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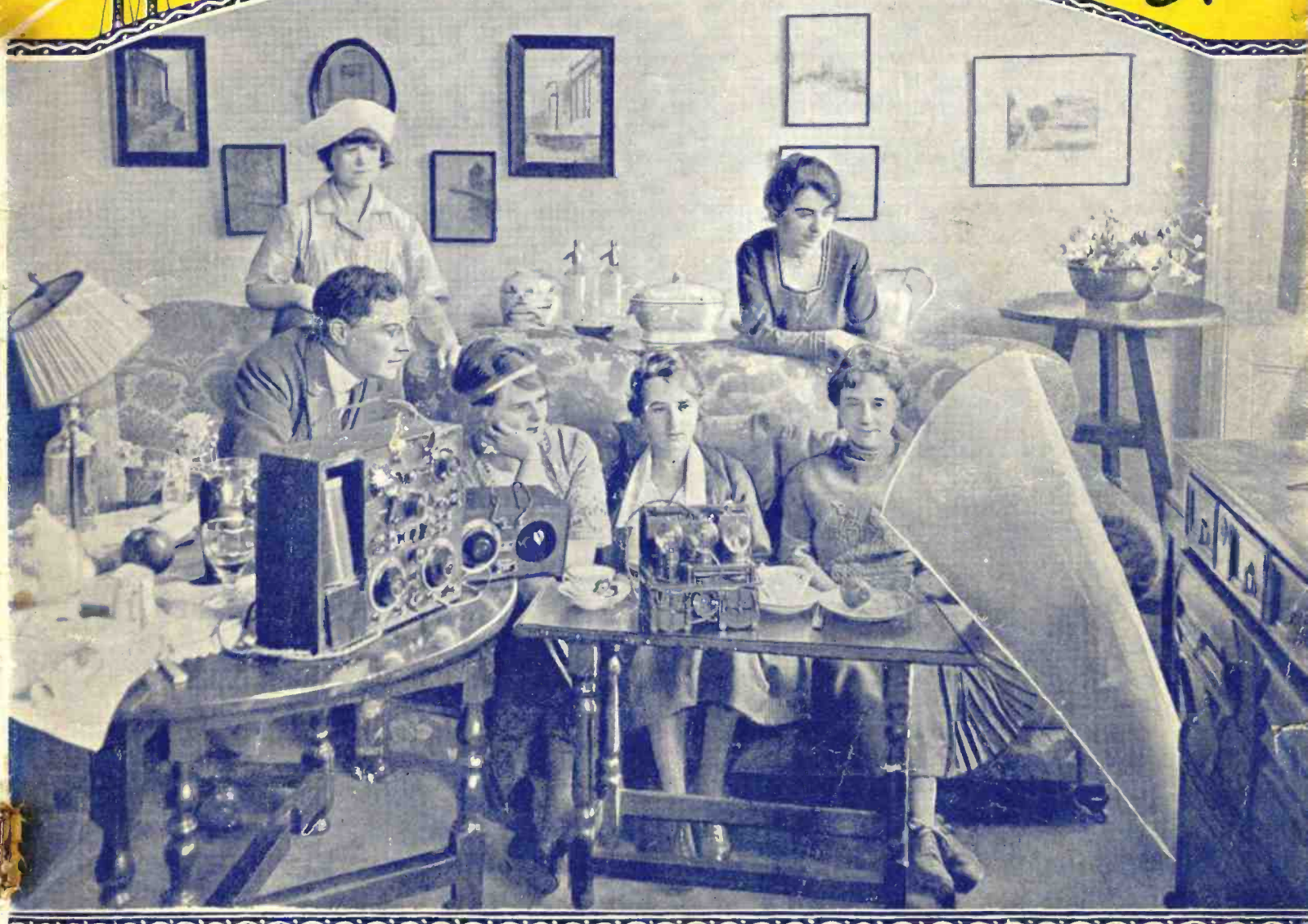

THE WORLD'S LATEST HOBBY FULLY EXPLAINED

PUBLISHED EVERY FRIDAY

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PACKED WITH PICTURES AND EXPERT ADVICE

Popular Wireless

TOPICAL NEWS AND NOTES.

Belgium and Radio.

BEFORE the war Belgium's merchant service had about ten ships fitted with wireless; she now possesses more than 120, which is a very big improvement. The wireless units are under the control of the Administration des Télégraphes.

* * *

Central Europe Wireless.

A STATION with a range of a thousand kilometres is being erected at Kbely, near Prague, to deal with the aeroplane service between Prague, Paris, and Warsaw. Two stations are to be built in Bohemia for aerial navigation purposes also.

* * *

Broadcasting Schemes.

THE Postmaster-General's scheme for wireless broadcasting by private enterprise has been considered by the Federation of British Industries, who suggest that only British-made apparatus should be used for receiving sets.

* * *

Help!

"PUNCH" recently published a very funny "wireless" cartoon. An aeroplane, tearing along in a cloud of smoke and flame and heading for certain destruction, brought forth the remark from a yokel that "There's another of them wireless messages caught fire!"

* * *

Amateur Concerts.

RADIO amateurs in the district of Broadstairs should note that Mr. H. Pound, a wireless amateur, transmits gramophone music and speech practically every evening at 9.30 on a wave-length of 440 metres. Mr. Pound's radio set has a transmitting radius of about nineteen miles. Good telephony has been received at Canterbury.

* * *

Pill Box Wireless.

MR. T. F. RENDALL, a young electrical engineer, of Sunderland, has constructed a wireless receiving set in a pill box. He believes it to be the smallest installation in the world. It is complete in every detail and, according to the inventor, picks up clear Morse code messages from vessels passing along the north-east coast.

