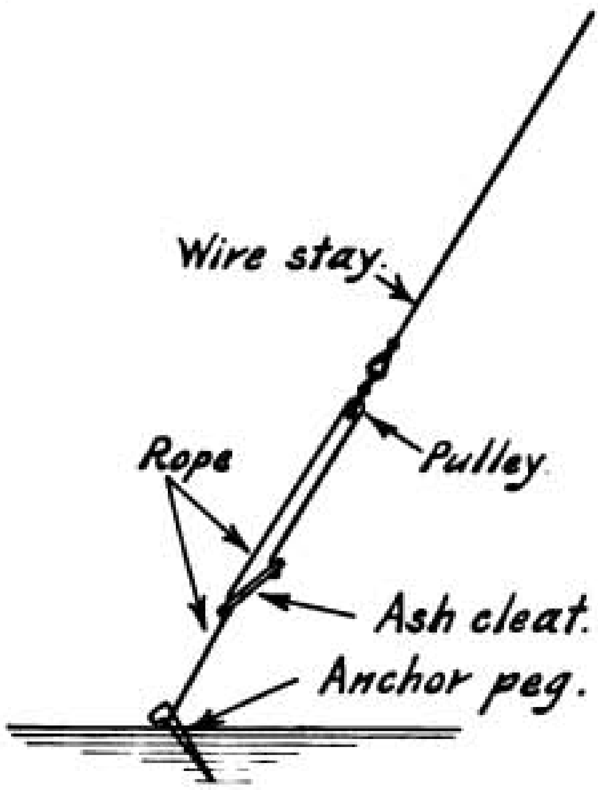


Fig. 2.

In the case of portable masts which rarely exceed 70 feet or 100 feet in height this division of stays is quite unnecessary, and an insulator consisting of a piece of rope between the stay and the anchor peg is quite sufficient.

Some means of adjusting the length of the stays is necessary, and it is usual to make this piece of rope serve the two purposes of insulating the stay and providing a means of adjusting its length, as shown in Fig. 2.

710. In the case of wooden masts no insulation is necessary at the upper end of the stay, but **in the case of steel masts the insulation of the stay from the mast is even more important than the insulation of the stay from the ground.** The reason for this is obvious by glancing at Fig. 3, when it will be seen that unless the stays are insulated at the point marked " A " *the stays, together with the mast, form a fair-sized umbrella aerial*, connected to earth through the mast, the stays forming the radial wires of the aerial and the mast forming the down lead. This would absorb a very large amount of the energy radiated from the aerial proper.

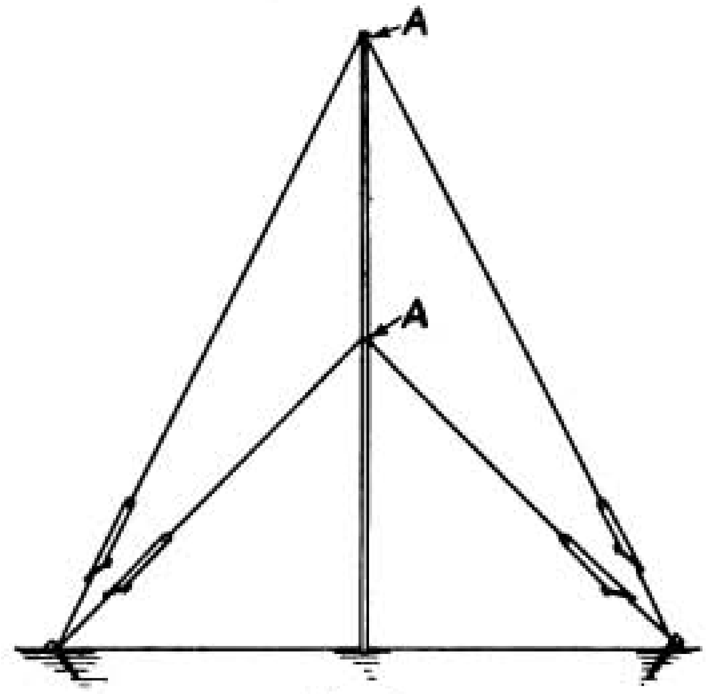


Fig. 3.

In the case of steel masts, therefore, it is necessary to insert insulators between the mast and the stay. For portable masts a length of about six inches of rope serves the purpose very well, as shown in Fig. 4.

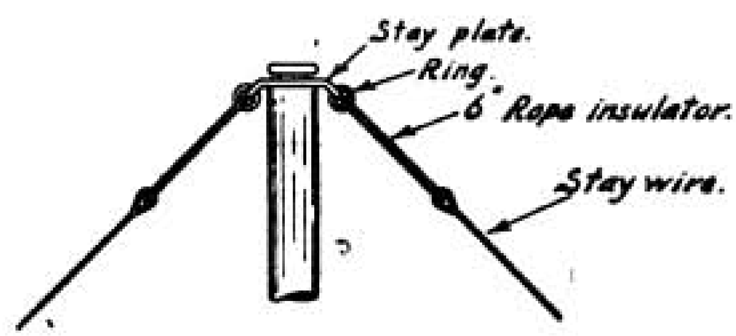


Fig. 4.

Erection of Portable Masts.

711. It is important to understand thoroughly the erection of portable masts. The cause of nearly every case of breakage that has come to our notice has been due to carelessness or ignorance while erecting the mast.

Telescopic masts are erected in a variety of different ways, according to their design; but as telescopic masts are for many reasons unsuitable for portable work (*vide* paragraph 703), and as the space at our disposal is limited, we will not describe any particular method in detail.

Suffice it to say that in most cases telescopic masts are used only to support umbrella aerials on account of their lack of stiffness, and the method usually adopted to hoist them is to set the telescopic mast up in a vertical position as shown in Fig. 5, and after

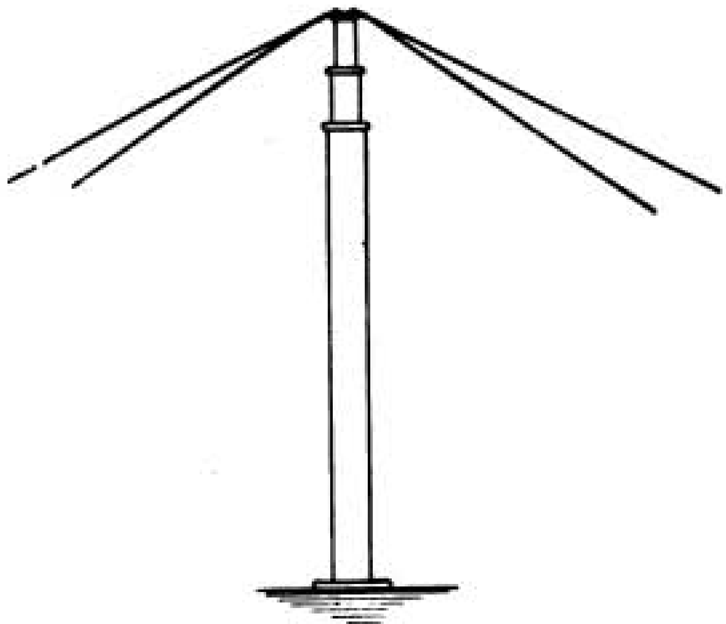


Fig. 5.

attaching the aerial wires to the top section, as shown, the mast is hoisted section by section, commencing with the top section, until the whole mast is extended.

With tall masts erected in this manner, it is necessary for a man to be stationed at each aerial wire to pay out the wire gradually as the mast is erected.

712. Sectional masts under 30 ft. or 35 ft. in height can be erected in two ways.

If the mast is to support an umbrella aerial, the best way is to first peg the aerial

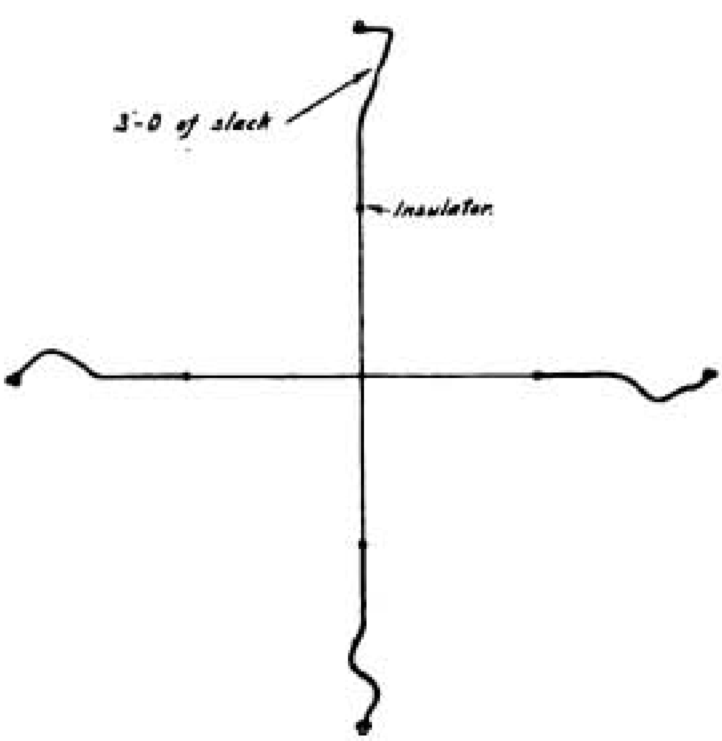


Fig. 6.

out radially, as shown in Fig. 6, leaving about 3 ft. of slack in each wire.

The top section of the mast is then attached to the centre point, or junction, of the aerial wires, and the mast pushed up section by section in much the same way as a chimney sweep pushes his broom up a chimney.

The reason for leaving 3 ft. of slack when pegging out the aerial wires is because the distance from the top of a mast to any one of the pegs increases as its height is increased, so by allowing sufficient slack to begin with, it is unnecessary for anyone to stand at the pegs and pay out the wire while the mast is being erected.

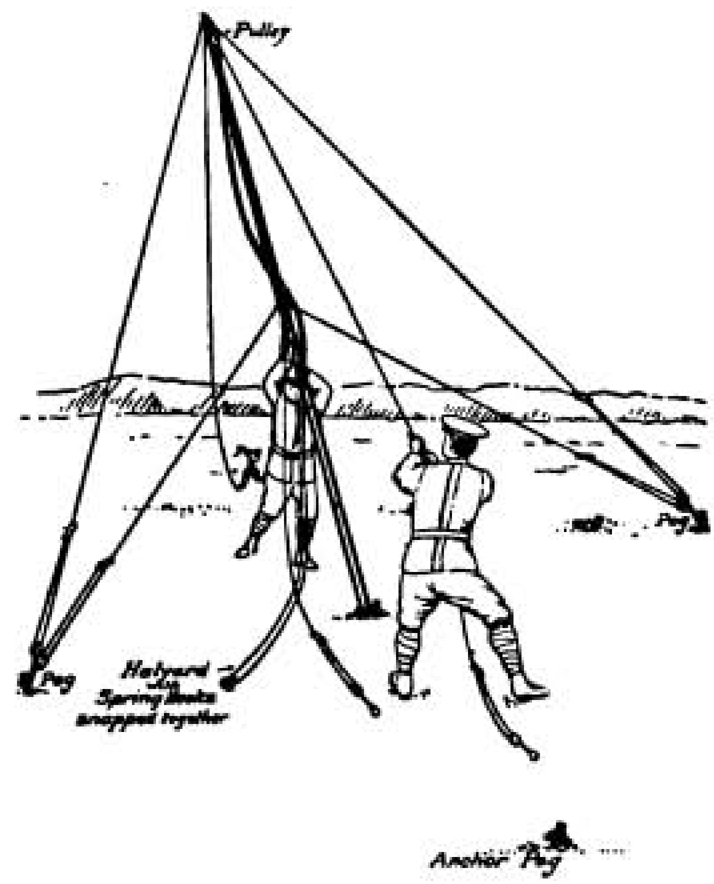


Fig. 7.

The other way of erecting short sectional masts is to join all the sections together and lay out the whole mast on the ground with its base at the point where the mast is to be erected, and after attaching the side stays of the mast to their respective anchor pegs, one man pulls on the front stays while another lifts the top end of the mast off the ground and walks the mast up like a ladder, as shown in Fig. 7.

When masts are erected in this way, it is most important that the mast is laid out on the ground correctly and that the pegs are correctly placed relatively to the foot of the mast.

In order to facilitate getting the pegs in the correct position, an instrument called a "**peg marker**" is usually supplied.

This consists of a four-armed peg, each arm about 4 in. long, with a central spike for sticking in the ground, as shown in Fig. 8. To the centre of the peg

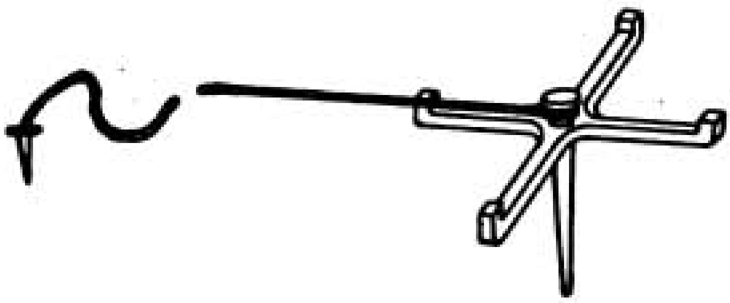


Fig. 8.

marker is attached a cord finishing with a small spike, the length of the cord being exactly the distance from the foot of the mast to any one of the pegs. This distance is usually half the height of the mast (*vide* paragraph 705).

The four arms of the peg marker being at right angles to one another give the direction of each peg, assuming that there are four pegs to the mast, so by getting the cord in line with each of the four arms in turn, and marking the point thus found with the end of the cord, a peg can be struck in at each of these points.

The mast should then be laid on the ground with its foot exactly at the point which was occupied by the peg marker, and the direction of the mast should be such that it lies close to one of the anchor pegs, *vide* Fig. 9.

Two side stays are then hooked to their respective pegs on each side of the mast, and all slack taken up. The two under stays are also hooked on to the anchor peg close to which the mast is lying. This is to prevent any chance of the mast falling over beyond the vertical position when being erected.

Masts over 30 ft. or 35 ft. in height cannot be erected by hand in this way on account of their weight and the short leverage which it is possible to obtain for pulling on the stays when the mast is being erected.

713. Sectional masts more than 35 ft. in height, therefore, are erected by means of a derrick usually made up of two or more mast sections. It is usual to make the derrick about one-third the height of the mast, this being found a convenient length.

Each mast is provided with four anchor pegs (1, 2, 3 and 4, Fig. 10) for the attachment of the guys, and a fifth peg (5, Fig. 10) for the attachment of the aerial halyard.

In addition to these, there is a pivot peg (D, Fig. 10) in the centre, on which the foot of the mast stands, a mast shoe (B, Fig. 10) which fits the foot of the mast to the pivot peg, a derrick shoe (E, Fig. 10) which fits the foot of the derrick to the foot of the mast, and an auxiliary bearing plate (A, Fig. 10) which prevents the pivot peg from sinking into the ground with the weight of the mast.

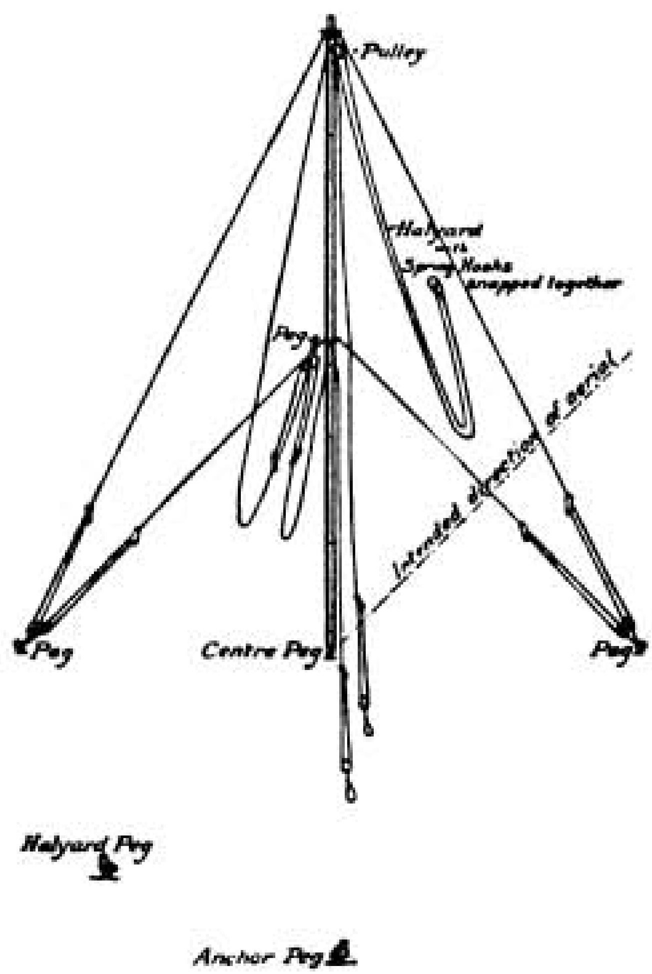


Fig. 9.

The peg marker is pressed into the ground with its four arms (A, B, C, D, Fig. 11) lying flat on the ground in such a way that a line drawn through the centre of the marker in the direction in which it is intended to erect the aerial, would roughly bisect the angle between any two arms of the peg marker (see Fig. 11).

The cord (E, Fig. 11) attached to the peg marker, the length of which gives accurately the distance from the foot of the mast to the anchor peg, is extended to its full length until it is in line with one of the four arms of the peg marker, and the first peg (1, Fig. 10) is hammered into the ground at the point marked by the end of the cord.

The cord is then carried round the peg

marker in a circular direction until it comes in line with the second arm, and the second peg (2, Fig. 10) similarly hammered into the ground at this point.

It is well to mention here that owing to the shortness of the arms of the peg marker, it is quite easy to make a comparatively serious mistake in the exact angular position of this peg, the result of which will be that when the mast is first erected it will not stand exactly vertical; but this, although wasting a certain amount of time, can easily be remedied by adjusting the guys. It is therefore advisable to measure this angle as accurately as the peg marker will allow.