* * *

A Step in the Right Direction.

THE Central Telegraph Office has now established wireless services with Berlin, Cologne, Posen, Rome, and Egypt. News that is handed in at their office is broadcasted from the Post Office Wireless Station at Leafield, near Oxford, and is easily picked up in India and Australia, except on those days when atmospheric conditions are far from favourable. They have also established a regular wireless news service with Halifax in Canada.

* * *

Marconi's Voyage.

SENATORE MARCONI recently stated in New York that he had no sensational announcement to make.

He declared that his experiments during the voyage on his yacht had shown that it was possible to flash wireless messages round the world. Previously, he stated, the maximum distance had been 12,200 miles, established between England and the Antipodes.

Senatore Marconi suggested that round-the-world wireless would doubtless greatly reduce the cost of long-distance communication.

* * *

Wireless in Sweden.

IN the 1921 report of Mr. H. Kershaw, H.M. Commercial Secretary at Stockholm, on the economic, commercial, and industrial situation of Sweden, he states that serious consideration is being given to the possibilities of practical use of the wireless 'phone, and that during the summer exhibition in Lulea communication by wireless telephone was carried out between that city and Boden. Experiments were also carried out earlier in the year with the object of examining the possibilities of utilising high-frequency power cables.

* * *

Congested Telegraph Traffic.

JAPAN is a very progressive country, and when we hear that the telegraph service between Tokyo and Osaka is congested at certain hours of the day, we are not surprised, but when we learn that the business men have found a means of getting over this difficulty, then we cannot suppress our admiration.

The business men of the two cities have planned a wireless telephonic service between the two points, with Nagoya as the intermediate station. Their application has already been placed with the Department of Communications for the establishment of this wireless service by the representative of the Daido Electric Motor Power Company, one of the chief promoters of the scheme

* * *

Wireless at Colombo.

WIRELESS has spread all over the world, and where it has taken root it has started to grow larger and larger by continual improvements.

The Government of Ceylon are now considering the report of a naval officer on the question of the Colombo Wireless Station. It is very nearly certain that they will improve this station in the near future, as it will prove of great service to the mercantile community of Colombo, who have been endeavouring for some little while to get this station modernised.

General Squier the man who invented the system of "wired" wireless.

* * *

Moth Radiograms.

MOTHS and a few other insects have a remarkable way of communicating with one another, and it has been proved that a female moth can be caged in a scent and sound-proof box and yet she is able to call her mate without any great difficulty. It has been suggested that the insects use some form of radio to get in touch, and following this suggestion experiments are being carried out by some well-known scientists. Already they consider it possible for the insects to send out small radiations of low intensity.

* * *

A Chance for Red-haired Men.

WHEN a recruiting office starts to apply for red-haired men with large ears one starts to think that that office has gone quite mad. Well, that is what the United States have done. It appears that red-haired men have an added alertness, and that big ears are better for listening with than small ones. It sounds reasonable enough, and they have applied for 150 candidates whom they intend to send to the Naval Militia Radio School to test their alertness. They will also probably measure the size of their cars!

His Father's Voice, 1922.

NEWS AND NOTES

(*Continued.*)

A Reminder.

THE Editor asks me to remind readers of POPULAR WIRELESS that he will award 10s. 6d. to the owner of every amateur photograph published in this paper, and £2 2s. if the photo is used as a cover plate.

* * *

"Last Post" by Radio.

WIRELESS operators on steamships round the U.K. coast "stood by" at noon last Thursday to hear the Last Post and Reveille sounded by six bugler-boys at Marconi House on the occasion of the unveiling of a Roll of Honour, containing 348 names, 316 being those of wireless operators lost at sea.

* * *

New Paris Weather Signals.

I HEAR that in future the National Meteorological Office, Paris, will at fixed hours and twice daily send a weather forecast by wireless telephone to the French rural districts. The Communes will have a receiving station put up in the parish school or at the gendarmerie station, and they will warn the peasants of impending storms by ringing a bell. The cost of the receiving stations will only be two hundred francs (£4).

* * *

A "Wireless" Garden Party.

A WIRELESS concert at a garden party was given by Commander Sir Trevor Dawson, Bart., R.N., and Lady Dawson last Saturday.

At their country residence, Edgwarebury House, Elstree, the wireless concert was given from 5 o'clock to 5.30 through the co-operation of the Marconi Wireless Telegraph Company. The wave-length was 360 metres, and the power 1½ kilowatts.

* * *

Henry Ford's Wireless.

HENRY FORD, who has made his millions out of his cheap car, has obtained a licence to operate a broadcasting station at Dearborn, Mich. A broadcasting station is a dangerous thing to handle and requires a lot of experience, but I understand that there is little about wireless that Mr. Ford has not learned.

Let us hope that he does not fill the ether with too much information about his cars, as it is possible to have too much of a good thing.

* * *

Some Horse Power!

I READ the other day that Mars was very near the earth, but when I saw that "near" meant 42,000,000 miles I rather changed my mind. But this huge distance is only 3,000 times greater than an intelligent wireless message has been sent on this earth.

Mr. Nikola Tesla has calculated that it would take at least a hundred million horse-power to get a message across to Mars. If the difficulty can be got over soon, it will be easier to send a message in two years' time, for the Greenwich Official has calculated that Mars will be under 35,000,000 miles away in 1924.

* * *

Radio and the Alps.

ALL have heard of the work that the famous St. Bernard dogs of the Alpine monasteries have done in rescuing mountaineers. At the Vollot Observatory, on the peak of Mont Blanc, a wireless station has been erected specially equipped to resist the sudden atmospheric changes that usually put ordinary equipment out of gear. Climbing parties are now warned to equip themselves with radio apparatus before setting out on a climb, so that help can be called for from the Observatory in case of emergencies.

The Enterprising Spirit.

AT the forthcoming meeting of the British Association we shall see a novelty in scientific entertainments. Mr. Howarth, the secretary, informs us that arrangements have been made with the Air Ministry and the Meteorological Office that synoptic weather charts and forecasts shall be given.

These will be compiled from reports received hourly by wireless sent from broadcasting stations at home and throughout Europe. The whole process of receiving, decoding, and charting the messages will be clearly demonstrated by experts for the benefit of members of the Association. This spirit of enterprise is one that I like to see.

* * *

Poldhu's Successor.

ONCE a furniture warehouse, a building in Wilson Street, Finsbury Square, E.C., has just become the centre from which wireless messages to all parts of the world are sent from London.

Radio House, Finsbury Square, London, is the latest sending station of the Marconi Company, although there is not a wireless instrument in the building. From one of the many rooms operators hold communication with three European capitals—Paris, Madrid, and Berne. By automatic machines under their control they work the transmitting apparatus at the new wireless station at Ongar, in Essex, 20 miles away.

A continuous wave is sent out from Ongar, and directly the operators touch their instruments in Radio House, that wave is interrupted and transmits the message, whether it be to France, Switzerland, or Spain.

* * *

Poldhu Gives "S.K."

ALMOST famous wireless station has closed down. M P D, the call of Poldhu, will no longer be heard by ships at sea, and its place has been taken by M F T, the sign of Clifden, Marconi's Irish station, which now takes up the duty of talking to ships and telling them at midnight all the news of the preceding 24 hours.

Poldhu is perched on the rocky coast of Cornwall and was the first high-power wireless station ever built, and it was from there that the first wireless message was flashed across the Atlantic on a 2,000 metres wave-length to St. John's, Newfoundland. This happened as long ago as November 12th, 1901.

At first it seemed as if the little cluster of houses that had sprung up round the wireless station would no longer shelter human beings, but it is now rumoured that the station will be used for research work, so there is no fear that this little place that has made history will fall out of existence.

It is a sad thing to relate, but Poldhu's last message was to a little town in Spain, and now the new wireless station at Ongar, in Essex, will look after the Spanish service. Amateurs and professional operators alike will feel a pang of regret at M P D's retirement.

As one of the old brigade, the station has rendered signal service (in more than one respect), and together with F L probably shares the distinction of being the best known and best appreciated station in the world.

ARIEL.

Wireless on top of a 'bus

Broadcasting Programmes

What you can hear every evening of the week on your set.

EVERY afternoon, excepting Saturdays and Sundays, the powerful wireless station at the Eiffel Tower, Paris, transmits speech and music on a 2,600-metre wave-length.

The transmissions commence at approximately 5 p.m. (summer time) and are followed at 6 by a weather forecast in French.

Special transmissions are fairly frequent from F L (the station's call sign), and, as a rule, notice is given of these special concerts during the regular transmission period at 5 p.m.

The 2,600-metre wave-length is not very sharply tuned, and amateurs in London should have no difficulty in "picking up" the telephony using only one valve. In Scotland it will be found necessary to use four valves if a loud speaker is used.

The Marconi Concerts from Writtle may be heard every Tuesday evening. The concerts commence at 8 o'clock (summer time) on a wave-length of 400 metres. The call sign is 2 M T.

The power used at Writtle is only ½ kilowatt; but using valve amplifiers, good speech and music have been heard in Scotland.

The Hague Concerts, sent out every Sunday from 2.30 to 5 p.m., are great favourites with amateurs in this country. The station's call sign is P C G G, and the wave-length employed 1,070 metres. The second part of the programme is sent in English for the benefit of amateurs in Great Britain.

Apart from the regular transmissions stated above, the amateur may hear telephony from the Croydon Station (call sign G E D) at various times throughout the day on a wave-length of 900 metres. This latter station communicates with aeroplanes on the Continental air routes. About 400 amateurs now hold transmitting licences in this country, according to the latest information, and they may be heard working at various times during the day and evening.

Aviation & Wireless

By MICHAEL EGAN, Late Instructor of W/T, R.A.F.

WE are only beginning to awake to the possibilities of wireless. This is proved by the fact that there are still many people who are unaware of the actual achievements of wireless in solving some of the most important problems of modern life.

The history of the development of aircraft forms in itself a story of thrilling adventure. And when that story becomes the setting for a record of the numerous deeds of noble endeavour that led to the successful application of wireless telegraphy and telephony to the needs of aircraft, we are confronted by such a tale of heroism and romance as is unparalleled in the most imaginative flights of fiction.

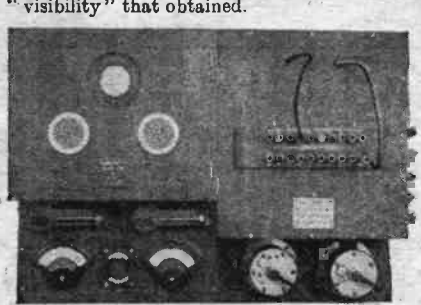
The first really serious attempts to use wireless in aircraft were made at the commencement of the late war. At first there was a good deal of opposition to it on the part of flying men. The chief argument was that it was dangerous. Wireless in those days, it must be remembered, meant "a thing that crackled and gave off sparks." And sparks and petrol tanks were by no means suitable companions to travel alongside each other on the same small craft!