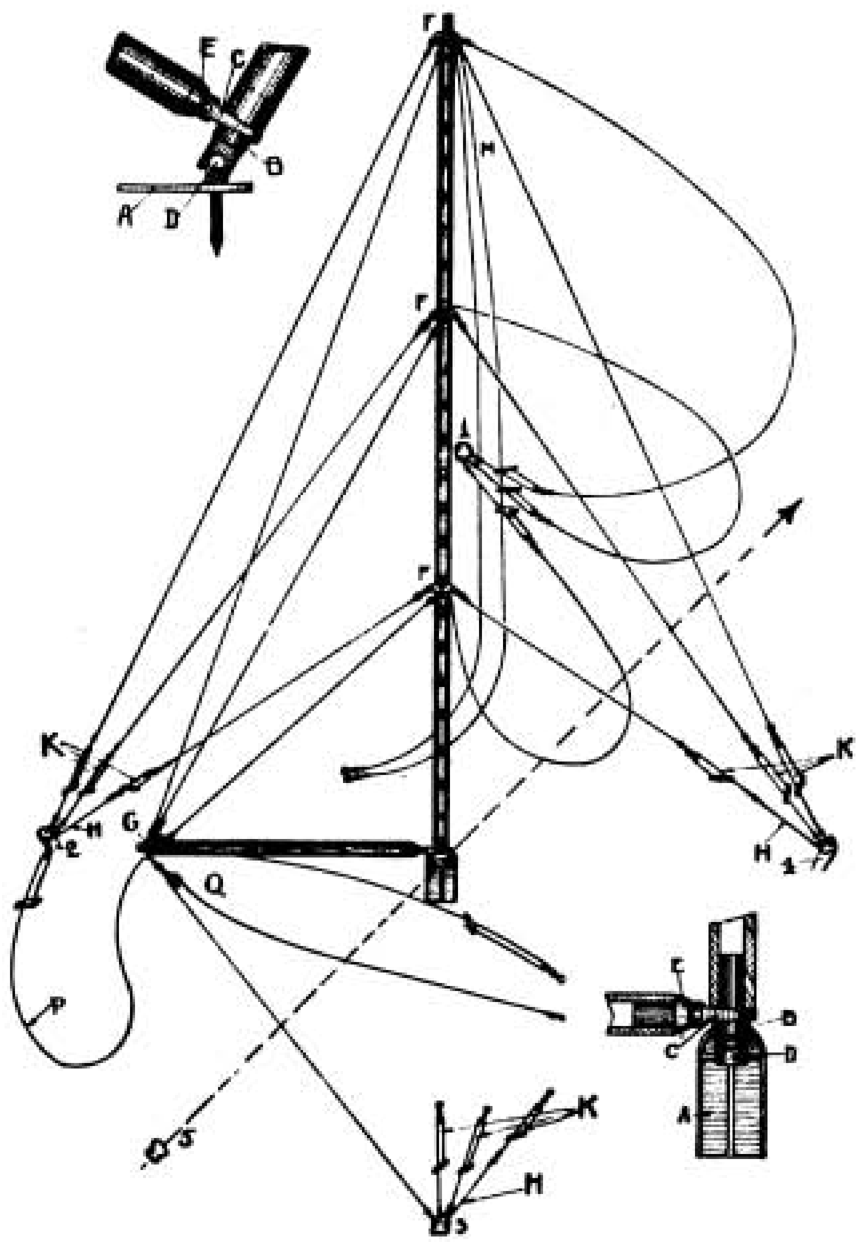


Fig. 10.

The cord is then again carried round the peg marker, **but in this case the angular position is not taken from the arm of the peg marker, but from the first peg, and great care must be taken that this third peg (3, Fig. 10) is exactly in line with the marker and the first peg.**

It is an easy matter to get the third peg very accurately in line with the peg marker and the first peg, but carelessness in this point is apt to have very serious consequences when erecting or lowering the mast, because, if the foot of the mast does not lie exactly in the line drawn between any two opposite pegs, whilst the mast is being erected or lowered, the stays attached to these two pegs will gradually become tighter and tighter as the erection or lowering proceeds, thus putting a very great strain on the stays and on the mast itself.

The fourth peg (4, Fig. 10) is marked out in the same manner as the third peg—*i.e.*, by getting it exactly in line with the peg marker and the second peg.

The fifth or halyard peg (5, Fig. 10) is stuck into the ground between two of the other pegs on the side of the mast opposite to the aerial.

The distance of this peg from the mast should be as great as convenient, as the further it is away from the mast the less strain will be put on the mast when the aerial is hauled up (*vide* paragraph 705). A satisfactory distance is between 15 and 20 yards.

The pivot peg (D, Fig. 10) should then be struck into the ground in the exact position previously occupied by the peg marker, taking care that the auxiliary bearing plate (A, Fig. 10) is placed on the ground underneath the pivot peg.

The mast sections are then plugged together and laid on the ground with a stay-plate between every other section, assuming that six sections form a mast, and care should be taken to see that the mast lies close to the first anchor peg, as shown in the drawing.

The two sections forming the derrick are then laid at right angles to the mast, *i.e.*, towards the second anchor peg, and the foot of the derrick is fitted into the derrick shoe (E, Fig. 10), which in turn is fitted to a turntable (C, Fig. 10), which allows the derrick to be hoisted (later) into a vertical position.

The mast is now ready for staying. This is done by attaching two sets of side stays by means of stay adjusters (K, Fig. 10), one set to the second peg and the third set to the fourth peg. When this is done that set of stays which will eventually be attached to the third anchor peg when the mast is erected is laid on the ground and attached temporarily to the head of the derrick, while the fourth set of stays are left lying slack on the ground with their ends attached through the guy adjusters to the first anchor peg.

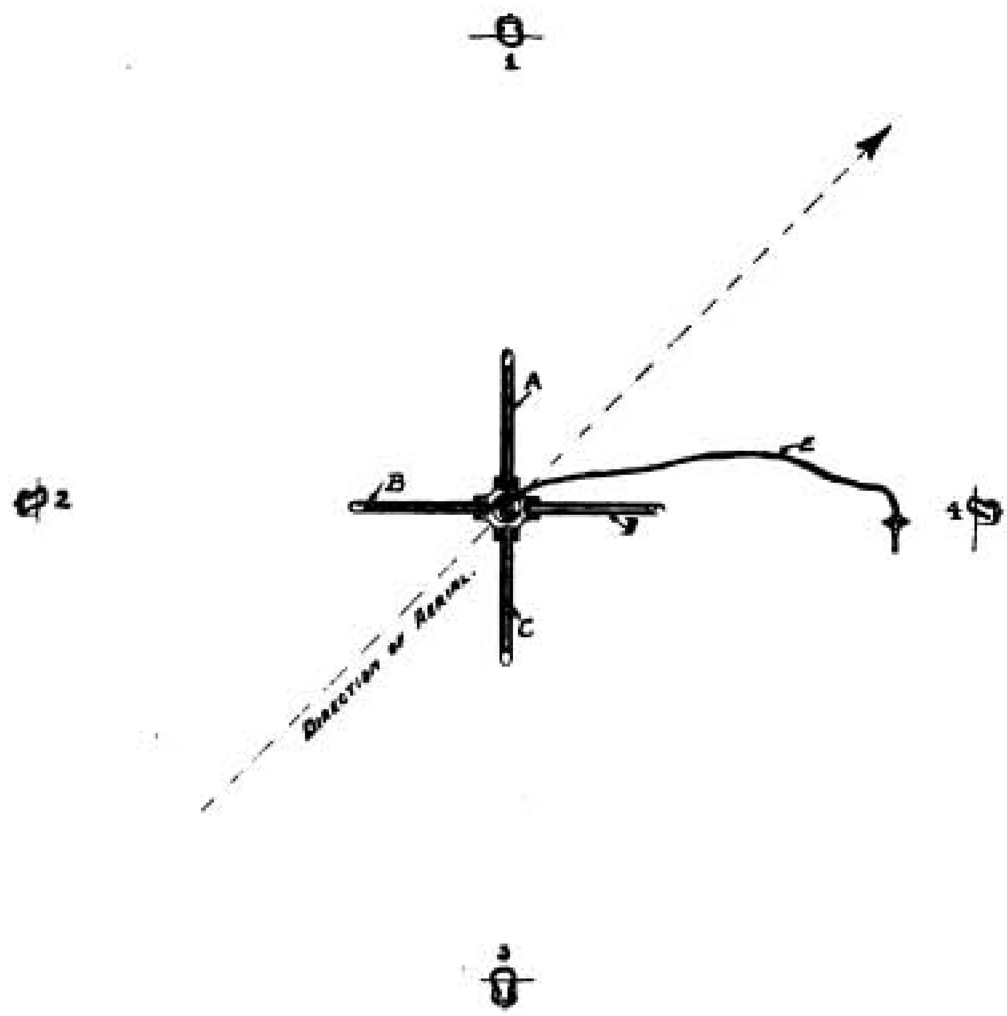


Fig. 11.

When this is accomplished, the derrick, to the head of which is attached a set of stays, is lifted and erected into a vertical position, and is then stayed in this position by temporary stays to the second and fourth pegs.

Further, a halyard (Q, Fig. 10) passing through a pulley block fixed to the head of the derrick is attached at one end to the third anchor peg, and two or more men pull on the free end of the halyard.

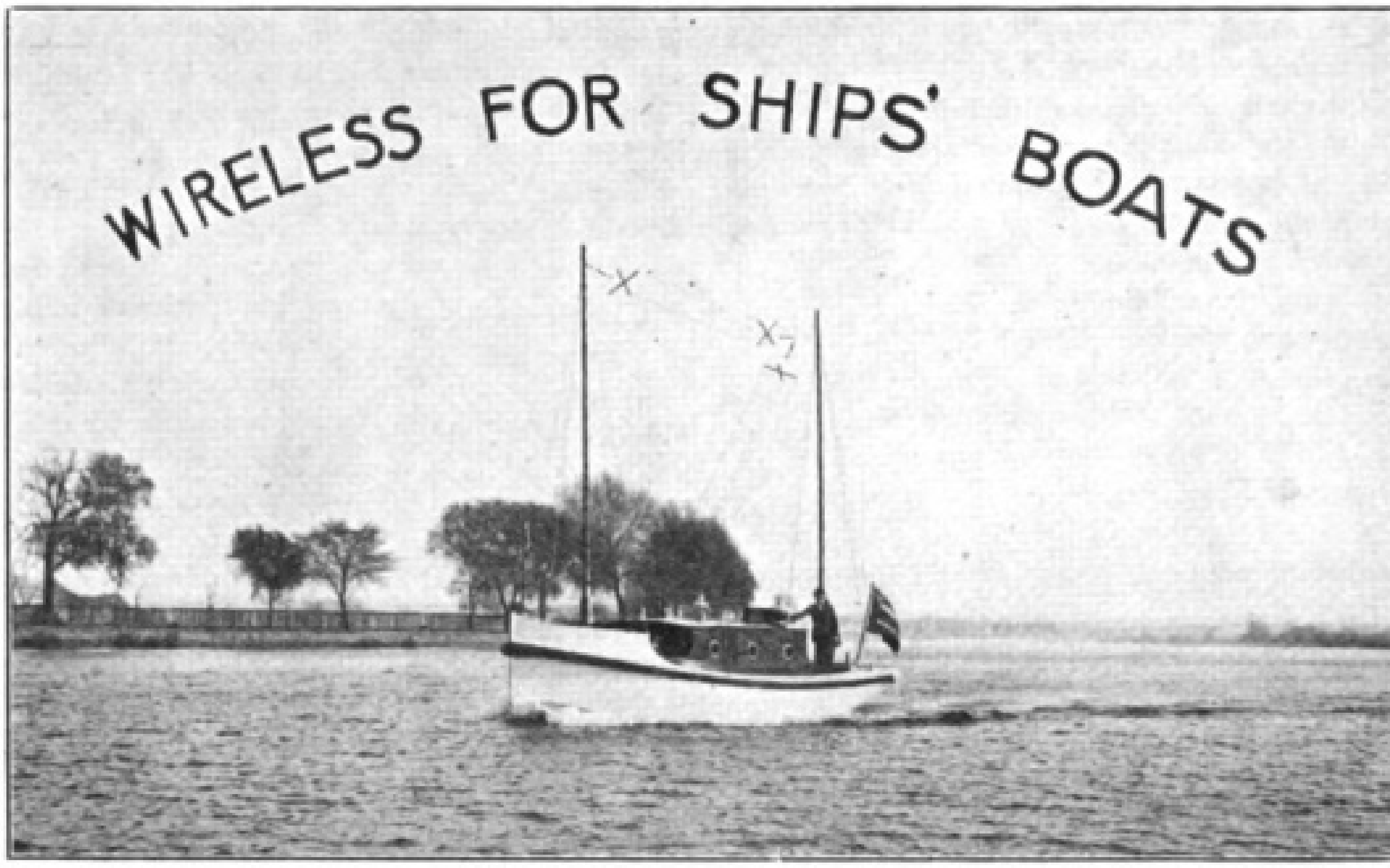
As these men pull, the mast will be raised until it stands in a vertical position, and it is prevented from falling over towards the derrick by the stays which are attached to the first anchor peg.

As soon as the mast is vertical the stays which are attached to the head of the derrick are removed carefully one by one and attached to the third anchor peg, and all stays can be adjusted and tightened by means of the stay adjusters.

To I am admiring your work and your proficiency - excellent result - Sir John French

The above is a facsimile of a wireless message sent by Field-Marshal Sir John French, when he visited the Boy Scouts' Wireless Stand at the Children's Welfare Exhibition held in London last month.

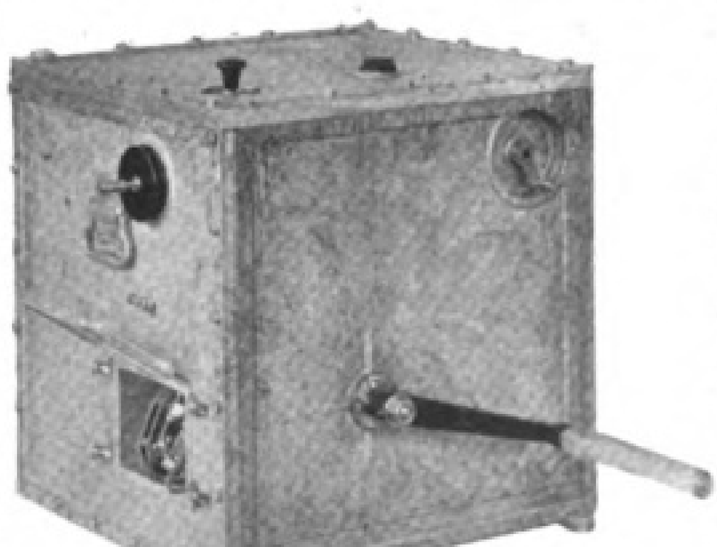
WIRELESS FOR SHIPS' BOATS



One of the "Aquitania's" Motor Boats fitted with Wireless Telegraph Apparatus.

THE provision of motor-boats for ocean-going liners will probably open a new era in the development and equipment for the saving of life at sea. The Board of Trade Departmental Committee on Ships' Boats and Davits recommended the provision of these boats and they have already been introduced by the Allan Line of steamships on board their two new liners *Alsatian* and *Calgarran*. These vessels are furnished with motor lifeboats which were built by MacLaren Brothers and fitted with Marconi Wireless Telegraph Apparatus.

Two motor boats have been built by Messrs. John I. Thornycroft & Co. for the R.M.S. *Aquitania*, the latest addition to the Cunard fleet. The dimensions of these boats are: length, 30 ft.; breadth, 9 ft. 6 in.; depth, 4 ft. 6 in.; and each is fitted with a Thornycroft Paraffin Motor developing 30 b.h.p. These motors are arranged to start on petrol until the vaporiser is sufficiently heated, and then turned over to paraffin, thus ensuring an immediate start.



The Marconi Lifeboat Set. View of the exterior of the Box containing the Apparatus.

The design is a distinct departure from the usual type of ships' boat, its primary function being to tow away the ordinary rowing lifeboats from the scene of a disaster. Each of the two boats carried on the *Aquitania* would be able to tow a considerable number of boats. The wide beam and specially designed lines make them excellent sea boats.

A cabin is fitted amidships, housing the motor: the forward end is divided off by a sound-proof bulkhead forming a room for the Marconi wireless apparatus. These compartments are lighted by eight portholes, and ventilated from the roof by mushroom ventilators.

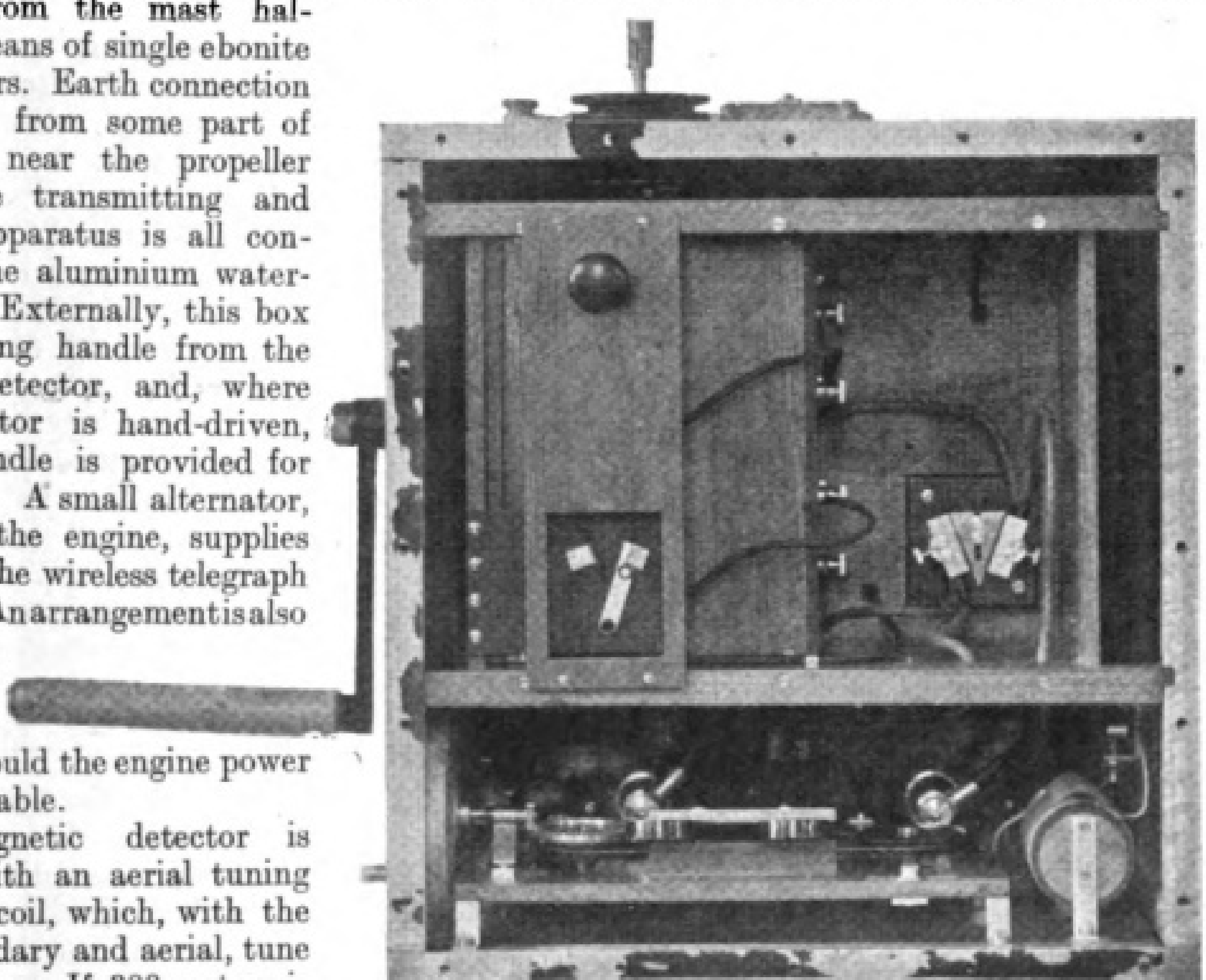
In addition to the function of towing, each boat is fitted with accommodation for medical chests, blankets and food supplies; thus in time of emergency the comfort of the passengers in the smaller boats are to some extent arranged for.

An important feature with this type of craft is the wireless installation already referred to, by means of which the boats can be kept in touch with other vessels in the line of shipping. The sets supplied to the *Aquitania* boats transmit on a wave length of 300 metres and receive on a wave length of 600 metres. The aerial is of the L type, 25 ft. long and 25 ft. high, composed of four wires supported on wood spreaders. The horizontal portion of the aerial is insulated from the mast halyards by means of single ebonite rod insulators. Earth connection is obtained from some part of the engine near the propeller shaft. The transmitting and receiving apparatus is all contained in one aluminium watertight box. Externally, this box has a driving handle from the magnetic detector, and, where the alternator is hand-driven, another handle is provided for the purpose. A small alternator, driven by the engine, supplies current for the wireless telegraph apparatus. An arrangement is also provided for driving the dynamo by hand should the engine power not be available.

The magnetic detector is provided with an aerial tuning inductance coil, which, with the jigger secondary and aerial, tune to 600 metres. If 300 metres is required a tapping is made on the inductance. An earth gap is provided and one change over is therefore necessary from transmitting to receiving.