Hence the early opposition to wireless. The introduction of wireless sparks into petrol-driven aircraft was regarded by many as a piece of rare imbecility on the part of a few hare-brained enthusiasts.

But time proved otherwise. Gradually it came to be realised that if wireless was dangerous, it was also very useful on occasions. So, by the end of 1915, numerous types of aircraft were carrying wireless instruments, by which they achieved very remarkable results.

This is particularly true of the smaller airships known as "Blymps," most of which carried a small transmitting and receiving apparatus. During the summer of 1916 several of these small airships were saved from destruction by wireless. I well remember my own excitement on first hearing distress signals from a sister airship on patrol.

We had both started out from a south-coast airship station to carry out a long patrol over sea. Shortly after crossing the coast we encountered fog and a heavy mist. I quickly lost sight of the sister airship as she set off on her own particular course. We kept in touch by wireless, however, and chatted to each other through miles of mist, commenting upon the "stickiness" of the weather and the poor "visibility" that obtained.



The type of transmitter used on R 38.

Suddenly the strident note of the aerodrome wireless station interrupted our gentle discourse with:

"Shut up. Get on with the job and stop jabbering," or words to that effect. I remember that we each replied meekly in turn: "Visibility bad. Nothing to report. All's well." Then silence followed for about half an hour.

Everything was so still that I began to wonder if my receiver had broken down owing to the vibration of the engine or for some other cause. Quite suddenly my fears were set at rest by the sound of our sister airship commencing to transmit. As I listened, however, the ominous significance of the message that reached me through the ether gave rise to fears of a far more serious nature. The other airship was flashing a wireless message to the base station at the aerodrome to the following effect: "Engine stopped. Unable to restart. Drifting rapidly in north-east direction."

I need not go into details of the rescue. The distressed airship was, fortunately, drifting back over the land. Motor-cars, fitted with wireless, were sent out from different stations to search for her and report developments. At last the drifting airship was sighted, and a safe landing was effected without any more serious consequences than a slight "shaking-up" for the small crew, comprising the pilot and the wireless operator!

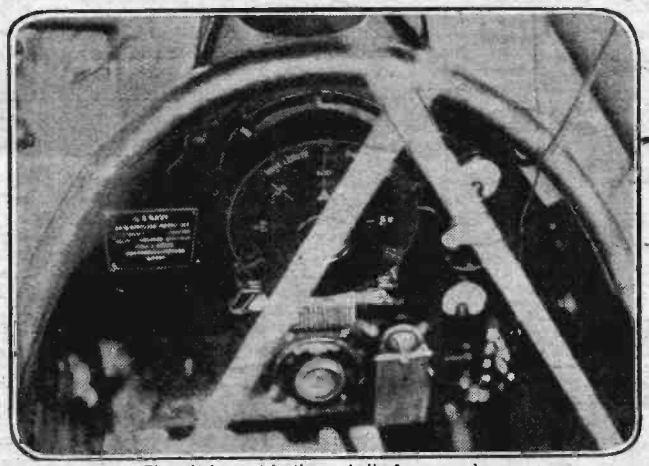
This was only one of the many instances in which wireless played a part of supreme importance in assisting the progress of aeronautical science. Over and over again it was the chief factor in saving the lives of those who were unimaginative enough to condemn its practical utility.

Of course, what has been said so far relates only to wireless *telegraphy*, in its application to the exigencies of aerial warfare. It was not until fairly late in 1917 that the first really successful attempts were made to employ wireless *telephony* in aircraft.

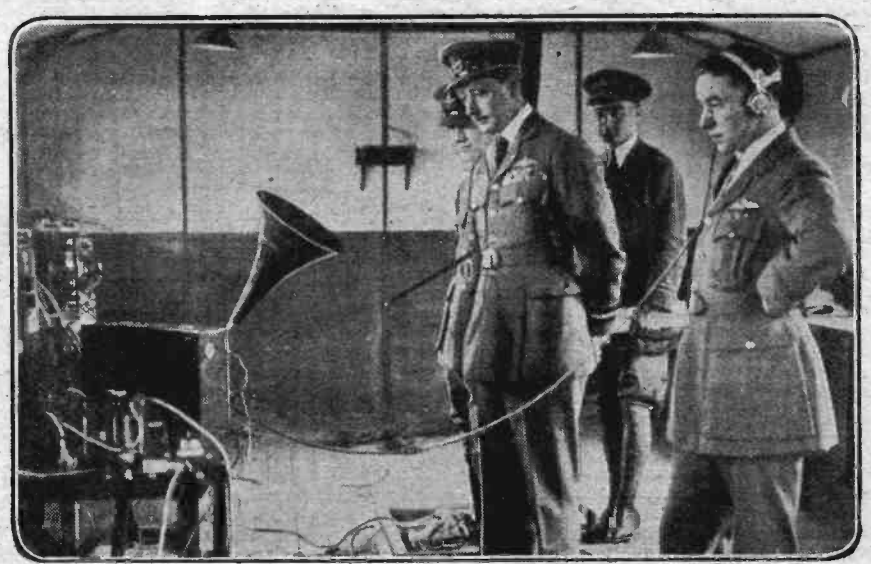
The progress that has been made since then may be judged from the fact that for months past the telephony equipments of British commercial aeroplanes have been rendering signal service in the operation of our Continental air route. Each machine is fitted with a telephony receiver and transmitter, by means of which it can keep in constant communication with one or other of the terminal aerodromes at Croydon (London) or Le Bourget (Paris).

The importance of this is manifold. For instance, owing to the notorious versatility of the climate in this part of the world, it is essential that a pilot should be acquainted, during flight, with the varying moods of the weather. It frequently happens that, as a machine is about to

(*Continued on page* 68.)



The wireless set in the cockpit of an aeroplane.



Our photograph shows General Salmond and his staff listening to speech sent from an aeroplane.

AVIATION & WIRELESS

(*Continued from page 67.*)

leave Paris for the homeward journey, the pilot is informed of the "bright, sunny weather and good visibility" that awaits him on the English coast.

Shortly after the flight has begun, a thick fog suddenly falls upon the English Channel which totally obscures the view of the coast-line from the air. Even the environs of the home aerodrome may disappear beneath clouds of rolling fog. Under such conditions, a pilot would have a difficult task to convey his human cargo safely to their destination without the use of a wireless telephone. In practice, the base station keeps him constantly informed with regard to the weather variations that occur on his route.

He is also warned of the presence of other craft that may be flying along his own route in the opposite direction. Likewise he is told the speed and direction of the wind at the home aerodrome and advised as to the best way of effecting a good landing.

Again, the pilot of a machine may want to report "engine trouble" whilst on his course, or inform the home aerodrome authorities that he is compelled to make a forced landing; or he may have been driven so far off his track by an unexpected high wind that he is in need of ascertaining his position by wireless. In all such cases his telephony transmitter comes into play.

In reading the foregoing notes it will have occurred to some readers to wonder how on earth a sensitive thing like a wireless instrument can withstand being "joggled to death" in a noisy aeroplane, or how, indeed, it is at all possible to hear wireless signals under such conditions? Such questions are perfectly natural and intelligent, and I propose to discuss them in my next article.

(*To be continued.*)

THE FORD CAR AS A WIRELESS TRANSMITTER.

MANY and varied are the stories at present being told regarding the Ford car. From the immaculate clubman to the humblest comedian, the name of Henry Ford is considered fair game wherever motor-car stories are broached as a topic of amusement.

But the statement that the Ford car is a transmitter of wireless waves, which are detected by sensitive valve receiving apparatus, is not given in a spirit of levity, but as a cold fact.

The magneto of the Ford is of peculiar construction, corresponding very nearly to the high-frequency dynamo employed by wireless stations for the radiation of messages.

The coils might be considered the equivalent of the high-tension transformers, and the sparking plugs as similar to the wireless spark transmitter. The sharp click of the ignition sparks are clearly audible in a wireless receiver's telephones, when a Ford car is some hundreds of yards away.

The signals thus received from the sparking plugs of a Ford car are so clearly defined that it is possible to detect a misfiring cylinder on the car by this means, without even having seen the car.

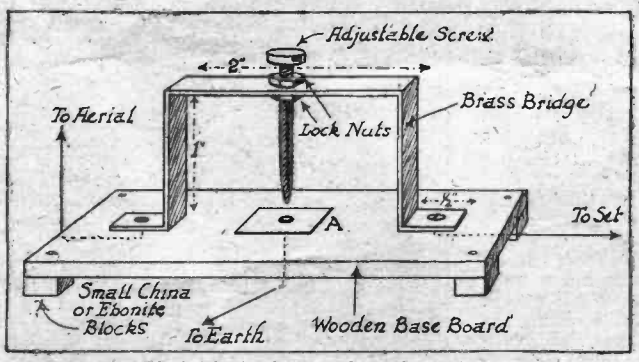
It has always been understood that the Ford car possessed certain advantages enjoyed by no other make of automobile, but that it numbers among its various accomplishments that of a wireless transmitting station, as well as a means of conveyance, certainly seems to be the strangest story of all.

A SIMPLE EARTH ARRESTER.

By fitting an earth arrester to your set you safeguard it against lightning.

OWING to numerous inquiries from readers of POPULAR WIRELESS regarding the possibility of injury to their sets through electrical charges in the atmosphere striking the aerial, the following article has been promptly published. Our contributor points out the manner in which a simple contrivance can be constructed which will carry to earth any static charges that may accumulate on the aerial without the necessity for disconnecting the aerial from the apparatus. A two-way switch could, of course, be used for earthing the aerial direct, or connecting it to the set, but it does not possess the advantages of the piece of apparatus described in this article, which ensures for the set a certain amount of protection, and enables the operator to "listen in" at the same time. It is also possible by its use to directly earth the aerial if required. It thus embraces the sole purpose for which the two-way switch is installed.—The Editor.