The accompanying illustrations will give a good idea of the compactness of the newly-designed Marconi apparatus for lifeboats, and the exhaustive tests to which it has been submitted on the *Aquitania* boats justify the high expectations that have been placed upon it. The whole of the apparatus is contained in the one box, which occupies very little room, and is watertight. The latter is an important advantage, for in the unfortunate circumstance of a liner's motor boats being called upon to perform the work of life-saving, the weather conditions are likely to be very far from ideal, and the robustness of the wireless telegraph equipment and its ability to weather the fiercest gales will alone bring out its highest utility. The need for motor-driven boats equipped with telegraph apparatus has been again and again emphasised.

We remember only too well how in the case of a disaster at sea the different boats, after leaving the ship, become very scattered, some being overloaded. With a boat as described above, in a moment of crisis the whole complement of the shipwrecked boat's lifeboats could be shepherded and cared for until the arrival of outside help, summoned and guided to the scene of disaster by wireless telegraphy.



View of the Interior of the Box.

Mr. Jack Binns, who was formerly a wireless operator, has been awarded in the American Courts $12,500 in a suit against a moving-picture concern which exploited a false portrait of Mr. Binns in connection with a shipping disaster in 1909.

Practical Hints for Amateurs.

An Interchangeable Circuit System for an Experimental Wireless Receiving Station.

By F. WALFORD PERRY.

THE following particulars of an interchangeable circuit system designed and invented by the writer may be of interest.

A wireless receiver which is permanently connected up in one circuit, no matter how efficient it may prove, is of little use to the serious experimenter, inasmuch that the utmost intensity of any given radiation can only be obtained with every instrument in the circuit, whereas under varying circumstances one or more of the units in a circuit when cut temporarily out, would result in the reception of better signals.

It is, of course, quite possible to change over the wiring of a permanent circuit station, but by the time that this has been carried out the station to whom you may be tuned has ceased operation and consequently this crude way of experimenting proves unsatisfactory.

With the use of an interchangeable circuit system such as shown on the diagram on p. 189, an operator is enabled to cut out or introduce any of the instruments included by the simple operation of the various switches shown at the top of the diagram. This can be carried out so rapidly that scarcely a single word of a message is missed, as three complete circuits can be introduced on to the same radiations in the course of a few seconds, while the switch operating the potentiometer and batteries enables a current to be passed through any of the circuits desired.

The diagram shows the interchangeable system in its simplest form and is only intended as a guide; for instance, a series of different detectors could be included under a three- or six-way switch control between the connections shown for the one detector illustrated. Then, again, an oscillation transformer can be included in the circuits, when the existing inductance would become a loading coil for long waves, or the transformer can be connected through a switch to the circuits so that it can be included or not, as desired. Numerous other improvements will suggest themselves to the advanced experimenter, while a receiver built in accordance with the diagram will be more useful to the experimenter than the stereotyped form of instrument.

For the most satisfactory results on the existing connections shown, the writer advises the use of a variable condenser with a maximum capacity of ·01 m.f., a blocking condenser with a capacity of ·002 m.f., Phones with a total resistance of 3,000 ohms, and a zincite-copper pyrites detector.

Other detectors advised for connection through a way switch are: Zincite-bornite, Zincite-tellurium, carborundum and point, silicon and point, and a reliable electrolytic.

Another blocking condenser can also be included through a switch; the capacity of same should be ·005 m.f. This will make it possible to use either the lower or higher capacity on any circuit as desired.

The battery shown in the diagram should be included in the circuit through the potentiometer, which should have a maximum resistance of 300 ohms.

For the best results wire the whole station with No. 20 insulated lighting wire.

The switches (Tumbler Electric Light Pattern) shown at the top of diagram all bear one or more coloured discs above them, so that any one complete circuit can instantly be detected and operated by closing all switches above which appears the colour representing the circuit desired, while the other switches would remain open. To change the circuit you simply open all the previously closed switches and close those bearing the colour of the next circuit desired. Details of the connections are all set out in the table at the side of diagram.

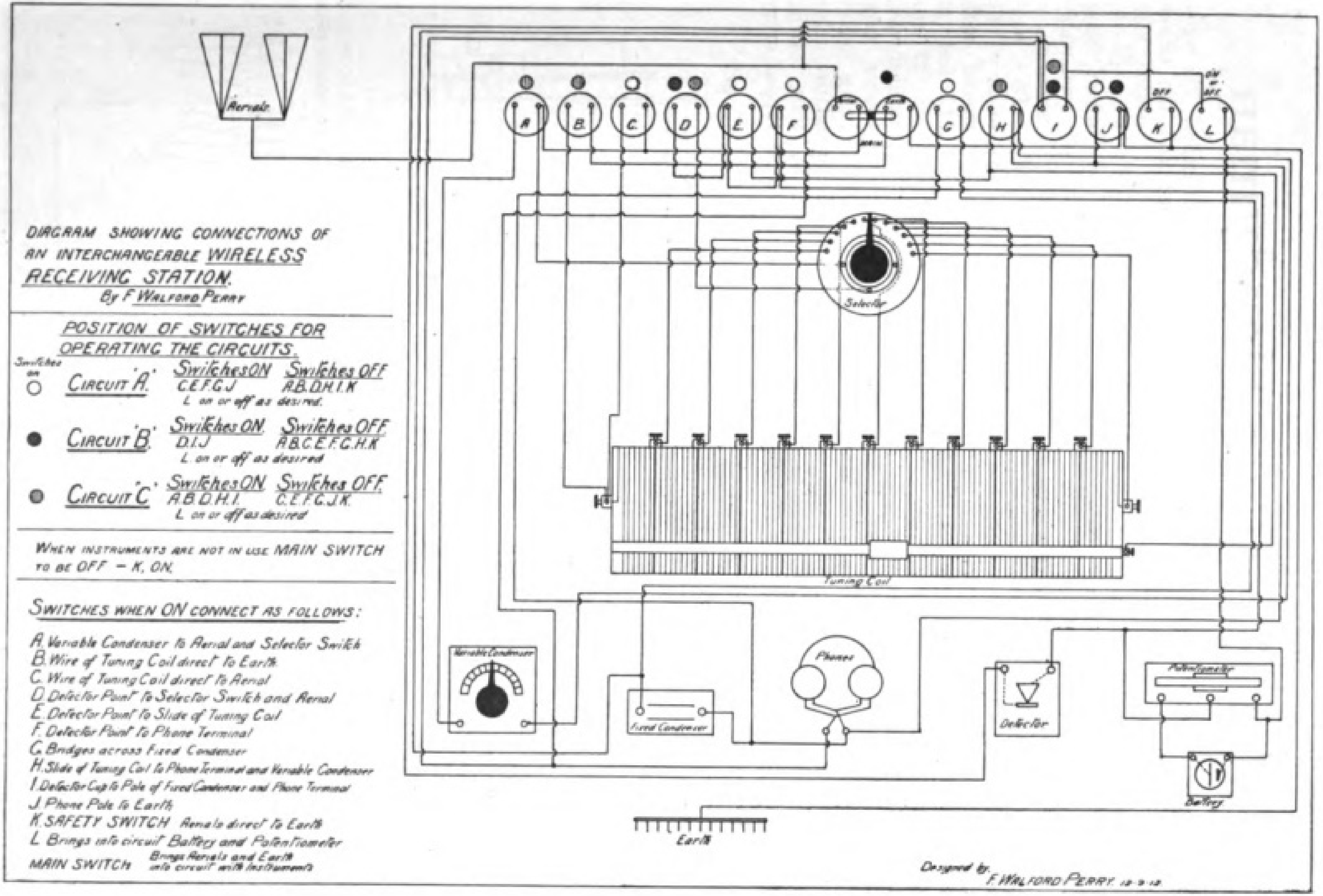


DIAGRAM SHOWING CONNECTIONS OF AN INTERCHANGEABLE WIRELESS RECEIVING STATION.
By F. WALFORD PERRY
POSITION OF SWITCHES FOR OPERATING THE CIRCUITS.
Switches on
CIRCUIT 'A' Switches ON C.E.F.G.J Switches OFF A.B.D.H.I.K
L on or off as desired.
CIRCUIT 'B' Switches ON D.I.J Switches OFF A.B.C.E.F.G.H.K
L on or off as desired
CIRCUIT 'C' Switches ON A.B.D.H.I. Switches OFF C.E.F.G.J.K.
L on or off as desired
WHEN INSTRUMENTS ARE NOT IN USE MAIN SWITCH TO BE OFF — K, ON.
SWITCHES WHEN ON CONNECT AS FOLLOWS:
A. Variable Condenser to Aerial and Selector Switch
B. Wire of Tuning Coil direct to Earth
C. Wire of Tuning Coil direct to Aerial
D. Detector Point to Selector Switch and Aerial
E. Detector Point to Slide of Tuning Coil
F. Detector Point to Phone Terminal
G. Bridges across Fixed Condenser
H. Slide of Tuning Coil to Phone Terminal and Variable Condenser
I. Detector Cup to Pole of Fixed Condenser and Phone Terminal
J. Phone Pole to Earth
K. SAFETY SWITCH Aerials direct to Earth
L. Brings into circuit Battery and Potentiometer
MAIN SWITCH Brings Aerials and Earth into circuit with Instruments
Aerials
A
B
C
D
E
F
G
H
I
J
K
L
OFF
ON or OFF
Selector
Tuning Coil
Variable Condenser
Fixed Condenser
Phones
Detector
Potentiometer
Battery
Earth
Designed by F. WALFORD PERRY

The Amateur Handyman

A Switch-Controlled Loose-Coupler.

By J. F. L. Corkett.

AN amateur's wireless receiving station depends largely on the efficiency of the tuning apparatus, which should be loose-coupled. The loose-coupler used by most amateurs employs sliders on the primary coil to vary the inductance. These in time wear away the wire and fill the intervening spaces with minute grains of metal, thus weakening the insulation. The transformer described below overcomes this objection and obviates the use of cardboard coils, which are not at every amateur's disposal.

The primary coil should be constructed first. Two pieces of wood, $5\frac{1}{8}$ inches by

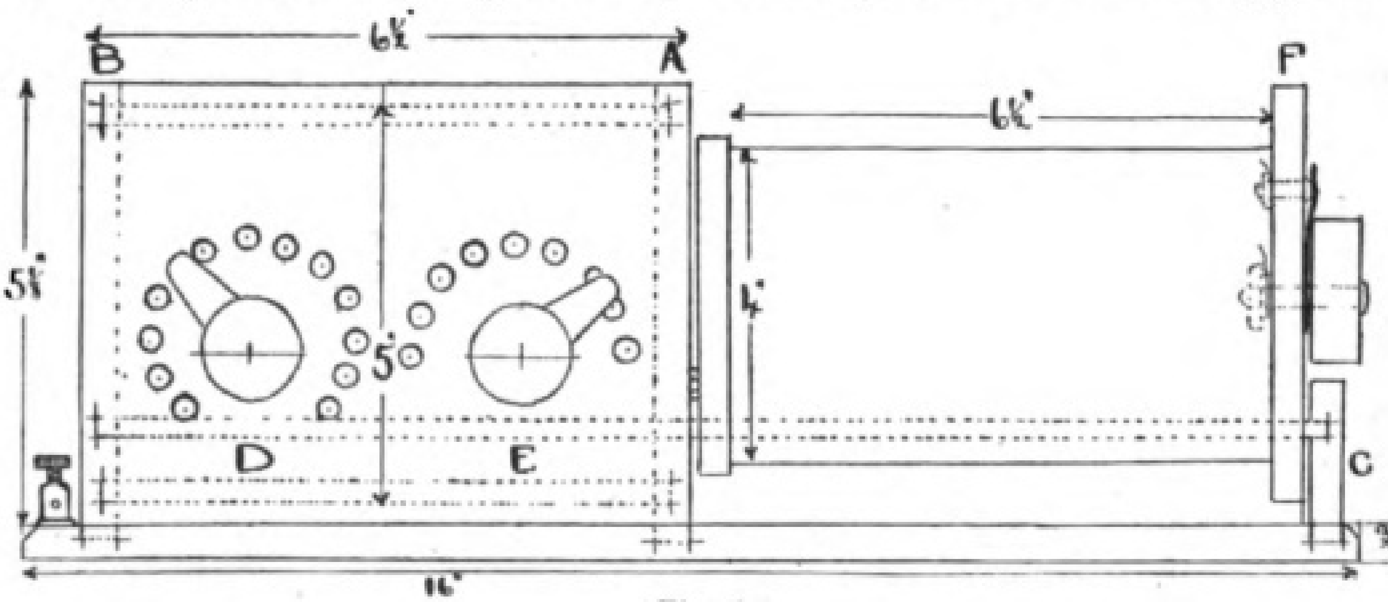


Fig. 1.

$6\frac{1}{2}$ inches and $\frac{3}{8}$ inch thick, are cut, forming the ends of the coil, connected by four $\frac{1}{4}$-inch dowel sticks, upon which the wire is wound, and placed in a square, $\frac{1}{4}$ inch from the edge of the wood, as shown in Fig. 2. One of the pieces of wood, marked A, Fig. 1, has its centre cut out for a $\frac{1}{2}$-inch all round, to allow for the secondary to enter.

The secondary coil is made of a piece of wood, 5 inches by 5 inches and $\frac{3}{8}$ inch thick, which is joined to a piece $4\frac{1}{8}$ inches by $4\frac{1}{8}$ inches, also $\frac{3}{8}$ inch thick, by dowel as above. This is connected to primary coil by sliding it along two dowels placed in B, Fig. 1, and connected to the base by the support C, 2 inches by 5 inches. The whole should then be stained and the dowels treated with varnish, which forms a good, cheap insulation.

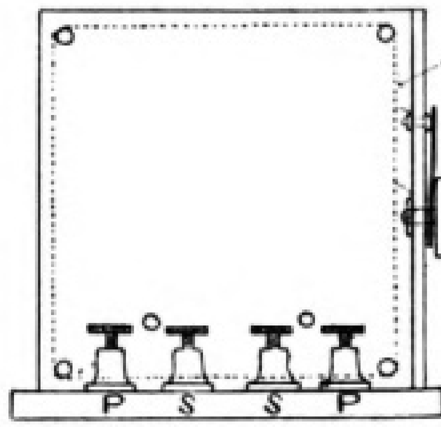


Fig. 2.

The primary is wound with 312 feet of No. 22 enamelled wire, twelve taps being taken nearly every $\frac{1}{2}$ inch of the coil to twelve points of the switch D, thus leaving about $1\frac{1}{2}$ inch over. This is tapped every three turns, the taps being brought to switch E, the handle of which can be made of a

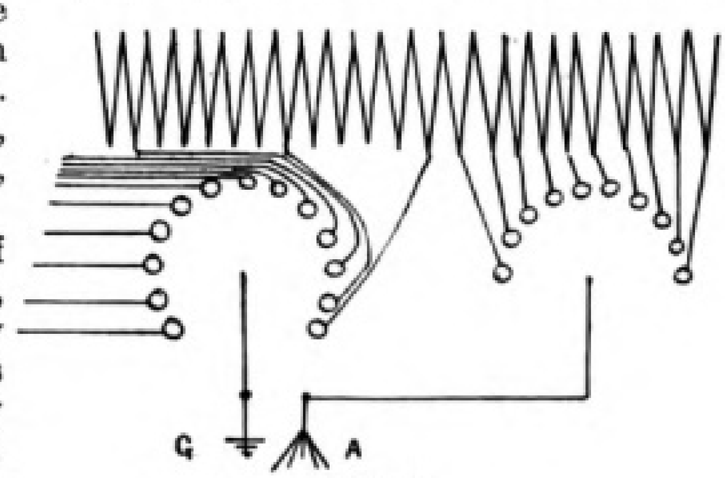


Fig. 3.

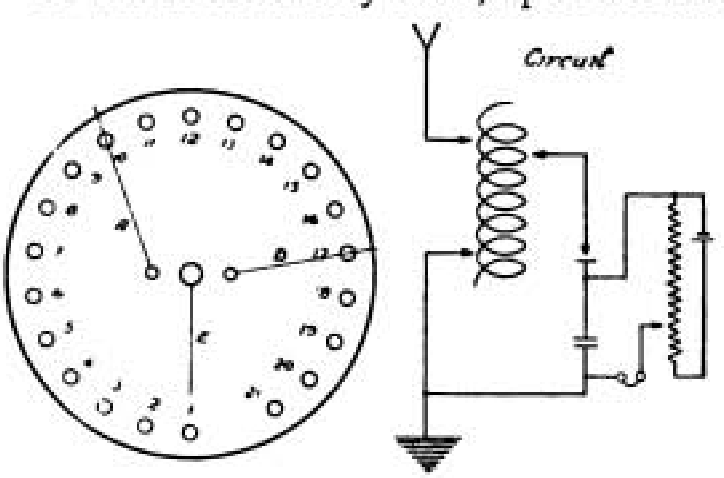
piece of ebonite and the switch-points of nuts and bolts.

The secondary is wound with 610 feet of No. 30 wire, the tappings being brought to a switch on F. The best method of tapping is to leave a loop when winding, bring this to the switch-point, and there solder it. The handles of these switches are connected to the two terminals PP, Fig. 2, and the secondary wiring to SS. The wiring is shown in Fig. 3.

The tuning is first on switch D, then on E. One switch, employing about twenty points, can be used in place of two switches if the latter is beyond the means of the amateur.

A Tuning Coil.

MR. MEGSON has furnished us with the following particulars of the tuning coil referred to by him in our April, 1913, number: Say 6 inches diameter, wound with 28 enamelled or silk-covered wire. Two turns between stud 1 and stud 2, two turns between stud 2 and 3, and so on up to eleventh stud; then between 11 and 12 are twenty turns, up to last stud.



This, by the method of units and tenths, gives 100 variations. E—earth switch common to all studs and slides over the other two switches. A—aerial switch. D—detector switch.

Aerial Construction.

By F. J. V.

AERIALS must be so modified to meet their surroundings that it is difficult to generalise, but the conditions usually met by amateurs may be roughly divided into (*a*) those cases in which on account of restricted area one very high support is required, and (*b*) those in which two supports of medium height can be erected at a suitable distance apart.

Under the first heading the umbrella type is the best to adopt, and for all-round experimental work it will be found very efficient. The total height should not be less than 60 feet, and this is best attained by using a pyramidal lattice tower constructed of 1½-inch by ¾-inch slater's battens, which can be obtained at ½d. the foot run.

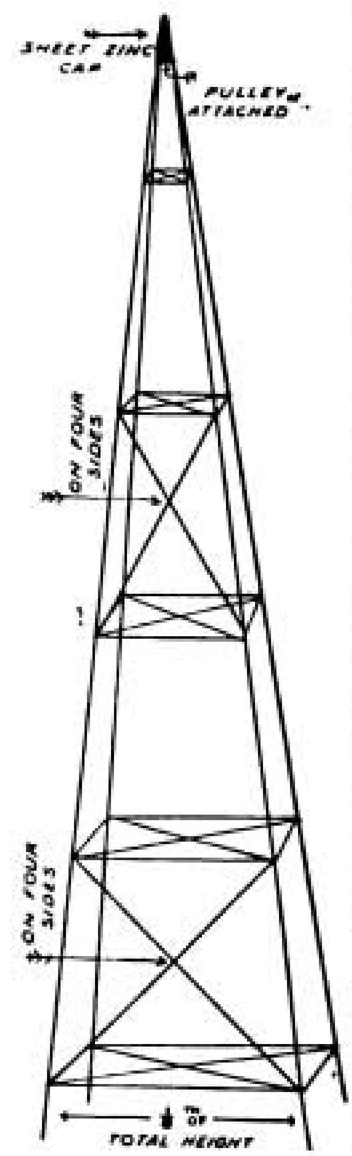


Fig. 1.

The construction shown in Fig. 1 is suitable for towers up to 60 feet; screws are used throughout, the internal cross pieces merely having their ends cut V-shaped and then driven into place. Stays of galvanised iron fencing wire should be fixed at all four corners every 20 feet up. If insulated at both ends with strain insulators the stays may form part of the umbrella, although this is not to be recommended. Two persons can easily handle towers of this size, and their fixing will be found much easier than poles of the same dimensions.

In the second case, where we have more space at our disposal, either smaller lattice towers or plain poles may be used. A very strong yet light pole can be made by screwing three slater's battens together the lengths of the first three being so adjusted that the joints do not coincide. Two- or four-wire Admiralty type aerials are most popular in these cases, but the multi-wired "sausage" type deserves attention. It can be constructed from a child's large wooden hoop at either end, and intervening supports made by undoing a large hoop and cutting the layers so that each forms a complete large but thin hoop. For experimental purposes an umbrella aerial may be also fixed to one tower or pole, provided that one aerial is entirely insulated while the other is working.

E

QUESTIONS AND ANSWERS

(Conducted by H. DOBELL.)

Readers are invited to send questions on technical and general problems that arise in the course of their work or in their study. Such questions must be accompanied by the name and address of the writer, otherwise they will remain unanswered.

I. F. I. (London) is another of those who are troubled with a continuous humming noise from the electric light leads in his house. We can only refer him to our reply to J. M. P. in our April number, adding that as a desperate last resource he might try constructing a cage of metal gauze to enclose completely himself and his instruments.

C. E. C. (Sheffield) asks which of the two is the better: Carborundum between two carbon blocks or carborundum and steel point (*i.e.*, for platinised crystals). For our own part we know of nothing better than a properly selected carborundum crystal, mounted in soft metal in a cup, with its sensitive point pressing on a steel plate.

R. D. (Bristol).—What capacity blocking condenser should I use with a pair of 'phones 3,500 ohms each?

Answers.—This might be variable in three steps, arranged so that any one value can be used by itself or in combination with any of the others. The units might be .001, .002 and .004 microfarad.

H. R. M. (Hornsey) asks (1) how to calculate the inductance of a tuning coil, and (2) how to calculate the amount of inductance in the receiving circuit, and (3) how it is that, judging from sound in receivers, the Eiffel Tower spark frequency is so low.

Answer.—(1) and (2) See replies to G. E. H. (March, 1914), S. F. H. (February, 1914). (3) F. L. has a fixed discharger and an alternator of very low frequency.

W. B. (Middlesex), who gives no name and who therefore would remain unanswered if his question were not so short and simple, asks if, say, a 10 in. coil could be connected to a rotary convertor just as well as an alternator, as he thinks it would be less expensive. Certainly: if a supply of d.c. is at hand a rotary is the cheapest and simplest arrangement. The objection to it might be that it has not the voltage regulation which is possible with an alternator.

J. C. A. (Middlesboro').—We do not think that you can easily improve your aerial, except by heightening it. If you cannot heighten the present aerial it might pay you to use a single wire which would be lighter, so that you might add light extension-masts (bamboos) at either end and get above the surrounding buildings. But first make sure that you cannot make things right by modifying your earths and your receiving circuits; to do this you should read carefully through all the answers in the back numbers which seem to refer to such matters.

T. F. N. (London).—(1) Which is the better method to adopt when transmitting, to short-circuit the detector (crystal) or to cut out both sides so as to isolate it? (2) If one neglects to do either of these, what is the exact effect upon the crystal? I have found that occasionally I have transmitted long messages without affecting the sensitiveness of the contact, but at other times a single dash has been sufficient to destroy same. I use zincite-bornite combination without applied e.m.f.

Answer.—(1) Cut out both sides. If necessary enclose in iron box. (2) Tiny sparks are set up between crystals which either fuse them together or carry away the sensitive point of contact.

W. E. D. (Bridport).—Why is it when working on transformer and receiving short wave-lengths, or rather up to 1,800 metres, that when I put my hand on the secondary coil, no matter where, the signals are quite twice as loud, and some stations I cannot hear at all unless I put my finger on the secondary coil? Altering secondary connections makes no difference.

Answer.—So far as we know this is invariably a sign that the circuit is not properly tuned to the incoming wave; putting the hand on the secondary coil is equivalent to increasing the capacity in that circuit, and could therefore be reproduced by increasing the condenser across the ends of the coil.

TRANSFORMER.—The following point appears curious, and I should like it explained in THE WIRELESS WORLD. With connections as on page 688 (February) working on "tune" side of M.T., it is frequently the case that *maximum* strength of signals is obtained with the intensifier handle showing a coupling of 45°. Either an increase or decrease of coupling sensibly weakens the signals, in spite of alterations to the tuning condensers.

Answer.—See final paragraph in reply to H. C., in April, 1914, number. If you tighten the coupling too much the detector-circuit starts re-acting on the intermediate circuit, just as in transmitting the aerial circuit starts re-acting on the primary.

A. T. (Watford).—Would the following arrangement be a safe protection from lightning in connection with an aerial (twin-wire) 30 feet above ground and 106 feet long? Aerial lead enters house through the scullery, where the pipe at the sink is connected directly to the water main. The pipe is of lead. Would it do to use a lightning arrester, the same as employed by telephone companies, and connect arrester and pipe by a thick copper wire run along the wall? If this would do, should the wire be bare or insulated.

Answer.—If the arrester you speak of is the type in which two metal surfaces are separated by mica, the plan should serve. The wire should be covered and should be taken as straight as possible to the pipe.

S. F. (London).—How is the earth wire substituted in the case of aeroplanes and airships, assuming the earth to be essential?

Answer.—In aeroplanes, instead of an "earth", a "balancing capacity" is employed, usually formed by metallic wires or netting spread on the wings, or the wire-stays of the machine itself. Or two trailing wires are used, one from each wing-tip so as to be as far apart as possible; one of these acts as "aerial" and the other as "earth." Such an arrangement is rather too "directional" to be good. Sometimes an "umbrella" aerial is erected on a mast fixed vertically to the body of the machine, but usually the aerial is a trailing wire.

L. B. M. (Wells).—(1) Would the variable condenser in my diagram increase or decrease the wave-length? (2) Would a two-slide tuning coil consisting of 1 lb. of S.C.C. (or enamelled) copper wire wound on a 4½ in. tube "tune" to Paris with aerial (natural wave-lengths 150 metres, twin wire)?

Answers.—(1) Your diagram shows the condenser A in parallel with the secondary of your auto-jigger; it will therefore increase the wave-length if you increase the value of the condenser. (2) You do not mention what gauge of wire you propose, therefore the mere total weight of it is no indication whatever of the inductance of the coil. You will require from four to six thousand microhenries, and for this you can calculate the number of turns—and therefore the total length of wire required—by one of the various formulæ given in these pages.

P. H. (Harrow), using a two-slide tuning-coil, used to get signals from all the British coast stations, and plenty more, on his old aerial, which was only 85 ft. long and 60 ft. high at both ends. Then he extended his aerial to 290 ft., 60 ft. high at the leading-in end and 35 ft. high at the free end; but his hopes for better results were entirely falsified —he got Paris, Cleethorpes, and Norddeich very loudly, but no one else. He asks us to tell him what is wrong.

Answer.—What is wrong is that P. H. does not study these Question and Answer columns carefully enough. For instance, if he had thoroughly taken in our reply to W. E. D. in the February, 1914, number he would have known, when his own experience confronted him, that by making his aerial so long that its natural wave-length would be about 500 or 600 metres, he was making it quite unsuitable for receiving wave-lengths of that order *on a single-circuit receiver*. It would be quite suitable—and P. H. ought to get good results—when used with a *coupled-circuit receiver*, and even with the former receiver it will be quite good for the long-wave long-distance stations which he mentions, since these latter require plenty of additional inductance. If P. H. wants to get quite clear on the subject he should read the newly-published "Elementary Principles" on the subject of single- and double-circuit receivers.

J. A. M. (Doncaster) had a five-strand aerial on 6 ft. spreaders, which was blown down: he replaced it by an inverted L aerial, as described in our Instructional Article for March, making it a twin-wire with the wires 8 ft. apart. He finds the new aerial less satisfactory than the old, and asks what change he should make in his various connections. In his rough sketch, by the way, he shows the main aerial entirely insulated from the down-leads, but we presume this is an error in drawing and not in actual fact. He finds, for instance, that his "loading coil" (in respectable English, his aerial tuning inductance) is too small with this new aerial. If he reads that particular Instructional Article carefully (pars. 73 and 74) he will see that this is bound to be the case, because his five strands were bound to have more capacity than his present two. Presumably he is trying to receive far longer waves than his aerial is designed for—all amateurs do this—so that he has to add an enormous amount of tuning inductance. When this is the case, it is obviously advisable to have as many wires as possible (and, therefore, as large an aerial capacity as possible) although if they are spaced too little the inner ones will have only a very small proportion of their proper effect. Also, his two-wire aerial will have more inductance than his five-strand one, and therefore the mutual induction of his jigger will be less in proportion to the total self-inductance of the aerial circuit, so that his coupling will be looser (see reply to H. C. in April number).

V. W. (Wallingford). has a tuning inductance of No. 26 wire, 26 cm. long and 10 cm. in diameter, and also a "loading coil" (which in decent English is also a tuning inductance) of 1,314,200 electro-magnetic units. He calculates that he should be able to receive a wave of 2,700 metres, with an 80-ft. aerial, twin, 30 ft. high; and he wants to get Eiffel, Norddeich, and Poldhu. He asks us if his calculations are right, and how, if his range of tuning is not large enough, he had better modify his arrangements. The length of his aerial can easily be increased if necessary. Also he has failed to get any test-signals by the use of a buzzer, though a Wimshurst machine gives good signals at 20 yd.

Answers.—Your second tuning inductance, if as stated, has a value of 1,314 microhenries (much the most convenient units to use), and when combined with your two-slide inductance should give you just about enough to tune to the stations you mention. But you should take advantage of your good luck in being able to lengthen your aerial, for in this way you will be able to do away with a lot of inductance coiled up on the operating table (where it is doing no work in gathering in the waves), replacing it by inductance and capacity 30 ft. high, which is working all the time to increase your signals. As for your buzzer, you have no excuse for failing to make it give whatever test-signals you desire, if you apply it in the proper way, as described in the "Elementary Principles" just published.

LAXFIELD.—(1) What are chokes on a transformer for? (2) What is the effect if they are strengthened or weakened? (3) How is their effect calculated, and can it be seen?

Answers.—(1) To protect the winding of the transformer from high-frequency currents from the oscillating circuit. To such high-frequency currents the transformer coils offer a very high impedance, so that high potential differences are liable to be produced in quite a short length of these coils. The normal low-frequency currents of the transformer would produce quite small potential differences in such short lengths, and the coils are insulated by the makers to withstand such small differences only; hence the high-frequency currents might easily break down the insulation (particularly of the end coils of the secondary winding). (2 and 3) If a point spark-gap is put across the transformer secondary terminals a spark will be produced on transmitting; when the air-core protecting chokes are removed this spark will be seen to be larger. It is worthy of note that if the connections from the transformer secondary are led to each side of the primary condenser (instead of to the two sides of the main spark gap as they should be), it is possible under certain conditions to get a worse spark across the transformer-terminals (and therefore more strain on the insulation) when the air-core chokes are in than when they are removed. These "certain conditions" depend on the wave-length generated and on the length of the air-core chokes; but if the leads from the transformer are connected properly this phenomenon does not appear.

A. E. C. (Hull).—(1) With regard to the size of wire for primary and secondary of loose coupled receiving jigger, is the best result obtained with the secondary slide over the primary, or *vice versa*? (2) What is the formula for finding the capacity of tinfoil and wax paper condenser? (3) Can you recommend some crystals to be used without battery and potentiometer? (4) To whom should application be made for a Post Office licence?

Answers.—(1) No. 22 for primary, No. 28 for secondary. Unimportant. In either case the primary should be near the lower end of the secondary only. (2) See reply to C. F. in May, 1914, number. (3) Practically all crystal detectors are improved by the provision of battery and potentiometer for adjusting the voltage to the most sensitive point of the current-voltage curve; certain crystals require such a small voltage-adjustment to attain this that the average amateur overshoots the mark and reports that it works best without any battery-and-potentiometer. Some specimens of the crystals which are commonly supposed to require a battery have such curves that they work well without—as for example some zincite-tellurium specimens, and some carborundum crystals. Zincite-copper pyrites and zincite-bornite are good crystals to work without batteries. But let us combine this answer with a word of friendly advice: look at the remarks of two correspondents, which happen to have come next to one another on pages 42 and 43 of April, 1914. *Verbum sap.* (4) Write to the Secretary, General Post Office, London, who will send you the necessary forms.

C. H. (Bristol) and a friend have a box of four coil from a Ford motor-car; they ask how they can employ these, suggesting the use of two connected together as one transmitter and the other two as a duplicate transmitter at the second station.

We have never worked two ignition-coils, where (as in your case) the primary and secondary windings have one end common, in combination; and though it is quite possible to combine two ordinary spark-coils (in which the windings are independent), we fear you may have some difficulty in getting your coils to work properly. However, it would be well worth trying. The usual way with two spark-coils is to cut out one break entirely and make the other do all the work; and to prevent this one from being overworked you would put the two primaries in series, double the voltage of your batteries (make it, say, 16 volts) and still keep the primary current small enough to be dealt with by the one contact-breaker. The secondaries would be put in series. The arrangement puts great strain on the coil-insulation. Another way would be to work with the primaries in parallel, but in this case you would have to use both contact-breakers, and then there is great difficulty in getting them to work together; so, on the whole, the first plan is the simpler. Do not forget that if the connections are made without due regard to polarity, the two coils will oppose one another and no spark will result. With regard to jigger and condenser, use Leyden jars and alter the number of jars till a good fat spark, not too long, is obtained. Then the size of your jigger-primary, leads, etc., will be governed by the value of the condenser, since you have a definite wave allotted to you.

The aerial you propose seems quite fair.

W. G. F. (Glasgow) asks what length of aerial (ship-form) would give the same capacity as one of his "80 ft. military station aerials," which he says have each a capacity of ·01 (4 Moscicki jars).

Answer.—We cannot help thinking that he has made some mistake in measuring the capacity; ·01 microfarad is a very large capacity indeed for an aerial, as will be seen when we point out that even if its inductance is as low as 60 microhenries, its natural wave-length without any jigger would be 1,885 $\sqrt{\cdot 01 \times 60}$.—*i.e.*, about 1,500 metres. The fact that he mentions "4 Moscicki jars" does not help us, since these jars are made in different sizes; some of them have as large a value as ·017 mfd. each. If our correspondent is sure that he is right, we can only say that it would be almost impossible to get such a capacity with the two- or four-wire aerial which he wants, without making it excessively long; and in that case its inductance would be great also, so that the natural wave-length would be enormous. If he would tell us what *wave-length* he requires with a given amount of added inductance (jigger-secondary) we could help him.

G. M. A. (Ilkley).—How can I make such a tuning coil as was described in your columns in April, 1913. The coil I want a description of is that in which tappings are taken and led to switches.

Answer.—Mr. Megson has not given us any particulars as to the system on which his special tuning-coil is made, but we should guess that it consists in dividing up the whole coil into (say) ten sections, a lead being taken from each end and from each section to a switch contact, the last section being sub-divided into (say) ten sub-sections, also connected to similar switch-contacts. All these contacts would be arranged in a circle on top of instrument: 12 o'clock for example, would be the top end of coil, 12.3 would be the end of first section, 12.6 the end of second, and so on till we got to 12.27, the end of the ninth section. The 12.30 would be the end of the first sub-section of the tenth section, 12.33 the end of the second sub-section, and so on till we get to 12.57, the end of the tenth sub-section, which is also the end of the whole coil. There would be three arms moving on these contacts, one rotating about the centre of the top of the instrument, the other two being mounted eccentrically, one on either side of the centre; these arms would be of springy brass, and would be so made that anyone can pass over any other when required. A suitable wire would be No. 22, if you do not mind having the whole apparatus large, but excellent results could be obtained with wire as small as No. 30.

C. J. (Horncastle).—The Postmaster has just granted my transmitting licence, allowing wave-length up to 200 metres and to use 50 watts. (1) Will you kindly advise me what type of coil to buy. (2) Particulars of the best form of accumulator to use with the coil in question to enable me to get my full licensed power. (3) The best length and form of aerial to make and use with this transmitting set. (4) And, if I am not asking too much, what distance may I expect this set to reach when transmitting in open country. At present I am receiving over 1,000 miles, and my aerial is, I am afraid, altogether too large to comply with my licence—it is 4 wires, 170 feet long, running up to the top of my mast 60 feet high, with a 50 feet lead-in wire at the low end.

Answer.—Spark-coils are described commercially as "half-inch," "two-inch," and so on, whereas they should be rated in watts, for the actual spark-length they will give is no indication of how they will behave in a wireless circuit; the resistance of the secondary is of great importance here. But as the manufacturers will not adopt the proper system, the most we can do is to recommend you to buy a "2½-inch" coil. Use two 6-volt motor-car accumulators with a discharge rate of 5 amperes, if the coil you buy is suitable for 12 volts. We should advise you to keep your present aerial for long-distance reception, putting up a separate smaller one for transmitting (if possible at right angles to the other), only we deduce from your letter that you have only one mast and that your long aerial slopes from this towards the house, so that it would seem likely that the second aerial would have to run parallel to this, which would be a pity. Moreover, it would not be easy to convert your sloping big aerial into a T by leading down from the centre point; otherwise this would keep your wave within the required limit. Unless you can find a way to adopt one of these suggestions, the simplest plan will be to reduce your wave-length for transmission by a condenser in series. As you seem to anticipate, it is impossible to prophesy the range likely to be obtained. Let us say, roughly, 15 to 20 miles, to an aerial of similar height, using a sensitive receiver.

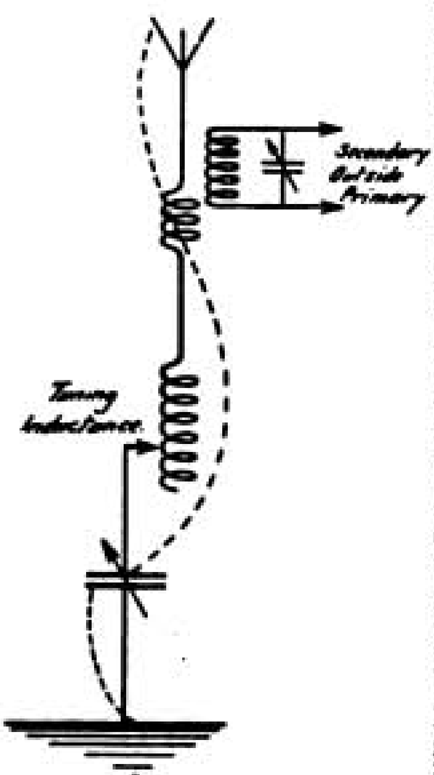
L. V. O. (Rhos-on-Sea).—(1) Where can I obtain a reliable book of call signs—the stations entered in the alphabetical order of their call signs. (2) What resistance in 'phones do you consider best for general work. I find that I am able to obtain louder signals with a set of one particular make of 2,000 ohms the pair than with other makes of resistances of 3,000, 4,000, and 8,000 ohms respectively. (3) I am informed that if I alter the length of my aerial in any way, I am liable to have my licence cancelled by the P.M.G. Is this so? If I wished to double its length, what steps should I have to take to ensure that everything was in order in that respect. (4) I enclose a diagram of arrangement of receiving apparatus. Can you suggest any improvements?