THE earth arrester shown in the accompanying illustration is simple and efficient, and quite easy to construct. The only materials required are a wooden base board, a few screws and terminals, some small pieces of china, ebonite, or rubber, and small brass "bridge." A strip of brass, say, five inches long and one inch wide, to conform roughly to the measurements given in the illustration, should be procured and two small holes punched through it, one at each end, about a quarter of an inch from the ends of the strip. A third hole should be punched in the exact centre of the strip, and, if possible, a thread turned in it. The dimensions of the holes will depend upon the size of the screws which are going to be used. The strip should then be bent as indicated, and if the foregoing dimensions have been used, a small brass bridge will result, being 1 inch high and 2 inches long, with two small "feet" each ½ inch long, in which the holes are punched. Before fixing the bridge into position on the base board, screw a small piece of the brass strip to the board as shown at A, connecting a lead between the lock-nut and the under part of the board. Thus both the screw and lead are held firmly in position. This lead should be of fairly large thickness or cross-sectional area, and should be connected directly to earth. Keep it as short as possible. The brass bridge should now be clamped firmly to the wooden base board by means of two screws, which must be of a proper size to fit the holes in the brass without allowing the screw heads to pass through. Now reverse the board and connect two more leads, one to the end of each screw, by tightening up the lock-nuts and making a firm connection, while at the same time tightening the screw. One of the leads should then be taken to the aerial, and the other to the receiving set. The hole, which is now in the centre of the bridge, must receive consideration. If the brass strip used is of sufficient thickness to permit of a "thread" being turned in it, all that remains to be done is to insert the corresponding screw, and continue to screw it through the strip until it just makes contact with the small brass plate on the base board. Then give the screw a half-turn in the reverse direction, and the arrester is ready for use. In the case of heavy atmospherics or a thunderstorm, the aerial can be effectively short-circuited to earth by just twisting the screw the half-turn necessary to establish connection with the metal plate—an operation which does not take a second to perform. The strip should not be thinner than $\frac{1}{16}$ inch, or the bridge will be unstable, and probably alter in shape. Neither will it be possible to turn a thread in the top hole. In any case, if difficulty is experienced in turning such a thread, or the strip is too thin, a screw terminal with two lock-nuts can be used. Screw one of the lock-nuts on to the terminal before running it through the brass strip. Then drop the terminal through the hole and screw the remaining lock-nut on the bottom end of the terminal. It will then be found that by turning the lock-nuts in opposite directions the terminal can be clamped firmly to the bridge in the required position. The end of the terminal should be dropped as near to the small brass plate as possible without making actual connection. By loosening the lock-nuts and dropping the screw, the aerial is earthed as previously described. The board should be well insulated by china, ebonite, rubber, or other insulating supports attached to the bottom of it. If screws are used, drive them downwards from the face of the board, and be sure that they do not go right through the support. Provided a fine adjustment of the screw is made, static charges on the aerial, such as accumulate in hot and thundery weather, will be found to spark from the end of the screw to earth and danger from this source is eliminated.



A sketch of a home-made earth arrester.

The dimensions given need not necessarily be adhered to, so long as the principle of providing a short path to earth is borne in mind. An earth arrester is sometimes mounted outside of the building, away from the set, but at the same time in a position where it can easily be reached. Do not place it on a window-sill or open space where rain will reach it. Instal it in a sheltered spot, and, if possible, run a separate earth lead from it to the garden, or other suitable earth outside of the building. It is worth a little trouble to know that the receiving set is in some degree protected from electrical discharges in the atmosphere.

BROADCASTING A CONCERT.

The difficulties of transmitting music by wireless.

THE evolution of broadcasting in America has taught the managers responsible for the transmission of concert items many things about the correct way a broadcasting station should be conducted, and the difficulties that must first be overcome before "listeners in" may enjoy a wireless concert to the utmost. This article explains some of the trials experienced in America, and the troubles which managers of British stations will have to overcome.—The Editor.

PROBABLY, as, with your receiver on your ears, you listen to a concert that is being broadcasted, you give little thought to the trials and worries of the man to whose efficiency you owe your enjoyment.

And yet the manager of a concert at a broadcasting station has many difficulties to contend with. There are tones that will broadcast, and there are tones that won't. There are singers whose voices sound well after having travelled over miles of space, and there are singers who, captivating in the opera house or concert hall, lose most of their attractiveness when they try to put their voices through the microphone.

One of the first troubles encountered in endeavouring to transmit the sound of musical instruments went by the name of "blasting."

This was a confusion of most unpleasant and unharmonious noises produced when certain notes were played. Probably it was caused by excessive vibration of some part of the microphone.

To combat this numerous experiments were made. Wood, tin, fibre, parchment, and lead were some of the materials of which the microphone was made in these tests, and, after months of careful study and improvement, the fault was entirely overcome; at least, as far as the better-class broadcasting stations are concerned.

A little while ago no sane broadcasting concert manager would attempt to transmit a quartette, because the combined voices would most assuredly lead to blasting; but nowadays a chorus of voices, accompanied by a full orchestra, can be sent out without fear of causing chaotic melody.

The most difficult of all the instruments to tackle was the piano. Forming, as it does, an indispensable part of a small orchestra, the manager of the earlier concerts fretted under failure after failure.

The bass notes "blasted" badly, and all that resulted from them in a receiver's ear-pieces was a confusion of sound, more like a peculiarly unpleasant fog-horn than anything else; the middle notes were tinny, and the top notes refused to transmit at all.

Experts took the piano in hand, dealing almost note by note from the highest in the treble to the lowest in the bass. They had to construct a microphone especially for the piano's peculiarities, but, nothing daunted, this they did, and in the end they succeeded, until to-day there is little or no cause for complaint, even from the most exacting musical critic.

The biggest part of the fight, as regards musical instruments, was then over. The other string instruments, such as the violin, the 'cello, banjo, harp, and guitar, created practically no further complications. Similarly the wood instruments—the clarinet and flute; all instruments of percussion—bells, xylophone, etc.; and brass instruments—trombones, cornets, etc., are to-day transmitted by wireless with complete success.

Brass instruments may, even at the present time, cause blasting if held too near the microphone, but this can be easily remedied by withdrawing the player a little.

The human voice lends itself to wireless broadcasting, and proved easier than any of the musical instruments. Yet there are grades of excellence even in voices, and the soprano carries best by wireless, the contralto worst.

The notes of a soprano will carry to greater distances than any other sounds, and the tones will sound as beautiful in the ear-pieces of a receiver as in any opera house or concert hall. The contralto at times loses, through transmission, some of the velvety richness of tone; a great deal depends upon the person singing.

It is not entirely a question of voice. It may be that some singers owe their fame to their personality; or perhaps nervousness or some other disability prevents them giving their best into an instrument; but it is an undeniable fact that some quite excellent singers do not sound well "by wireless." Makers of gramophone records will tell you just the same.