Answer.—(1) The "Year Book" for 1914. (2) Resistance is really no indication of the worth of a pair of telephones. (See reply (3) to H. C. B. in December, 1913, number.) Much depends on the design, the good workmanship, and the nature of the diaphragm. If all these are of the best, there seems to be practically no limit to the resistance which can be used with advantage with high-resistance crystals. On the whole, however, it is more satisfactory to use good low-resistance telephones in combination with a suitably-designed telephone-transformer, proper values of condenser being provided across the coils. (3) You must certainly notify the Postmaster-General if you propose to alter your aerial, though if you have only a receiving-licence we think he is hardly likely to refuse his consent. If you have a transmitting licence, he would certainly object unless you took care that the wave-length was unchanged. (4) Your connections are perfectly correct: we are inclined to expect, however, that like many amateurs you have too large a condenser across your jigger-secondary. Do not forget that with high-resistance detectors, the larger the jigger-secondary-inductance is and the smaller the condenser necessary to bring it into tune, the better. That is the objection to trying to get a very wide range of tuning on one secondary; since the idle portion of the coil adds its capacity to the circuit. It is really better to have several actual breaks in the secondary, so as to isolate completely the idle portions, only bridging the gaps as required. In this way the maximum amount of inductance for any wave-length can be utilised, with a consequent increase of voltage to operate the crystal. See numerous replies in back numbers.

Q. R. S. (Derby).—What is meant by the dotted line shown in the accompanying sketch, as I do not recollect seeing anything about it in the usual text books? I find that it is better, in my case, to have the tuning inductance below the transformer, instead of in the aerial lead, and also that my secondary must be mainly withdrawn from the transformer to get best results. With a much *smaller* diameter primary I have to tightly couple to get any results at all. There is less wire on the latter.

Answer.—The wavy dotted line represents the distribution of potential in the aerial circuit corresponding to the stationary wave set up in it by the incoming oscillations. It shows that there is a maximum of potential at the free end of the aerial, a minimum at the jigger-primary (in the case you show), and another minimum at the earth. As a matter of fact it is wrongly drawn, for it shows a minimum at the upper plate of the condenser and a maximum (or something approaching a maximum) at the lower plate; this is impossible.

If this line truly represents (apart from this little discrepancy) what is happening in your circuit, your aerial must be so long that in combination with your jigger-primary it is in tune with the in-coming wave, without any tuning-inductance; for the line shows a quarter wave in aerial and primary; and this is the condition which is satisfied if the natural wave-length of aerial and primary is the same as the incoming wave-length. Therefore, in this case, the tuning-inductance shown is not needed at all, and the same signals should be received if the jigger-primary were directly earthed. If the line does *not* represent what is happening in your case, and if the extra inductance is necessary in order to tune to the in-coming wave, then the whole aerial-circuit — aerial, primary, and extra inductance — would have a quarter-wave in it; *i.e.*, a potential maximum at the free end of the aerial, and a minimum at the earth-lead. Now a potential maximum corresponds to a current minimum, and *vice-versa*; therefore the current will be at a maximum close to the earth-lead. It is this maximum current which is required in the jigger-primary, to induce similar currents in the secondary; so that the best place to put the primary is as near the earth-lead as possible—that is to say, *below* the tuning inductance and condenser. If, therefore, you find that you get the best results with the primary *above* the inductance, you have got some anomalous effect or else you are tuning up in some unnecessarily complex way such as is represented by the dotted line.



G. M. (Glasgow).—(1) What is the ratio of voltage between primary and secondary of transformer in 1½ k.w. set, when both are in parallel? (2) What is the spark gap in 1½ k.w. set? (3) How many times does the condenser discharge per cycle of the charging current in the high-tension circuit? (4) Do the Marconi Company take advantage of group or trained tuning? (5) How can a 300 metre wave pass through a 600 metre wave in space without the one neutralising the other? (6) Do the waves of a "T" aerial radiate from the leads, as well as from the earth? (7) In July last you stated that the "greater the frequency of the oscillations in the aerial the shorter the wave." Does the potential of these oscillating currents also affect the frequency, and, therefore, the wave-length as well as the capacity and inductance of the circuit? (8) If two wires encircle the earth, both being identical, and if a pressure of 2,000 volts is applied to the one and 4,000 volts to the other, will the time taken for the electric current to travel round the earth be the same in each case?

Answers.—(1) The ratio of transformation of the Iolanda transformer with both windings connected in parallel is approximately 150 to 1. This does not mean that the secondary voltage is 150 times the primary under working conditions. When the transmitter is properly adjusted resonance comes into play and the secondary voltage,—*i.e.*, the spark potential, is raised. In fact, assuming that the resistance is negligible, the secondary voltage is simply governed by the distance to which the balls are separated. (2) The spark length in a 1½ k.w. ship set with the condenser in parallel is 4 mm., and the difference of potential necessary to break this down is about 14,000 volts. (3) You seem to think that the frequency of the current on the high-tension side of a transformer is twice that of the current on the low tension side. This is incorrect. The two frequencies are the same. When working with the 4 mm. gap the condenser discharges about every fourth cycle of the charging current. The fact that a discharge does not occur every half cycle is due to the resonance effect referred to in (1). (4) Group frequency tuning was patented by Mr. Marconi many years ago, and the Marconi Company has employed it from time to time for special purposes and in special forms. For everyday purposes it does not seem to possess so many advantages as might be supposed. It is of some slight value, however, and the Marconi Company provide telephone condensers for the purpose of approximate note tuning. (5) Different waves can pass through each other in space without undergoing any modification. It is altogether outside the scope of these columns to enter into a discussion of this question. We must refer you to any standard textbook on the subject. (6) Your query is somewhat vague. When a T aerial is oscillating, it vibrates as a whole and waves are detached from it in loops in exactly the same manner as from a Hertz oscillator, with the exception of the fact that the loops are only half formed, the lower ends terminating on the surface of the earth. (7) The potential has nothing at all to do with the frequency of the oscillations. Wave-length is entirely independent of both current and potential and is governed solely by the inductance and capacity of the circuit (this is always assuming that the resistance is small, as it usually is in oscillating circuits). (8) Certainly. The speed of propagation of any wave motion is independent of its amplitude.

Forthcoming Meetings.

WEDNESDAY, JUNE 3RD.

Dublin Wireless Club.—Meeting at 11, Lower Sackville Street, 8 p.m.

THURSDAY, JUNE 4TH.

Liverpool Wireless Association.—Mr. A. P. Whittle on "Central Battery Telephones," 12, Goree Piazzas, 7.30 p.m.

THURSDAY, JUNE 18TH.

Liverpool Wireless Association.—B. C. Eason on "Detectors," 12, Goree Piazzas, 7.30 p.m.

WEDNESDAY, JUNE 17TH.

Dublin Wireless Club.—Annual general meeting, 11, Lower Sackville Street.

Among the Wireless Societies

Derby.—*A Tour of Inspection.*—An interesting meeting of the Derby Wireless Club was held recently, when a number of corresponding members journeyed specially to Derby to hold a conference with the local amateurs. Among the visitors was the borough electrical engineer of an important North Country town, who is designing a special rotary converter for wireless use on D.C. mains, and Mr. A. T. Ward also came from Sheffield with a carefully prepared description of his own station. Mr. Ward has an exceedingly high aerial—some 100 feet—and is consequently able to transmit a very long way. After tea the visitors went the round of the local stations, and were particularly interested in Mr. Bemrose's fine show of instruments. These included a wireless clock which derives its current from two metal plates buried in the earth. Mr. Trevelyan Lee (the Hon. Secretary) had his station working, and gave practical illustrations of how to obtain a pure musical note from a rotary spark gap. This station can be heard at other local stations on more "wave-lengths" than its fundamental 250 metres, the third harmonic being specially loud. Mr. Taylor's unorthodox oscillation transformer attracted so much attention that after the visitors had left it could not be found. It transpired that another local member had offered to loan it to a visitor to experiment with. At Mr. Downe's station signals were received from a number of small ship wave-lengths, and occasioned considerable surprise by the amount of noise they made in the operating room. His success is probably due to the fact that his own aerial approximates somewhat closely to the aerial used on ships. Some curious results were noted on the club station instruments, one being that "duplex reception" is easily possible, even Gibraltar being readable whilst a local station was being read by another operator. The fact that "Gib." can be received on the Full Street small aerial at all speaks well for the efficiency of the instruments used. Another meeting for corresponding members is shortly to be held on a Saturday afternoon, when an expert will read a special paper. Conferences of this sort are extremely valuable, and letters of regret at inability to be present were received from corresponding members in China and Peru.

* * *

Dublin.—*The Wheatstone Bridge.*—Mr. J. Smyth, one of the members of the Dublin Wireless Club, delivered a lecture on the Wheatstone Bridge on April 1st at the Club's city premises, 11, Lower Sackville Street. He dealt very exhaustively with his subject, which was led up to by a detailed explanation of Ohm's law—the electromotive force available for work at various points in an electrical circuit, the division of current in branch circuits of different resistance, etc. The bridge was then explained on the blackboard in colours, and the illustrations were identified with the actual parts of the apparatus. Examples of testing the various classes of electrical circuits (including telegraph and telephone lines) were explained and worked out mathematically.

Under the auspices of the Club an Exhibition was held on May 1st and 2nd, space in the Hall having been placed at the disposal of the Club by the Model Engineers' Society, who were also holding their Annual Exhibition.

The Wireless Section was an unqualified success and proved a great attraction. Thanks to the members of the Club of a mechanical turn of mind and the efforts of Mr. P. K. Turner, proprietor of the Irish School of Wireless, there was an exhibition of apparatus which lent itself to all forms of demonstration, both technical and practical.

Two stations were erected, one at each end of the hall—one being composed of parts of a Marconi ship's installation, belonging to Mr. Turner, and the other a complete transmitting and receiving apparatus, the property of Mr. Campbell.

An attractive feature of the Exhibition was the transmission of messages from one end of the hall to the other.

Although the indoor aerial was short, Mr. Turner succeeded in getting Paris signals, and also some ships.

Mr. H. C. Draper's exhibit consisted of an arrangement by means of which a paper tape with the Morse characters represented by long and short cuttings was moved over a roller, a brush contact reproducing the signals on a buzzer and Morse inker, when the contact was made through the cuttings.

* * *

Halifax.—A meeting of the Halifax and District Amateur Wireless Association was held on May 7th at the club's headquarters, Warwick Street, Halifax. Several new members were elected. Mr. E. Kirkby, who presided, was elected President; Mr. A. L. Maude, Hon. Sec.; and Mr. R. Palmer, Hon. Treasurer.

* * *

Liverpool.—A meeting of the Liverpool and District Wireless Society was held on April 3rd, with Mr. J. T. Mathews, Chester, in the chair. The chief subject under discussion was switching arrangements for combined direct and loose-coupled receiving outfits, as stations were considered very incomplete without a good "stand by" direct-coupled position. Several designs were submitted by the members, together with samples of the switches in use. The work-benches in the balcony were fully occupied by parties of members conducting various experiments, also practising sending and receiving. The secretary also reported with regard to visits to distant corresponding members, and of successful assistance given to them with their stations.

A meeting of the Liverpool Wireless Association was held on May 14th, the subject under consideration being "An Introduction to the Study of Current Electricity," by Mr. S. Frith, Hon. Sec. After dealing with the difference between what is known as a "charge" of electricity and a "current" of electricity, the lecturer described the various methods for "producing" a current of electricity, primary batteries, the dynamo, and also the thermo pile. The properties of an electric current were dealt with. The various units—the volt, ampère, watt, coulomb, joule, etc.—were fully explained, and the lecture was well illustrated by experiments and blackboard illustrations. Another meeting was held on May 21st, when Mr. J. A. Henderson lectured on "Coherers." Mr. S. Frith again addressed the members on May 28th, his subject being "Electrical Measuring Instruments." The Hon. Secretary is "at home" to all interested in wireless telegraphy at 6, Cambridge Road, Crosby, on Fridays, from 8 p.m. to 9 p.m.

* * *

London.—*Radiotelegraphic Measurements.*—The April meeting of the Wireless Society of London was devoted to a paper by Dr. J. Erskine-Murray which dealt with Radiotelegraphic Measurements. The author showed the many and varied applications of a method for the determination of the radiation co-efficient, joulean resistance, and efficiency of a transmitting station. In addition to finding the efficiency of a station it is possible to determine the best and most economical form of earth connection, the best site for a station in a given locality, the best form of antenna for a given wave-length, power and decrement, and many other numerics of the utmost importance to the radiotelegraphic engineer. He placed before the members a brief statement of the fundamental quantities involved, with, in each case, an indication of a satisfactory method of measurement and of the precautions which must be observed in order that a reliable result may be obtained. Dr. Erskine-Murray claimed that the simplest way, and indeed the only way (until the publication of Mr. de Groot's paper a few weeks ago) which is at all direct for the measurement of the actual radiation efficiency of a station is that which he devised some three years ago and used for the measurement of the efficiency, earth resistance, and other constants of the Post Office wireless station at Hunstanton in 1911. That method depends on the measurements of the ratios of the energy received at a receiving station when the sending antenna is at slightly different heights. The factor varied is the radiation co-efficient, and therefore the power radiated, everything else being maintained as nearly as possible. For each position of the antenna an equation is obtained in which there are only two unknown quantities. Two positions are, therefore, sufficient to give two equations which can be solved simultaneously for the two unknowns, and from these the radiation co-efficient (or radiation resistance), the earth resistance, the power radiated, and the efficiency are directly calculable.

London (South East).—*Amateur Wireless Alliance.* — The "Amateur Wireless Alliance" has been formed with headquarters at 71 Peckham Rye, London, S.E.

At a meeting held on May 6th, Mr. A. W. Knight was elected temporary secretary, and he will be glad to receive applications of membership for all interested. It is proposed to equip a model workshop for the use of the members and a complete station will be erected. We understand that many prominent amateurs in the district have promised to support the new alliance.

* * *

North Middlesex.—A meeting of the North Middlesex Wireless Club was held on May 4th. Part of the evening was occupied with interesting experiments with Mr. Reed's portable wireless set, and, as he had arranged for the fixing up of a temporary aerial, he was able to demonstrate what one could do with apparatus that could be packed in a small travelling bag. Signals from many commercial and Government stations were received; but, owing to the small time at Mr. Reed's disposal, he was unable to get the best results out of his instruments. Many of the club took part in Morse code practice with Mr. Midworth's silent practice set, by means of which any number can practise simultaneously, and by which the signals received are as near as possible to the real thing.

The President explained the accounts, which showed that the club was financially sound, and that the affairs generally were very satisfactory, but that he would not be satisfied himself until he saw the club in its own well-appointed club-room.

Another meeting of the club was held on May 18th.

* * *

Nottingham.—*A Novel Receiving Apparatus.*—A meeting of the Nottingham and District Wireless Society was held at the temporary premises, Mansfield Road, on April 29th, the Chairman, Mr. Williams, presiding. A paper on "Units of Electrical Measurement and the Effect of an Electric Current," was given by Mr. Stevens, and at the end of the discussion Mr. Codd exhibited a novel receiving apparatus. This consisted of loose-coupled tuner, loading-coil, four variable step condensers and blocking condenser, potentiometer, battery, and a pair of phones. The whole outfit was contained in a 100 cigar box, and works admirably. The primary and secondary are capable of being connected in series for direct coupling on long waves by means of a switch provided for the purpose.

THE INSTITUTE OF RADIO ENGINEERS.

AT a meeting of the Institute of Radio Engineers held at Columbia University, U.S.A., two Papers were read, one on "The Effect of a Parallel Condenser in the Receiving Antenna," by Dr. L. W. Austin; the other, on "A Method for Determining Logarithmic Decrement," by Mr. Louis Cohen. In the first Paper, Dr. Austin said that the practice of using a variable condenser in parallel with all or part of the inductance in the receiving antenna in order to receive a longer wave was convenient, inasmuch as it did away with the necessity of small inductance steps and reduced the total amount of inductance required; it was usually found, however, to be less efficient than pure inductive tuning. Tables showing the effects of different values of parallel capacity for two sizes of artificial antenna were given. The readings were made with a galvanometer replacing the telephone. As the capacity was increased and the inductance decreased the galvanometer deflection decreased. Replacing one-half the inductance by capacity decreased the deflection about one-third. Practically the same results were obtained with the real antenna. Mr. Cohen, in the second Paper, discussed the Bjerknes formula, and stated that the results obtained might be incorrect, so that it was desirable to develop another method for use in checking the results obtained by the Bjerknes method. He proposed that, instead of the usual method of de-tuning the wavemeter circuit until $1^2/_2$ was obtained, the resistance of the wavemeter circuit should be increased until $1^2/_2$ was obtained; then, with the inductance, resistance, added resistance of the wavemeter and frequency known, the desired decrement could be readily obtained.

THE POST OFFICE REPORT.

THE Postmaster-General made his annual statement in the House of Commons on April 30th, and remarked as follows concerning the Imperial wireless chain:—

"There are two working stations in England—one at Leafield and the other at Devizes. The sites are purchased. At Leafield, which is near Oxford, the erection of masts has already begun to take place. We are considering the power plant, but we have not yet settled details of the wireless plant. The second of the stations includes one near Cairo, in Egypt, for transmitting, and one near Ismailia for receiving wireless messages. The sites have been acquired, and the masts are in process of erection. There is only this difference between the statement made by my right hon. Friend and what is being done, that the station in Egypt will be what is called a three-way station instead of a two-way station, and will communicate with India and East Africa.

"The third of these stations is at Poonah. In regard to those three stations, which have been approved by the House of Commons, they are being erected and established by the Marconi Company. With regard to the other three, in East Africa, South Africa and the Straits Settlements, although the Marconi Company has a lien on the erection of those three stations, their claim does not go beyond the lien, and the Post Office may give notice at any time before their completion that they intend to hand it over to another company."

Here the Postmaster-General complained of the absence of competition in wireless telegraphy with the Marconi Company. The only possible competitor that he could think of in this country was the Poulsen Company, which has "always promised" to prove ability to give an efficient service, but has never fulfilled the promise. Referring to this Company Mr. Hobhouse said:—

"If they can demonstrate their ability to give us an efficient service, and I am bound to lay great emphasis on the word 'if,' we would gladly give them a licence and let them at least try their service. But I am waiting at the present moment, and I have been waiting ever since I was first appointed to the office of Postmaster-General, to get a test which will satisfy us as to their ability to carry on this service. It has always been promised to me, but the promise has never been fulfilled. I will gladly receive a demonstration of their ability to enter on commercial conversations and communications, but, until I am in a position to see that they can actually enter on such communications, I, at all events, on behalf of the Post Office, cannot avail myself of their service."

Patent Record.

The following patents have been applied for since we went to press with the May number:

APRIL-MAY, 1914.

9285. April 14th. Wm. Mellersh-Jackson (for Otto Scheller und C. Lorenz Akt-Ges. Germany). Method of and connections for tuning antennæ to a plurality of electric waves which are independent of one another.

9686. April 20th. John Kuhr & A. W. Bridge. Electro-magnetic wave detector for Wireless Telegraphy of a mercury and crystal type, carborundum or other crystals.

10385. April 27th. T. W. Stratford-Andrews & Axel Orling. Receiving arrangement for Wireless Telegraphy.

10697. April 30th. Wm. T. Ditcham. Spark Gaps for radio-telegraphy and radio-telephony.

11102. May 5th. Egbert von Lepel. Methods of producing electric oscillations.

11120. May 5th. Nicholas James Jeffries. Antennæ for Wireless Telegraphy and Telephony.

11372. May 8th. Gisbert Kapp. Means for actuating signals on locomotives by electromagnetic induction.

Share Market.

May 19*th*, 1914.

There has been some closing of speculative accounts in the various Marconi issues, which has caused a sudden fall in prices. The shares have been largely taken by small investors at the prices now ruling. Closing prices are: Marconi Ordinary, £3 2s. 6d.; Marconi Preference, £2 10s.; Marconi New Ordinary, £3; Marconi International, £1 7s. 6d.; American Marconi, 15s.; Canadian Marconi, 7s.; Spanish Trust, 7s. 6d.

OVERSEA NOTES.

Australia.

Proposals for a daily budget of news to keep the passengers on steamers fitted with wireless telegraphy abreast of happenings inside and outside the Commonwealth is embodied in a scheme which the Postmaster-General has submitted to the shipping companies trading in Australian waters. Mr. Agar Wynne states that the proposal is that a précis of about 400 words, giving the news of the day, should be sent to all passenger steamers through the Australian wireless stations. The scheme can be applied to the mail steamers, which will be placed in possession of Australian and other news when they are 2,000 miles from the land. Discussing other features of the Australian wireless system, Mr. Wynne said that he was considering the question of reducing the rates to make the service more popular.

Belgium.

The members of the International Wireless Telegraphy Commission met recently at the Royal Laeken Park, near Brussels, and placed the first rivet in the large pylon there, which will be 333 metres high. Mr. Duddell, Dr. W. Eccles, and Dr. E. W. Marchant represented England.

Germany.

Duke Ernst of Sachsen-Altenburg, one of the most scientific of German princes, is about to have a wireless installation fitted up at his castle at Altenburg. It will be used specially for communicating with airships, as the duke is a keen aeronaut, and is besides a practised hand at the operator's key. He hopes to obtain a pleasurable and profitable experience from this installation.

New Zealand.

New Zealand has two high-power wireless stations capable of maintaining communication over a distance of 1,250 miles, Radio-Awanui (VLA) in the extreme north and Radio-Awarua (VLB) near Bluff in the south. Both are 30 kilowatts with attendance for commercial business from ship stations 6.30 p.m. to midnight (New Zealand mean time), and a continuous listening service for distress signals. There are also three low-power (2½ kw.) stations at Auckland (VLD), Wellington (VLW), and Chatham Islands (VLC) respectively, with normal range of 300 miles. Wellington, as the principal station, maintains a continuous attendance, Auckland from 8 a.m. to 6 p.m., and Chatham Islands, 9 a.m. to 1 p.m., 3 p.m. to 5 p.m., and 7 p.m. to midnight.

The Government cable steamer *Tutanekai* is also fitted with wireless for use when engaged repairing cable breaks or on special trips to adjacent islands. The rates are based upon coast station charge, 6d. per word (including inland telegraph charges), and ship-station, 4d. per word. For ships trading exclusively between Australia and New Zealand or between ports in New Zealand, the charge is reduced to half rates, ship, 2d., coast station, 3d. The rate between the mainland of New Zealand and Chatham Islands is 6d. per word, with a special "relaying" rate for messages from ship-stations relayed through Chatham Islands of 4d. per word.

United States.

Secretary of Commerce Redfield recently approved a fine of $25 imposed upon an amateur wireless operator in San Francisco for a violation of the wireless regulations, in that the wave-length emitted by his station exceeded by 370 metres the limit fixed by law for his class of station. The imposition of the penalty showed several warnings from the United States radio inspector, and the allowance of considerable time for the proper adjustment of the station. There are several simple methods by which an amateur may determine the wave-length he is using, and with which all amateur station operators should be familiar.

In another recent case a commercial wireless operator, holding a licence issued by the Department of Commerce, either through ignorance or intent, forged the signatures of two captains under whom he had served to the licence record. This case has been referred to the United States attorney for prosecution, for wireless operators must be taught to realise their responsibility under their licences. A commercial operator should be very careful to have the service record on the back of his licence properly filled in and signed by the captain or other official under whom he is employed.

The Native Workman

SOME not uninteresting incidents occur in the life of the wireless engineer in the handling of native workmen. One feature of the Indian native labourer is his indolence—a feature which was well brought out in a number of epistles addressed to Mr. E. C. Montague when in charge of the erection of the wireless telegraph station at Fort Allahabad. Some of the letters from Mr. Montague's post bag make very interesting reading, as they show the native character as it is, without the varnish of English interpretation. Most of these letters have been written by native letter writers, for the low class native is generally unable to write English, and we have no doubt that they will interest a large number of wireless engineers and enable them to contrast the native Indian workman with other types they have had to put up with elsewhere. The first letter is from Mr. Montague's Chawkider (watchman) and reads :—

SIR,—I most respectfully beg to bring to your kind notice that I have received a letter to-day from my house that my brother is seriously ill. Therefore I request the favour of your kindly granting my resignation, and settled of my pay up to date. For this act of kindness I shall ever pray for your long life and prosperity.

I have the honour to be, Sir,

Your most obedient servant,

KOBESHWAI.

This is the old subterfuge.

But here is another, which, for bare-faced impudence would be difficult to beat. Abt Ratan Metar, it seems, has acted on the principle that it is better to take first and ask afterwards.

SIR,—In my absence from fort I Myself appointed a man to work in your Bungalow in place of me, and in a hurry I forget to report this fact, for which I beg to be excused. I am very poor man and get a small pay to maintain my family, and I beg to before you that you will kindly payment me of my 29 days' pay, for which I shall ever and ever pray to god.

I have the honour to be, Sir,

Your most obedient servant,

ABT RATAN METAR.

Buddhist Festival scenes near the River Ganges.

Mr. Montague employed a "Baboo," or native clerk, when he was at Allahabad, but after a time he no longer required his services, so, anxious to do the man a good turn, he obtained another post for him at Meerut. Very shortly afterwards he received the following letter from the Baboo, asking for a personal character, as his prospective employer is disinclined to accept those of a general nature, which, by the way, are in most cases the invention of their possessors. It is a first-class specimen of native penmanship, and has been preserved with its original spelling. Perhaps the reader will find some difficulty in construing it grammatically, but the meaning is clear.

HONOR SIR,—I moust hambly and beg to recfectbly and bruig This beafore yours kind Honer. So money thanks for yours kind Leter Dated of 18th My Lord. I am very sory to said That my first Leter is not understude My Lord. I am very sory to give This Turble to yours kind Honer bcaeuse yours Kind Honer give me my serveace cirtifict at Jaitouck Staition on a Telegramph fourm. That is not much use because The onther Gentelman not Trust and not Like. Therefore I shall much Obligged if yours Kind Honer kindly plise give me or send me a ceritifict on a praper peaper. Therefore I want a ceritifict. Kindly pleise send me. Now I am and all my Familey all alright and sending Slam (Salaam) to yours kind Honor. Iam and all my Familey pray for yours long Life and good helth and for yours high Rank.

I beg to Ramian,

Yours sir obedeant Servant,

KARUM ALI BEARER.

A Buddhist Festival.

But perhaps the most amusing part of the correspondence was a series of telegrams which were sent to Mr. Montague from Peshawar by a native workman, who was apparently much alarmed at the dread influences possessed by wireless telegraphy. His first telegram ran:

"Your are trying on me with telephone wireless please wire.

SITRAM KAPOOR,"

and the reply was prepaid.

Mr. Montague was nonplussed by the message, and as he could not conceive its purport he decided to wait for further developments. Nothing happened for a month or two, then another telegram was sent by Sitram Kapoor to Simla, where Mr. Montague was then staying. It ran:

Sitram Kapoor very much troubled with wireless These wireless is same which killing men reply.

SITRAM KAPOOR.

And again the answer was prepaid.

The man was apparently suffering from nerves—perhaps had a slight touch of fever—and put it all down to the mysterious agency, directed "*Via* Marconi."

The poor man was evidently in a dead funk, for three months later he sent a third and final wire, which remained unanswered for the very good reason that it is hopeless to argue with natives. It ran:

Your wireless is hippnateazam which testing on me. My fee for wasting time on rupee per movement.

SITRAM KAPOOR.

The fourth word of the telegram means "Past comprehension," unless it is supposed to read "hypnotising."

Apparently the postal authorities found it difficult to understand, for they had added a note to the effect that the text was repeated in order to obviate any possible errors in transcription.

There is one little problem yet unsolved. Did Sitram Kapoor make this an excuse for obtaining blackmail to the extent of "on rupee per movement"? and again, did he get it? We think not.

Positions of Engineers

(May 13th.)

Gray, A., Chief Engineer.
Anselmi, S. C., Towyn.
Barrington, R. N., Carnarvon.
Beatson, A., Carnarvon.
Benning, B. S., Southampton.
Blinkhorn, A. B., London.
Boome, G. J., Cardiff.
Borghese, G. G., Clifden.
Boucicault, P., Carnarvon.
Boyle, C. W., Clifden.
Brown, W. H., Belfast.
Burrowes, F. E., Yacuiba, Bolivia.
Burrows, H. M., Carnarvon.
Casperd, C. C., Clifden.
Chevallier, J. C. E., Yacuiba, Bolivia.
Childs, H. B. T., on leave.
Clark, J. P., London.
Cole, W. B., Ferrol.
Cooke, R. R., on leave.
Croaker, P., Devizes.
Dalgairns, A., London.
Dashwood, S. L., London.
Davis, W. J., Carnarvon.
Demont, R., Bolivia.
Densham, W., Chelmsford.
Dobell, H., Chelmsford.
Dockray, S. T., Punta Arenas.
Dowsett, H. M., Chelmsford.
Eisler, P., London.
Entwisle, G. H., London.
Entwistle, W. S., Carnarvon.
Ewen, H. A. E., London.
Fellowes, H. S., Poldhu.
Fielding, W. F., Newcastle.
Flanagan, F., Clifden.
Flood-Page, A., London.
Franklin, C. S., Carnarvon.
Galster, J., Stavanger, Norway.
George, E., Special leave.
Gelmour, R. J., Liverpool.
Golland, E., London.
Green, E., London.
Groser, S. R., Cadiz.
Hill, L. D., Letterfrack.
Hobbs, T. E., London.
Hughes, C. H., Vigo.
Hunter, M. B., Poldhu.
Ichino, E., London.
James, C., Egypt.
Johnson, J. N., Ferrol.
Jones, D. H., Southampton.
Jupe, A., Newcastle.
Keith, C. H., returning from Chili.
Kemp, G. S., Haven.
Kent, A. D., Antwerp.
Kift, A. A., London.
Kindersley, R. G., London.
King, L. H., Leafield.
Korber, F., Clifden.
Koe, S. F., London.
Lacy, T. S., on leave.
Ladner, A. W., Poldhu.
Landon, G. H., Clifden.
Leary, J. J., Punta Arenas.
Linsell, A. A., Chelmsford.
Loveband, A. W., London.
MacCallum, H., Letterfrack.
Marden, E. S. D., Egypt.
Mathias, E. L. A., Clifden.
Maunder, W. R., Carnarvon.
McKay, C. A., Glasgow.
McCullough, H., Riberalta, Bolivia.
McLellan, A., Letterfrack.
Meikle, G. C., Clifden.
Merriman, W. H., London.
Merton, H. F. J., Londonderry.
Montague, E. C., Poldhu.
Moore, A. E., London.
Morris, A. J., Clifden.
Mott, W. F., Glasgow.
Newman, F., London.
Newstead, T. B. L., London.
Nicholls, H., Punta Arenas.
Paget, P. W., Chelmsford.
Payne, D. H., Carnarvon.
Persichetti, C. S., London.
Picken, W. J., Letterfrack.
Pitcairn, R. F., London.
Pole, A. T., Riberalta, Bolivia.
Pontifex, B., London.
Poyntz, J. M., Carnarvon.
Prince, C. E., Chelmsford.
Privett, P. E., Poldhu.
Quick, R. C., Newcastle.
Rackstraw, N. C., Southampton.
Rattray, C. G., Sick leave.
Rice, R. K., Poldhu.
Richmond, H., Leafield.
Ridley, W. O., London.
Robinson, F. E., Broomfield.
Round, H. J., London.
Rust, N. M., Letterfrack.
Ryan, C. P., Chelmsford.
Sauve, H., Teneriffe.
Savill, A. G., Brazil.
Shaw, H. E., Poldhu.
Sherborne, A. K., Widnes.
Smith, S. B., Towyn.
Stacey, F., London
Steen, H., Stavanger, Norway.
Strickland, R. H., Punta Arenas.
Tisshaw, H. S., Towyn.
Topham, F. C., Clifden.
Tremellen, K., London.
Triggs, E., Glasgow
Trost, O., Stavanger, Norway.
Turner, W. G. A., Carnarvon.
Tyler, E. G., London
Venn, W. H., Liverpool.
Volter, E. F. W., Poldhu.
Vyvyan, R. N., London.
Wells, N., Poldhu.
White, J. D., London.
Whitmore, G. S., London.
Willis, M. F., Carnarvon.
Witt, B. J., Towyn.
Wood, W. H., Liverpool.
Woodward, P. J., Carnarvon.
Wright, G. M., Chelmsford.

Positions of Operators

(May 14th.)

Abbott, S. H. V., *Panama*.
Adam, J. H. S., *Berrima*.
Adams, F. W., *Michigan* (Warrens).
Adams, G. E., *St. Andrew*.
Adnitt, C. H. H., *Edinburgh Castle*.
Akehurst, C. J., *Highland Laird*.
Akerman, A. R., *La Negra*.
Albrow, H. V., *John Pender*.
Alderton, C. G., *Beacon Grange*.
Alford, L. W. G., unattached.
Allchurch, H. P., *Devonian*.
Allison, W., sick leave.
Allnutt, C. M., *City of London*.
Allott, N. E., *Chili*.
Allsworth, H. P., *Campania*.
Alston, S. K., unattached.
Alton, H. F., *Mesaba*.
Alton, T. F., *Chaleur*. *(P.S.N.)*
Ambler, P., *Mexico*.
Amott, F., *Maryland*.
Anderson, G. A. L., *Empress of Britain*
Anderson, G. D., *Elephanta*.
Anderson, L. N., *Saxonia*.
Andrews, A., *San Dunstano*.
Angill, A. G., *Irishman*.
Arbuckle, D., *Grampian*.
Aris, B. F., *Waipara*.
Arlaud, C., *Sardinia*.
Armstrong, C. C., *Oropesa*.
Armstrong, S., *Magdalena*.
Arnold, A. C., *Appam*.
Arrowsmith, G., *Tarquah*.
Ashbrook, J., *Arabic*.
Atkinson, J., *Corcovada*.
Atkinson, W. F., *La Correntina*.
Atkinson, W. H., *Narragansett*.
Auvache, J. E., *Medina*.
Avery, F., *Chaudiere*.
d'Avigdor, A. H. D., *Mauretania*.
Bailey, F. M., *Arabic*.
Bailey, H. H., *Teutonic*.
Bain, W. R., *Kelvinbank*.
Baker, E. A., *Khiva*.
Baker, F. H., *Orteric*.
Baker, J. R., *Orissa*.
Balding, G., *Grantully Castle*.
Balfour, G. W., *Mauretania*.
Ballard, A. E. R., *Oruba*.
Bamford, E., *Empress of Ireland*.
Bamford, J. R., *City of Vienna*.
Banbery, W. C., *Durham Castle*.
Band, H. J., *Star of Australia*.
Barber, C. E., *Highland Brae*.
Barber, W., on leave.
Barker, L. T., *Matura*.
Baron, C. E., *Huanchaco*.
Barrell, W. S., on leave.
Barron, T. G., *Baron Jedburgh*.
Bartlett, C. H., *Matatua*.
Baxter, B. O., *San Wilfrido*.
Beamon, T., *Ascot*.
Bean, H. H., *Arzila*.
Beardmore, G. A., *Caledonian* (Leyland).
Beatson, F., *Walmer Castle*.
Beckett, G. N., *Pancras*.
Beckett, J., *Corinthian*.
Beilby, W., *Uranium*.
Belcher, H. F., *Armadale Castle*.
Bell, A., *Highland Laird*.
Bell, E., unattached.
Bell, J. A., *Raeburn*