It is one of the difficulties of the wireless concert manager to select artistes whose voices will sound well after transmission, and the only sure way is by an actual trial of the singer's suitability for wireless work.

A big point is that in a concert hall the singer is never nearer to the most forward member of the audience than fifteen or twenty feet. A gangway, and possibly the orchestral pit, will separate the stage from the front row of the stalls.

In wireless concerts the artistes are near the microphone, and the tendency is to sing or play right into it. As the microphone practically represents the listener's ear, it can quite be understood that this is not desirable.

The manager works hard and persistently to keep the artiste back, but it is most difficult to break the habit of trying to get as near as possible to the audience whom you know is miles away.

If a singer gets too near to the little recording instruments, such sounds as, for example, breathing, which are lost before they reach the audience in an ordinary concert hall, are, by wireless, caught up, and distinctly heard by "listeners in."

An instrument like the clarinet will even record the clicking of its stops unless it is placed some distance from the microphone.

Yet another problem that has to be overcome by the successful manager of a broadcasting concert is the selection of the right type of microphone for the style of concert to be broadcasted.

Also the positions around the microphones of the various singers and musical instrument players must be carefully allocated.

In the most up-to-date broadcasting stations in America, a plan of the floor is made, and on it are marked normal positions for microphones and artistes. But these will be found to vary from time to time, and ultimate perfection can only be obtained by trial.

Probably you will have noticed that, as the programme of a broadcasting concert—from the Hague, Writtle, or Eiffel Tower—is gone through, there will be a distinct improvement of one selection on the last one played. This is often due to some fault having been remedied between the playing of the two pieces.

The manager of the concert listens in from a receiver near the concert hall of the broadcasting station, and by this means can detect many defects. But he is too near to be aware of some imperfections.

In America the manager relies on a staff of critics.

These critics listen in from their homes or offices at varying distances from the broadcasting station, and telephone to the manager any alterations they deem advisable, such as:

"The piano is drowning the singer. Tone it down a little."

"Bring the contralto forward; her voice isn't strong enough."

A difficulty that a little experience soon helps the manager to lessen, if not to overcome altogether, is to select a programme pleasing to the "listeners in." It is impossible to please everybody, but what the wise manager does is to vary the items on his programme so that anyone who does not care to listen in to one piece will find the next more to his taste

A Liverpool amateur enters into competition with a local organ-grinder. His loud speaker entertains the neighbourhood with wireless music

CRYSTALS AS DETECTORS.

Before setting up a Valve Set, gain experience by using a Crystal Detector.

BEFORE 1914 most wireless amateurs were happy to be in possession of a good crystal detector from which heaps of interesting fun and enlightenment were obtained. To-day, the crystal should not be despised.

As most of you know, when we receive wireless music, song, or speech, the waves reach our aerials in the form of oscillating currents—that is to say, the current surges to and fro.

After tuning in for the wave-length which we require, we are not able to hear anything unless we employ a detector of some kind. The detector, acting as a sort of valve, stops the two-way movement of the current, and converts it into a one-way current which allows the telephone diaphragms to respond, and enables us to hear whatever is being broadcast.

I will not give a list of all minerals which are more or less suitable for use as detectors, but three of the most sensitive are quite cheap, and can be obtained from your wireless dealer:

(1) ZINCITE PRESSING AGAINST CHALCOPYRITE. This combination is sometimes known as "PERIKON."

(2) GALENA in contact with the point of a fine, springy wire, or with the point of a blacklead pencil.

(3) SILICON in contact with a point of gold, bronze, brass, or steel.

No. 1 has the great advantage of being a very sensitive detector. Moreover, once the two companion crystals have been adjusted and pressed together, they remain in sensitive condition, even though vibration or accidental jarring takes place.

No. 2 is sensitive at certain points, but as the wire or blacklead must rest very lightly indeed on the surface of the crystal, this type of detector is easily knocked out of action by the slightest vibration. Sometimes the act of walking across the floor will destroy the adjustment.

No. 3, silicon, also is sensitive at certain points, and the pressure upon it by the metal point may be rather stronger than is the case with galena. Consequently a silicon detector will remain in adjustment for a longer time than galena.

Another method of using galena has recently been patented in France. A container is partly filled with mercury, and is sealed by an insulated plug. Two terminals pass through the plug, and fixed to their lower ends, inside the container, are two pieces of galena which dip into the mercury.

I have not yet tried this device, but it would seem to be of a more permanent nature than the usual method with galena.

A good crystal detector, in conjunction with efficient tuning coils, however simple, and good telephones, will give excellent results in reception of broadcast concerts, provided you live within about 15–20 miles from the broadcast stations. After the initial outlay for the crystal detector no expense is incurred for maintenance, as no batteries are required.

For all-round reception a valve detector is much better, and, in fact, is essential if you live far away from the broadcast stations. But, in any case, you will learn quite a lot by using a crystal set first.

AVIATION WIRELESS STATIONS.

Amateurs "listening in" will often hear telephony from many of the stations given in the list below. They are in almost constant communication with aeroplanes and other land stations.