Bellhouse, G. L., *Benefactor.*
Bernard, R. A., *Minnewaska.*
Berry, C., *Bovic.*
Bessell, B. W., *Minnetonka.*
Beynon, A. R., *Kanawha.*
Biggins, J., *Canadian.*
Bilton, W. W., *Hantonia.*
Birch, A., *Minnehaha.*
Birtwistle, W., *Himalaya.*
Blake, E., *Macedonia.*
Blezard, J., *Magdalena.*
Blight, W. T., *Poona.*
Bliss, G. E., *Carnarvonshire.*
Blizzard, R. E., *Tara.*
Blow, A. G., *Vitruvia.*
Bloxham, A. I. W. H., unattached.
Blundell, E. T., *Oxfordshire.*
Boileau, J. M., *Patuca.*
Bolster, A., *Teesta.*
Bone, D. W., *Monmouthshire.*
Boon, N. A., *Bogota.*
Boorne, E. V., *Takada.*
Bower, A. B., unattached.
Bowling, J. E. K., unattached.
Bowman, H. A., *Welshman.*
Boxer, H. R., *Hurunui.*
Boylan, J. A., *San Bernardo.*
Bradfield, T., *Aronda.*
Bradley, F. A., *Chignecto.*
Brain, R. L., *Haverford.*
Bramley, J. R. C., *Italia.*
Bransby, A. H., *Highland Brigade*
Branton, S. V., *Pera.*
Bremner, J., *Barranca.*
Brennan, J., *Empress of Britain.*
Brett, C. H., *Limerick.*
Brewer, C. H., *Calabria.*
Bridges, W., *Deena.*
Bright, A. E., *Massilia.*
Brindle, F., *Kathiawar.*
Brookes, J. F., unattached.
Bropny, M. J., *Canadian.*
Brown, A. C., *Galician.*
Brown, A. H., *Demerara.*
Brown, A. R., *Motagua.*
Brown, J., *Potaro.*
Brown, J. A., unattached.
Brown, S. W., *San Eduardo.*
Brown, Stanley W., *Deseado*
Browne, A., *Huasco.*
Browne, C., *Alsatian.*
Brun, L. S., *Perugia.*
Bruton, A. F., *Derbyshire.*
Bryan, H. F. B., *Sardinian.*
Bryant, P., *Andania.*
Budge, J., *Quillota.*
Bull, J. G., *Montrose.*
Burgess, A. F. T., *Ucayali.*
Burgham, G. M., *Sumatra.*
Burke, M. M., *Columbian* (abandoned).
Burnett, W. C., *Ruthenia.*
Burnett, W. J. T., *City of Chester.*
Burrows, T. R., *Borda.*
Butler, J., *Ivernia.*
Butterworth, J. M., *Lanfranc.*
Buttle, J. G., *San Tirso.*
Caldwell, A. C., *Suevic.*
Caldwell, J., *City of Paris.*
Calver, F. N., *Mauretania.*
Calver, G. H., *Megantic.*
Cameron, R. S., *Pardo.*
Camfield, J., *Bohemian.*
Campbell, M. J., *San Urbano.*
Candy, W. H., *Montcalm.*
Carey, J. P., *Drumcree.*
Carnaby, N. E., G.W.R. steamer.
Carroll, J., *Arzila.*
Carruthers, G., Liverpool Depot.
Carter, B. A., *Baroda.*
Carter, W., *Chagres.*
Cauvin, M. A. J., *Manxman.*
Cavanagh, H. S., *Alaunia.*
Chadwick, J. G., sick leave.
Chapman, G. G., *Orama.*
Chapman, P. J., *Arankola.*
Chesterton, A. J., *Ilapura.*
Cheyne, J., *Manhattan.*
Chick, C. A., unattached.
Chick, O., *San Melito.*
Chick, W. H., *Orotava.*
Child, L. J., *Orissa.*
Church, G. R., *Arzila.*
Church, T. M., unattached.
Clark, F., *Cawdor Castle.*
Clark, J. W., unattached.
Clark, J. W. A., *Pathan.*
Clark, L. B., *Nigeria.*
Clark, P. S., *Assaye.*
Clarke, A. H., *Oceanic.*
Clarke, A. M., *San Francisco.*
Clarke, H. T., *Comrie Castle.*
Clarke, J. G., *Cestrian.*
Clarke, W. F., *Francisco.*
Clarke, W. J., *Victorian* (Leyland).
Clarkson, G., *Crown of Toledo.*
Cleary, L. B., *City of Glasgow.*
Cleaver, W. W., unattached.
Cleverley, E. S., *Amazon.*
Clifford, A. J., *City of Bombay.*
Cobham, A., *Franconia.*
Cocks, H., *Ingoma.*
Coffey, P. J., *San Gregorio.*
Coldwell, G. A., *El Cordobes.*
Coleman, T. H., *Gloucestershire.*
Condon, W., *Mount Royal.*
Connell, J., Liverpool Depôt.
Cook, E. J., *Llanstephen Castle.*
Cook, F., *Georgian.*
Cook, G. E., *Athenic.*
Cookson, V., *Sachem.*
Cormack, D. B., *Scindia.*
Cormack, W. L., *Gujurat.*
Cottam, H. T., *Persia.*
Cousens, E. C., *Nubia.*
Cousens, W. T., *Clearway.*
Cowhey, K. S., *Laconia.*
Cox, E. J., *Knight Templar.*
Cox, L. H., *Eupion.*
Cox, W. G., *Baltic.*
Coysh, W. D., *Mongolian.*
Craigie, J. A., unattached.
Craven, W. M., *Themistocles.*
Crawford, J. G., *Andorinha.*
Crofts, A., *City of Durham.*
Croke, L. G., *Mantua.*
Crookes, W. D., *Oriana.*
Crosby, S., *Asian.*
Cross, S. R., *Megantic.*
Crossman, C. H. G., *Tanda.*
Cruess-Callaghan, S., *Koranna.*
Cryan, W. J., unattached.
Cunningham, J., *Lucerie.*
Cutbush, H. E., *Karroo.*
Dale-James, W. R., *Marmora.*
Daly, D. G., *Trent.*
Daly, R. H., *Walmer Castle.*
Damen, O. G., on leave.
Daniels, J. H., *Missouri.*
Darby, P. T., *Francis.*
Darracott, R. P., *Alnwick Castle.*
Davey, A. G., *Taroba.*
Davies, F., unattached.
Davies, J. E., *Orduna.*
Davies, J. I., *Mimiro.*
Davies, W., Liverpool Depôt.
Davis, A. C. J., *Ellora.*
Davis, G. E., *Desabia.*
Davy, W. H. G., *Karema.*
Dawson, B., *Canopic.*
Dawson, W., *Philadelphian.*
Day, E. J., *Palma.*
Dean, F. L. W., *Californian.*
Dean, J. J., *Botanist.*
Denison, P., *Den of Crombie.*
Dennis, F. L., unattached.
Dewey, G. H., *Lancastrian.*
de Witt, D. T., *Barneson.*
Dick, J., *Ausonia.*
Dicks, A. G., *Rangatira.*
Dickinson, A., *Peru.*
Dixson, E. W., *Namur.*
Dods, L. A., *Victorian* (Allan).
Doherty, P., *Moldavia.*
Donnan, W. J., *Indian.*
Donnegan, J. J., *Berwindmoor.*
Driscol, J. R., *Waiwera.*
Drohan, J., *Columbian* (abandoned).
Duff, J., *Corsican.*
Duncanson, J., *Bamora.*
Durston, W. J., *Cambrian.*
Dyer, E. W., *Corinthian.*
Earl, H. E., *Avon.*
Earl, W. F., unattached.
Earle, H., *Huallaga.*
Ebbetts, F. T., *Manora.*
Eccles, P. B., *Delphic.*
Eddington, D. F., *Oruba.*
Edwards, W. G., *Karamea.*
Egan, M. B., *Gaika.*
Elliott, B. S., *Empress of Asia.*
Emery, B. F., *Coconada.*
Empson, T. L., *Bankura.*
Entwistle, A. M., *Aragon.*
Erbach, E. W., *Matina.*
Evans, A. W. N., *City of Baroda.*
Evans, C. F., *Manxman.*
Evans, T. H., *Indore.*
Fagg, G. K., *Andes.*
Farman, A. H., *Zent.*
Farmery, J. C., *Calypso.*
Farrell, R. T., *Swazi.*
Ferguson, R., *Empress of Ireland.*
Findlay, J. N., *Whakarua.*
Firman, A. R., *La Rosarina.*
Firth, P. S., *Idaho.*
Fitton, F., *Georgian.*
Fitzgerald, J. M., *Potomac.*
Fletcher, L., *Carmania.*
Ford, H., unattached.
Foster, R. T., *Tagus.*
Fowler, W., London School.
Fox, L. C., *Paparoa.*
Fox, W., *Knight Companion.*
Foyle, H. J., *Kentucky.*
Fraser, R., *Caledonia* (anchor).
Freeman, H. T. E., *Pardo.*
Fry, F. A., *Hubert.*
Gadd, W. C., *Mashobra.*
Gale, B., *Teutonic.*
Gale, W., *Asturias.*
Gallagher, H. J., *Omrah.*
Garbutt, H. W., *Kia Ora.*
Gardner, F. T., sick leave.
Gardner, R. S., *Numidian.*
Garwood, F. W., *Akabo.*
Gascoign, R. A., *Oriental.*
Gibb, J., *Wayfarer.*
Gibson, A., *Orita.*
Giles, A. D., *Peru.*
Giles, R. W., *Changuinola.*
Gill, C. J. A., *Merion.*
Gillam, A. C., *Carpathia.*
Gillett, B. A., *Caribbean.*
Golding, J. H., *Guildford Castle.*
Goodsell, W. B., *San Valerio.*
Gornall, J., *Karina.*
Graham, T., *Winifredian.*
Graves, D., *Vandyck.*
Graves, W. P., *Hypatia.*
Gray, F., *Uranium.*
Gray, J. H., *Caronia.*
Gray, W. F., *Mongolia.*
Green, E. H., *Campanello.*
Greene, A. L., *Highland Pride.*
Greenstreet, P., *Whakarua.*
Gregory, R. V., *Potaro.*
Gregson, A. J., *Normannia.*
Gregson, E. A., *Numidian.*
Greig, A. F., *Campanello.*
Gresham-Barber, K., unattached.
Griffith, J. T. R., *Munster.*
Griffiths, A., *Vauban.*
Grover, A. F., *S.Y. Lysistrata.*
Groves, W. G., *Zealandic.*
Gullen, F., *Mechanician.*
Haddock, R. B., *Kenilworth Castle.*
Hagon, W. R., *Manzanares.*
Hague, W. J., *Durndee.*
Haining, A. J., *Kildonan Castle*
Halcrow, A., *San Jeronimo.*
Hall, H., *Caraquet.*
Halsall, T. H., *Hesperian.*
Hamlet, M. B. W., *Peru.*
Hancock, L. A., *Devanha.*
Hanson, A. E., *Poleric.*
Harding, R., sick leave.
Hardy, C. L., *Bovic.*
Hardy, H. E., *S.Y. Doris.*
Hardy, R. S., *Laurentic.*
Harford, R., *Minneapolis.*
Harlow, E., *St. George.*
Harris, A. J., *Lake Michigan*
Harrop, T., *Danube.*

Hart, H. P. J., *Nyanza.*
Hartigan, M. J., *Sardinian.*
Harvey, D., *Cassandra.*
Hatfield, A. H., *Tunisian.*
Hathaway, A. D., *Rimutaka.*
Hawes, H., *Hydaspes.*
Hawkes, G. E., *Letitia.*
Heath, W. H., *Garth Castle.*
Henderson, W. C., *Jose de Larrinaga.*
Hendry, A. O. R., *City of Naples.*
Henry, R. J., *Nicoya.*
Herbert, C. W., *Medic.*
Herbert, T., *Sicilian.*
Herd, H., *Corsican.*
Hewitt, S., *Milwaukee.*
Hickling, W., *Berbice.*
Hicks, W. J., *El Torro.*
Hill, A. E., *Otranto.*
Hill, A. G., *Inverlay.*
Hill, E. G. unattached.
Hill, G. R., *Vauban.*
Hill, V. J., *Anglian.*
Hilton, F., unattached.
Hindle, T., *Victorian* (Leyland).
Hitchner, J. W., *Barpeta.*
Hoare, H. R., *Corinthic.*
Hobbs, P. R., *Abosso.*
Hodge, T. H., *Chilka.*
Hodgson, W. H., *Chinkoa.*
Holden, H., *Kandahar.*
Holden, T. F., *City of Karachi.*
Holker, N., *Saldanha.*
Holland, E. J., *Barjora.*
Holliday, P., *Demerara.*
Holman, C. G., *Colonian.*
Holmes, T. B., *Historian.*
Hood, J. A., *Ultonia.*
Hooley, T. E., *Star of India.*
Hooper, P. H., *Galeka.*
Hoppe, R. G., *San Zeferino.*
Horne, T., *Snaefell.*
Horwood, H. J., *Alaunia.*
Hosking, L. G., *Palermo.*
Howard, R., sick leave.
Howard, J. Q., *City of Birmingham.*
Howard, W., *Hermione.*
Howlett, W. J., *Manitou.*
Huggins, W. T., *Neuralia.*
Hughes, C. L., *Highland Harris.*
Hughes, C. K., unattached.
Hughes, L. E., *Olympic.*
Hughes, W. J., unattached.
Hugo, V. S., unattached.
Humphreys, E. H., *Wilcannia.*
Hunt, F. G., *Drumcliffe.*
Hunt, G., *Victoria.*
Hunt, H. P., *Ballarat.*
Hunter, A. E., *Galeka.*
Hutchinson, W. E., *Highland Corrie.*
Inder, W. W., *Cymric.*
Ingle, G. W., *Indus.*
Ings, W. A., *Star of Australia.*
Iredale, J. J., *Canada.*
Isherwood, T. P., *Afric.*
Jacobs, A. G., *Ascanius.*
James, F., *City of Poona.*
James, R. C., *Kasenga.*
James, R. H., *Royston Grange.*
Jamison, A. F., *Oronsa.*
Jefferies, F., *California* (Anchor).
Jeffries, A. H., *Leinster.*
John, W. L., *Syria.*
Johnson, F., *Denis.*
Johnson, W. A., *San Fraterno.*
Johnston, M., *Kasama.*
Jolly, E. E., *Briton.*
Jones, A. E., *India.*
Jones, A. V. G., *El Argentino.*
Jones, C. E., *Engineer.*
Jones, C. F., *Quillota.*
Jones, H., *La Blanca.*
Jones, J. P., *Calgarian.*
Jones, O., *Osterley.*
Jones, R., *Calabria.*
Jones, Richard, *El Uruguayo.*
Jones, T. G., *Canopic.*
Jones, W. A., *Canada.*
Julius, A., *Æneas.*
Kean, O. P., *Hawkes Bay.*
Keen, F. L., *Saxonia.*
Kenworthy, H. D., *Goorkha.*
Kelly, J. A., *Carthaginian.*
Kelly, K. C., *Sicilia.*
Kett, H. S., *Philadelphian.*
Kinder, F. V., *West-Meath.*
King, B., *Colorado.*
King, R. R., *British Sun.*
King, V. M., *Araguaya.*
Kingsbury, A., *Makarini.*
Kingsford, J. R., *S.Y. Sapphire.*
Knapman, W. H., *Simla.*
Knox, T., *Ulysses.*
Kull, G. R., *Llandovery Castle.*
Lacock, F. J., *Scandinavian.*
Lambert, E., *South Point.*
Lambert, G. H., *Circassia.*
Lambert, L. J., *Mendi.*
Langham, A. E., *Charles E. Harwood.*
Langley, A., *Goorkha.*
Law, C., *Shenandoah.*
Law, S., *Pannonia.*
Lawson, A. L., *Araguaya.*
Lawton, A. H., *Flamenco.*
Lea, R. H., *Highland Enterprise.*
Learman, E. E., *Anglian.*
Leche, W. J., *Quernmore.*
Ledward, T. A., *Aguila.*
Lee, G., *Musician.*
Lee, R. A. C., *S.Y. Cassandra.*
Lee, W., *Mexico.*
Leech, H. S., *Cymric.*
Leeds, K. F. N., *Ellenga.*
Lees, E. A., *Huayna.*
Lees, J. H. D., *Nagoya.*
Lefebure, H. H. R. A. C., *Baron Napier.*
Leighton, L. H., *Narragansett.*
Leith, R., *Lusitania.*
Leith, S. A., sick leave.
Lemon, S., *Campania.*
Lever, G. H., *Marquette.*
Lewington, W. H., unattached.
Lewis, W. T., *Laconia.*
Lewis, S. P., *Buffalo.*
Lewis, S. W., *Deena.*
Lightfoot, H. J., *Darro.*
Lillis, W., unattached.
Lindsay, M. J., *Minneapolis.*
Lines, W. T., unattached.
Linnell, F. J., *Rotorua.*
Lister, C., *Caribbean.*
Litchfield, C. P., *Den of Ruthven.*
Lithgow, W. H., *City of Colombo.*
Little, H. T., *Exmouth II.*
Lock, H. G. W., *Durham Castle.*
Longton, C. E., *Letitia.*
Lovelock, J. D., *Delaware.*
Lovett, F. J., *Melford Hall.*
Lovibond, R. A., *Parana.*
Lucey, J., *Candia.*
Lund, A. C., *Braemar Castle.*
Lush, J. K., *Nestor.*
Lynch, G., *Ghazee.*
Lyons, J., *Oronsa.*
Macdonald, J., *Marina.*
Machan, J. W., *City of Corinth.*
Mackenzie, C. F., *Itapuhy.*
Mackintosh, J., *Atahualpa.*
Macleod, S. E. S., unattached.
MacNab, J. A., Liverpool Depot.
Macrae, C., *Cedric.*
Macrae, K., *Balmoral Castle.*
Madgwick, G., *Isis.*
Makin, A. E., *Monmouthshire.*
Maltby, P. B., *City of Bristol*
Mangan, D. D., *Chirripo.*
Mares, A. H., *Castalia.*
Marriott, J. E., *Dunluce Castle.*
Marsh, J. E., *Welshman.*
Marshall, W. T., *Scandinavian.*
Martin, P. B., *Olympia.*
Martin, S. F., *Melania.*
Martlieu, J. E., *Oceanic.*
Massey, C. T., *Mesaba.*
Massey, W., *Dakar.*
Masters, C. K. E., *Highland Laddie.*
Mather, J., *Andania.*
Matthews, E. M., *Niceto de Larrinaga.*
Matthews, W. C., *Eskimo.*
Mattinson, E. V., *Cassis.*
Mattock, P., unattached.
Maudsley, C. V., *Caronia.*
Maurice, J., *Den of Airlie.*
Mauro, O. G., *Junin.*
May, A. H., *Manitou.*
May, P. B., *Armadale Castle.*
Maycock, T. C. C., *Star of Scotland*
Mayer, E. D., *Edinburgh Castle.*
McCarthy, C. F., *Poleric.*
McCarthy, C. J., *Nile.*
McCarthy, C. M., *Pomeranian.*
McCormack, M., *Drina.*
McCormick, D. C., *Sandon Hall.*
McCreath, R. V., *Drumlanrig.*
McCrohan, T., *Inca.*
McCu' cheon, W. J., *Reventazon.*
McEn ry, T. C., *Aysen.*
McGhee, W. J., *Calgarian.*
McKenna, J. M., *Crofton Hall.*
McLachlan, D., *Genesee.*
McLennan, R. F., London School
McMillan, J., *Hesperides.*
Melling, H., *Denbigh Hall.*
Meredith, M. W., *Italia.*
Middleton, P. G., *Hilary.*
Miles, J. L., sick leave.
Miles, L. J., *Victorian* (Allan).
Miller, D., *Balantia.*
Miller, W., *Persic.*
Miller, W., *Start Point.*
Mills, L. C., *Star of Ireland.*
Mitchell, A. J. H., *Galway Castle*
Mitchell, F., *Khyber.*
Mitchell, P. M., *Grantully Castle.*
Mitchell, S. W., *Appalachee.*
Mole, H., *Custodian.*
Monsey, M., *Scotian.*
Montgomrie, J., *Pretorian.*
Montgomery, B. H., *Chaleur.*
Moodie, T., *City of Lahore.*
Moody, J., *Balmoral Castle.*
Moon, A. T., *Angora.*
Moore, J. J., *Quernmore.*
Moores, J. H., *Ekma*
Morgans, R. H., *Lackawanna.*
Moriarty, D. J., *Matoppo*
Morris, C. E., *Kalomo.*
Morris, P., *Deseado.*
Morris, T. P., *C. A. Canfield.*
Morrison, L. D. G., *Barala.*
Morrison, J. D., *Saturnia.*
Morse, W. S., *Vandyck.*
Moss, C. O., *Antony*
Mountain, R. H., unattached.
Mowe, F. H., *S.Y. Valiant.*
Mulhall, J. P., *Caraquet.*
Munroe, H., *Saturnia.*
Murch, R. W. B., *Berwindvale.*
Murphy, D., *Whakatane.*
Murphy, E., *Pannonia.*
Murphy, H. P., *Ortega.*
Murphy, J., *Mantaro.*
Murphy, W. F., *Californian.*
Murray, T. W., *Ardeola.*
Muschamp, T., *Briton.*
Myron, G., *Tritonia.*
Nailer, E. I. F., *Borderer.*
Nash, R. H., *Herefordshire.*
Naylor, A. T., *Gascon.*
Needs, W. A., *Nellore.*
Nelson, G. H., *Winifredian.*
Nethercoate, J. K., *Bayano.*
Newby, F. W., *Parana.*
Newman, W., *Highland Watch.*
Newns, L. S., *Cunning.*
Nicholas, W. G., *Columbia.*
Nicholls, G. J. G., *Huntsman.*
Nicholson, A., *Erinpura.*
Nicholson, J., *Colonian.*
Nightingale, F., *Bandra.*
Nixon, C. S. C., *Devon.*
Noble, H., *Palma.*
Nolan, J. J., *San Hilario.*
Norwood, P. R., *Warwickshire.*
Nowlan, C. F., *Moto.*
Obey, W. C., *Runic.*
O'Brien, G. W., *Marere.*
O'Carroll, M. E., *Cassandra.*
O'Connor, A. W., *Highland Warrior.*
O'Connor, J., *Iroquois.*
O'Connor, P., *Principello.*
O'Connor, P. J., *Ionian.*
O'Connor, T., *Montfort.*

O'Donnell, T. J. *Laurentic.*
O'Halloran, T., *Otaki.*
O'Keeffe, P., *Vedamore.*
Oliver, C. A., *Malofa.*
Oliver, H., *Arcadia.*
O'Riordan, T., *Marengo.*
Osborne, A. J., *Tunisian.*
Osborne, A. E., *Sutherland Grange.*
Osborne, J. Edward, sick leave.
Osborne, J. Edwin, *Cluny Castle.*
Osborne, R. F., *Trent.*
O'Sullivan, C. F., *Turcoman.*
O'Sullivan, D., *Mount Temple.*
O'Sullivan, J. P., unattached.
Overall, E., *Marquette.*
Owen, A. W., unattached.
Owen, L. L., *El Toro.*
Owen, R. M., *Carpentaria.*
Owen, W., *Aaro.*
Owlett, R. A. J., *Ivernia.*
Packer, R. H., *S.Y. Iolanda.*
Pales, F. A., *Ascania.*
Palmer, H. M., *Pakeha.*
Pannett, W. E., *Menominee.*
Parker, C. T., *Dover Castle.*
Parker, E. P., *Nevasa.*
Parkinson, W., *Kathlamba.*
Patrick, R. V., *Kildonan Castle.*
Payne, J. H., *Peshawur.*
Payne, T. A., *Arcadian.*
Pavitt, H. J., *Ausonia.*
Pearson, D. E., on leave.
Peever, F., *Tropic.*
Penketh, G., *Cardiganshire.*
Pennington, C. J., *Star of Victoria.*
Penrose, H. E., *Minnehaha.*
Pepper, W. H., *Llanstephen Castle.*
Perfect, A. E., *Inanda.*
Perkins, C. W., *Leicestershire.*
Perkins, H. J., leave
Perlman, A., *Bloemfontein.*
Peterson, T. G., *Marere*
Pettingill, W., *Orsova.*
Phelan, N. J., *Orita.*
Pink, Alfred, *City of York.*
Pitchford, G. R. J. W., *Lanfranc.*
Pitkeathly, W., *Garth Castle.*
Planterose, E. A., *Arabia.*
Pollard, F. G., *Arlanza.*
Ponsford, W. H., *Lancastrian.*
Pope, H. W., *Crown Point.*
Porter, H. R., *Armenian.*
Pott, G. M., *Grampian.*
Potts, A. S., Callao Depot.
Potts, J. W., *Naneric.*
Power, W., *Sagamore.*
Preece, E., *Surat.*
Preston, M. A., *California* (P.S.N.).
Proughton, A. J., *Tonawanda.*
Quinlan, J. F., *Orcoma.*
Railton, N., *Marere.*
Ralphs, P. L., *San Isidoro.*
Rapsey, C., *Patia.*
Ratcliffe, L. G., *City of Calcutta.*
Ratcliffe, T. C., *Avon.*
Rattee, S. G., *Lusitania.*
Raw, W., unattached.
Rawsthorne, W., *Pacuare.*
Rea, J., *Aracataca.*
Read, C. A., *Sachem.*
Reid, H. S., *Highland Loch.*
Reid, S., *Haverford.*
Reid, W. H. W. *Benalla.*
Reidy, M., *Etonian.*
Renshaw, P. J., *Ultonia.*
Renshaw, R. W., unattached.
Renwick, W. D. R., *Highland Heather.*
Revell, J. L., *Dunluce Castle.*
Reynolds, A. J., *Galileo.*
Reynolds, F. W. J., *Carnarvonshire.*
Rhodes, T., unattached.
Ricol, R. E., *Tainui.*
Rice, H. W., *Carmania.*
Rice, P. F., *Indrabarrah.*
Ridley, J. M., Liverpool Depot.
Rivett, F. W., *City of Edinburgh.*
Robb, T., *Toronto.*
Roberts, C. O., *Oropesa.*
Roberts, D., *City of Benares.*
Roberts, G., *Virginian.*
Roberts, M., *North Point.*
Robertson, C., *Remuera.*
Robertson, D., *Cardiganshire.*
Robertson, J. K., *Cheyenne.*
Robinson, F. V., *Highland Piper.*
Robinson, L., *Glenetive.*
Robinson, S., *Suverie.*
Robson, E. W., *Cameronia.*
Rookes, C. E., *Turcoman.*
Rosney, P. J., *City of Dunkirk.*
Ross, W. M., *Hesperian.*
Rowdon, W. A., *Aidan.*
Rowlands, H., *Manistee.*
Rowlatt, F. W., Liverpool Depôt.
Rudderham, S. W., Southampton Depot.
Rundle, E. H., on leave.
Rushforth, A., *Potosi.*
Rushworth, F. B., *Sicilian.*
Rushton, F., *Carpathia.*
Russ, E., *Cretic.*
Ryan, J., *Agadir.*
Ryan, L., *Mongolian.*
Ryan, V. A., *Manhattan*
Ryan, W. C., *Montreal.*
Salmon, J. B., *Highland Glen.*
Salmon, J. L., *Empress of Russia.*
Salter, T. H., *Asian.*
Salway, R. L., unattached.
Sanders, C. T., *Arcadian.*
Sanderson, L. T. N., *Star of England.*
Sandison, J. L., *Baltic.*
Sandham, T. D., *City of Lincoln.*
Sandford, J., *Merion.*
Sandon, E., unattached.
Sang, H. K., *Athenia.*
Sarll, S. R., *Circassia.*
Sayer, H. T., *Great City.*
Scales, C. W., *Atlantian.*
Schanch, H. S., *Crofton Hall.*
Schofield, A., *Guatemala.*
Scott, M., *Knight Bachelor.*
Scott, R. C., *Esmeraldas.*
Scully, E., *Navahoe.*
Searl, C., *Empress of Asia.*
Sedding, N., *Elmina.*
Seddon, W., sick leave.
Seeney, H. W., *Berbice.*
Sellars, G. H., *Caledonia* (P. & O.).
Sequeira, H. C., *Turakina.*
Sharp, E. W., *Thongwa.*
Sharpe, C. H., *Ascania.*
Sharpe, F., *West Point.*
Sharpe, W. H., *Egypt.*
Sharples, E., *Katuna.*
Shatwell, E., *Dover Castle.*
Shaw, A. H. H., *Armenian.*
Shore, R. M., *Mamari.*
Shrimpton, E. T., *Kaipara.*
Silvester, W. H., (Hull trawler), *Columbian.*
Simmons, E. A., *Guildford Castle.*
Simmons, H. F., *Pachitea.*
Simmons, J. M., *Victoria.*
Simpson, J. C., *Galician.*
Simpson, T. A., Callao Depot
Simms, W. R., *Saxon.*
Sinclair, D. H., *Herbert G. Wylie.*
Single, G., *Darro.*
Skinner, J. S., *Andes.*
Slater, F., *Iberian.*
Sloggett, S. D., unattached.
Smith, A. C., *Antillian.*
Smith, A. F., *Intaba.*
Smith, D. A., *Highland Heather.*
Smith, F. J., *Oriana.*
Smith, F. J. D., *Drumcliffe.*
Smith, H. F., sick leave.
Smith, H. S., *Novara.*
Smith, L. J. G., *Arlanza.*
Smith, P. S., *Celtic.*
Smith, S., Liverpool Depôt.
Smith, W., *Salmo.*
Smith, W. H., *Inkosi.*
Smythe, G. W., *Malda.*
Snow, H. C., *Cretic.*
Snow, W. E., *Hyacinthus.*
Snowden, H., *Kingstonian*
Soans, R. T., *Ionian.*
Soar, R. A., sick leave.
Solway, H. E., *Stephano.*
Sotheran, A. W., *Banca.*
Southam, R. W., *Otway.*
Spence, R. S., *Devonian.*
Spicer, S. W., *German.*
Spiers, J., *San Ricardo.*
Sproat, H., *Mexico.*
Sproat, D. M., *City of Marseilles.*
Spurgeon, W. P., *Geelong.*
Standen, T. F., unattached.
Stanley, H. J., *Nore.*
Stannard, C. E., *City of Norwich.*
Stansbridge, S., *Adriatic.*
Stansfeld, D. R., *Miltiades.*
Starkey, J., *Kinfauns Castle.*
Stephen, A. K., *Gascon.*
Stephenson, J. A., *Highland Hope.*
Stevenson, A., *Gaika.*
Stevenson, P., *Niwaru.*
Stevenson, J. L., *Indrapura.*
Stewart, E. H., *Adriatic.*
Stewart, L. C., *Virginian.*
Stewart, W. M., *Caledonia.*
Stickland, A. G., *Muritai.*
St. John, H. W., *Minnewaska.*
Stocker, A., Canadian Cruiser *Margaret.*
Stockton, S. A., *Braemar Castle.*
Stone, J. B., *Olympic.*
Strong, R., *Walton Hall.*
Stubbs, T. H., on leave.
Studholme, J. J., *Patrician.*
Sturdy, H., *Quilpue.*
Styles, A. C., *Ionic.*
Summerlin, S. C., *S.Y. Alberta.*
Summers, E. B., *Calabria.*
Sutherland, D., Glasgow Depôt.
Sutherland, W. G., unattached.
Sweetnam, R., *Delta.*
Syme, W. A., *Orvieto.*
Tamplin, L. H., *Danube.*
Tayler, G.R. W., *Kumeric.*
Taylor, A., *Tortoguero.*
Taylor, A., *Chignecto.*
Taylor, A. W., *Monmouth.*
Taylor, H. W., *San Lorenzo.*
Taylor, R. F., *Seal.*
Taylor, W., *Osiris.*
Taylor, Wilfred, *Etonian.*
Taylor, W. G., *German.*
Teahon, S., *Pretorian.*
Terranneau, E. G., *Nerehana.*
Thomas, G., *Cambrian.*
Thomas, G. H., *Edward L. Doheny.*
Thomas, H., *Itatinga.*
Thomas, W., unattached.
Thomas, W. H., *El Paraguayo.*
Thomasson, F., *Franconia.*
Thomasson, H., *Orotava.*
Thompson, A., *Cevic.*
Thompson, A. T., sick leave.
Thompson, W. J., *Nankin.*
Thomson, F. A., *Highland Scot.*
Thomson, G., *Salsette.*
Thomson, J., *Highland Watch.*
Thomson, J. R., *Georgic.*
Thomson, R., *Cameronia.*
Threlkeld, T. G., *Worcestershire.*
Tilford, G. L., *California.*
Timperley, J. H., *Kelvinia.*
Tunbridge, A. O., *Carthaginian.*
Turner, G. E., *Gloucester Castle.*
Turner, J., *Salamis.*
Tyler, G. R., *Sagamore*
Tyler, W. E., *Sorata.*
Underwood, H. G., *Karonga.*
Utting, R. T., *Tongariro.*
Veale, R. J., *Dominion.*
Vincent, J., *Malta.*
Vincent, J. R., *Beltana.*
Wainwright, A. C. L., *Baron Erskine.*
Wakeling, G. P., *Elysia.*
Walker, H. P., Callao Depôt.
Walker, R. S., *Kingstonian.*
Walker, S. R., East Point.
Walker, T. R., *Anchises.*
Wall, D. G., *Kenilworth Castle.*
Wallace, W. W., *Roerric.*
Wallworth, W. A., *Cedric.*
Walsh, L., *Bayano.*
Walsh, S. P., *Scotian.*
Ward, A., *Highland Harris.*
Ward, H., *Galway Castle.*

Ward, J. N., *Ceramic.*
Ware, W. R., *Montezuma.*
Warner, E. L., *Falaba.*
Warner, N. S., *San Antonio.*
Warren, H. G., *Keelung.*
Wasley, J. G., *Eagle Point.*
Waters, F. H., *Englishman.*
Waterworth, A., *Principello.*
Watkins, L., *Lake Manitoba.*
Watkinson, E. A., *Kenilworth Castle.*
Watson, G. H., *Athenia.*
Watts, B. O., *Aragon.*
Webb, C. B. N., *Agadir.*
Webb, R. A., Callao Depôt.
Weller, C. A., *Ruahine.*
Weller, E. S., *City of Delhi.*
Wellington, C., *Antillian.*
Weselby, A., *Kabinga.*
Wheeler, N. B. W. M., *Saxon.*
Whitaker, C. H., *Minnetonka.*
White, A. G., *Kioto.*
White, V., *Den of Ogil.*
Whittaker, H. A., *City of Madras.*
Whittred, H., *Chaudiere.*
Wickers, H. M., *Itacuera.*
Wignall, R. M., *Oroona.*
Wilcocks, A. E., *Perugia.*
Wilkins, A., *Hildebrand.*
Wilkins, J., *Celtic.*
Wilkings, D. A., *Rappahannock.*
Wilkinson, E., *Amazon.*
Wilkinson, J., *Atlantian.*
Willett, F. W., *Kayembe.*
Williams, A. C., *Orontes.*
Williams, F. A., *Cestrian.*
Williams, D. F., *Tagus.*
Williams, G. V., *Digby.*
Williams, J., *Kansas.*
Williams, J. R. T., *Tokomaru.*
Williams, J. T., *Miami.*
Williams, J. T., *Clement.*
Williams, T. D., *Milwaukee.*
Wills, H. C., *Malwa.*
Wilson, H. O., *Limari.*
Wilson, N. J., *Pomeranian.*
Wingrave, D. W., *Balantia*
Winser, F., *Egra.*
Wood, C. B., *Imperial.*
Wood, C. E., *C.S. Restorer.*
Wood, D., *Ashtabula.*
Wood, T. A., *Oslo.*
Woodhouse, W. A., *Norseman.*
Woods, F., *Swanmore*
Woods, L. J., *Guatemala.*
Woodward, J. E., *Comanchee*
Woollam, M. W., *Manchester City.*
Woolley, L., *Kinfauns Castle.*
Woolway, C. J., *Statesman.*
Wright, E., *Brodstone.*
Wright, F. M., *Menominee.*
Wright, G. J., *Llandovery Castle.*
Wright, T. G., *Edavana.*
Wroughton, E. M. N., *Marathon.*
Wyard, L., *Quilpue.*
Wyatt, F. C., *Kenuta.*
Wyatt, R. C., *Borneo.*
Wyett, A. W., *Mooltan.*
Yelding, A. T., *Kafue.*
Yelland, W. P., *Sunda.*
Yorston, J. F., *Elmina.*
Young, F. E., *Empress of Russia.*
Young, J., *Galicia.*

The following have been appointed to the staff of the English Marconi Company during the past month :—

Alton, H. F., May 8th.
Berry, C., April 16th.
Bessell, B. W., May 6th.
Bone, D. W., May 5th.
Carroll, J., April 15th.
Dawson, W., April 30th.
Drohan, J., April 15th.
Freeman, H. T. E., May 11th.
Gillam, A. C., April 16th.
Harvey, D., April 30th.
Heath, W. H., May 8th.
Haddock. R. B., May 13th.
Hood, J. A., April 16th.
Ings, W. A., May 5th.
Kelly, J. A., April 30th.
Kenworthy, H. D., April 9th.
Kull, G. R., May 11th.
Mitchell, A. J. H., April 20th.
Macnab, J. A., April 16th.
McLellan, R. F., May 13th.
Montgomerie, J., April 30th.
Owlett, R. A.C., April 16th.
Pales, F. A., May 4th.
Pavitt, H. J., April 20th.
Reidy, M., May 8th.
Rudderham, S. W., May 11th.
Ryan, L., April 25th.
Simmons, E. A., April 17th.
Stockton, S. A., May 13th.

The following have resigned from the staff of the English Marconi Company during the past month :—

Allen, G. A., April 4th.
Dawson, R., April 25th.
Ellis, R. O., May 14th.
Emanuel, R., May 7th.
Garrett, E. W., April 29th.
Kelly, C., May 14th.
Ledger, F. H., May 2nd.
McCormack, G. N., May 2nd.
Munday, R. A., April 29th.
Redgate H. J., May 9th.
Roden, C., May 11th.
Rodway, J. C., April 29th.
Waddoup, J. B., April 30th.

The following operators have been engaged, and are assigned temporarily at Marcon House :—

Boot, E. G.
Charlton, W.
Green, H. C.
Hills, G.
Hurley, A. H.
Lackmaker, S.
Lanning, J. P.
Linton, S. G.
Lipscombe, A.
Macdonald, E. P.
Mallett, H. D.
Miles, F.
Mills, V. T.
Moodey, L. T.
Moore, F. H.
Parsons, S. G.
Phillips, P. C. O.
Riordan, T.
Stevenson, J. B.

Trans-Ocean Operators

(Positions May 14th).

Belcher, H. J., Clifden.
Bisping, A., London.
Brown, W., London.
Cotter, W. J., Clifden.
Digby, J. P., Clifden.
Gallivan, T., Clifden.
Gordon, C. S., London.
Gray, J. D., London.
Halliday, W. C., Carnarvon.
Hibberd, P. J., Poldhu.
Irvine, A. J., Clifden.
Moore, A., London.
Noakes, F. W., London.
Norris, C. H., Clifden.
Pain, C. W., Clifden.
Pettyfer, P. H., Clifden.
Pink, A., Clifden.
Reeves, G., London.
Rogers, J., Clifden.
Skeet, F., Clifden.
Smedley, B. B., Clifden.
Smith, J., London.
Smith, S., London.
Stickles, T., London.
Treacy, P. J., Poldhu.
Webb, T., Clifden.

Marconi House Notes.

Music.

There is a stir in the Marconi athletic circles; the advent of summer is largely accountable for this. Cricket bags and tennis rackets are once more to the fore, and every night at the Acton ground many of the members in their cool white flannels are to be seen practising. But before dealing with the events of the summer season, we must first mention the concluding event of the winter, that was the last concert given by the Musical Society, on May 2nd. It was unanimously voted the best of the series, and those who took part in the evening's entertainment deserve warm congratulations.

Cricket.

In the Athletic Section, cricket now occupies the premier place, for the "leather" has been relegated to the locker to await next winter. The Challenge Cup presented by Mr. H. S. Saunders has aroused considerable enthusiasm among members of this section, and practices have been vigorously pursued, with the result that some good form has already been shown. The first matches of the season were played on Saturday, May 9th, against the Linotype Cricket Club and the Oyez Cricket Club. The former were successfully overcome by the first eleven after a very close game, when the principal honours fell to Mr. S. B. Balcombe for bowling and Mr. A. J. Clarke for batting. The second eleven were unfortunate, especially as they showed much keenness, and were by no means wanting in form.

Tennis.

In the Tennis Section chief interest centres round the competition for the Inter-Departmental Tennis Shield. The play between the London departments has been drawn up in the following order:

Betulander *v.* Field Station.
Manager's and Secretary's Staff *v.* Accountants.
Traffic *v.* Publicity.
Engineers, a bye.

Swimming.

In the Swimming Section, although the season is but a fortnight old, the outlook is very hopeful. The enthusiasm and keenness shown by all members in their practises augur well for the future. The fixtures for the coming month are of particular interest and should draw together not only the foremost swimmers, but a good assembly of Marconi supporters. These are: May 21st, relay race against Shaw Savill; May 28th, relay race against Union Castle; June 4th, 1 length club race; June 9th, relay race against Royal Mail; June 18th, 2 lengths club race; June 24th, return relay race against Union Castle.

For the Club Races the entries are sure to be numerous, but there must necessarily be an element of uncertainty with regard to races with outside competitors. Nevertheless, although the club possesses few fast swimmers, yet it possesses a number of well trained men with plenty of go and spirit, and with their help the club stands a very fair chance of pulling off the events.

Philately.

The Philatelic Society has just completed the first year of its existence. Although the number of its members is comparatively small, yet the lack of quantity is made up by the quality, for all are extremely enthusiastic, while many are first class authorities in one or other of the various branches of philately. The result is that much interesting information, as well as many rare bargains in the way of exchange, can be picked up at these meetings. They are to be held on the first Monday of every month during the summer.

Art Exhibition.

Arrangements with regard to the Exhibition, which is to be held some time in June or July, are still proceeding, and the response to the appeal for exhibitors has been most gratifying. At the same time the organisers are anxious that the exhibition shall be as representative as possible, and as this may be the last opportunity to make any announcement, all who are interested in painting, sketching, and photography are asked to take especial notice, and if they care to take part in the exhibition to send any exhibit together with their names as soon as possible to Bernard C. White. A Committee who will deal with the hanging of the exhibits and the general management of the exhibition is in process of formation.

Obituary.

Mr. John Reeve, who was employed as a genera handyman at the Marconi Works, Chelmsford, died recently as the result of a distressing accident. He was walking along the High Street, Chelmsford, when he was knocked down by a frightened horse, and died shortly after his admission to the hospital.