NAME	CALL SIGN	NORMAL RANGE	OPERATED BY	WAVE-LENGTHS IN METRES
Belgium: Evère, Brussels	B A V	—	Belgian Government	C.W. 900
France: Bordeaux	A B	300 km.	French Government	C.W. 1,400
Le Bourget, Paris	Z M	800 km.	French Government	C.W. and Telephony 1,400 and 900
Lyons	A L	400 km.	French Government	C.W. 1,400
Maubeuge	A V	—	French Government	C.W. 1,200
Nimes	A N	300 km.	French Government	C.W. 1,400
St. Inglevert	A M	400 km.	French Government	C.W. and Telephony 1,400 and 900
Netherlands: Soesterburg	S T B	—	Dutch Government	C.W. and Telephony 900 and 1,400
Amsterdam	K L M	—	Dutch Government	C.W. and Telephony 900 and 1,400
United Kingdom: Castle Bromwich	G E C	—	——	C.W. of Telephony 900
Croydon	G E D	—	Air Ministry	C.W. and Telephony 1,400 and 900
Didsbury	G E M	—	——	C.W. or Telephony 900
India House	G F A	—	Air Ministry	C.W. 1,400
Lympne	G E G	—	——	C.W. or Telephony 900
Renfrew	G E R	—	——	C.W. or Telephony 900

JAN MAYEN ISLAND.

An Arctic Wireless Station.

JAN MAYEN ISLAND, over which flutters the flag of Norway, is a dreary, desolate spot of land, rising forlornly from the icy waters of the North, far within the confines of the imaginary Arctic Circle.

It is an island where night reigns for nine long months of the year, and day for but a short twelve weeks. The nearest land is distant 500 miles.

It is a place of dreary desolation, intense cold, and high winds, and, in short, has nothing to recommend it to the average man in search of a solution to the housing problem. If we boarded a vessel at Land's End, Cornwall, and sailed or steamed away due north, we should eventually come to Jan Mayen Island.

It lies within the Arctic Circle, practically in the latitude of the North Pole, and the course followed by our vessel would have been along the meridian line, 10 degrees west of Greenwich. This little spot, however, has attracted the attention and interest of meteorologists. The island is situated in the path of the Great North wind, one of the factors governing European weather conditions, and the idea of erecting a station on this outpost of habitable earth has been carried out by the Norwegian Government.

The station is able to supply valuable information regarding the weather, and enable regions farther south to forecast more accurately the kind of weather likely to be experienced as far as Europe is concerned.

The severity of the bleak north is tempered by the Gulf Stream, that huge warm water artery which flows to us across the Atlantic from the Gulf of Mexico. We are thus protected to some extent from the uninviting conditions which prevail farther north in parts of Iceland, and Jan Mayen Island.

The British Government also has evinced an interest in lonely Jan Mayen Island and its new meteorological station, and has offered to contribute towards the fund required for the cost and upkeep of the station. It will undoubtedly prove of great value from the meteorological point of view, but the staff necessary to operate it will have to be simple, contented souls. Even then they will certainly not be sorry when the arrival of the relief ship is signalled across the waters of the lonely north.

Readers are invited to send photographs for publication in POPULAR WIRELESS. A fee of 10/6 for every photo used will be paid, and £2 2s. if used as a cover plate.

Wireless for the Deaf

The story of the wonderful Ossiphone.

By P. J. RISDON.

IN the midst of the present popular enthusiasm over wireless, one is apt to overlook a large and patient class who, by reason of their common infirmity, are debarred from the excitement and enjoyment of listening to concerts and speeches borne on the crests of ether waves. That class is the army of the deaf.

For them, however, there is good news, for Mr. S. Brown, a London scientist, has invented an instrument, known as the "ossiphone," by means of which deaf persons are enabled *to hear through their bones*, independently of the outer ear. Since, however, even the inventor does not claim it as a panacea in all cases of deafness, we must not raise any false hope where there is room for none, but only explain in which cases the instrument is applicable.

Deafness may be due to any one or more of a number of causes. Without going into technical details, and avoiding the use of medical terms, it may be said that the causes are of two principal kinds, one being disease of the aural nerves communicating between the ear and the brain, for which no remedy is at present known. The other causes of deafness are due to defects in, damage to, or other affections of the outer or middle ear, such as a broken ear-drum, growths or wax in the ear, or a severe cold or catarrh.

It often happens that even these troubles are not met by any of the various devices, such as ear trumpets and microphones, which merely serve to augment sound vibrations with the object of forcing them through, and so influencing the aural nerves.

Sounds via Bones.

By means of the ossiphone, the sound vibrations are imparted to the bony structure of the system, and are thence communicated directly to the aural nerves leading to the brain, entirely *independently of the outer ear*, which may be quite useless. Many medical men refuse to believe this until they have witnessed a demonstration, but some wonderful results have been secured, and the writer has, personally, thoroughly tested the instrument.

The ossiphone is contained in a small, light, ebonite case, that can be slipped into the waistcoat pocket quite easily. It is a perfectly simple instrument, actuated in much the same way that certain telegraph appliances are worked. It comprises a small iron bar that vibrates under the influence of electro-magnets. It may be coupled up by "flex" and plugs

How the ossiphone is used

to the receiver of an ordinary telephone, or to a wireless receiving set, without interfering with anybody else's use of the instrument. When the current passes through the electro-magnets, the bar of course vibrates. The end of the bar projects outside the ebonite case and terminates in a small knob. The case is held in one hand, and the knob is pressed gently but firmly against one's knuckle or skull, and, as the bar vibrates, the knob communicates the vibrations (which are imperceptible to the touch) to the bone, and thence by the aural nerves to the brain. A curious thing is that, when in use, if held loosely in the hand, sounds proceed from the instrument, although they cannot be distinguished.

It might reasonably be argued that the cartilage separating the different bones would prevent the vibrations from reaching the aural nerves at all, or, at least, that they would be deadened so as to become imperceptible. Yet, strange to say, that does not happen, and, in point of fact, with one of these instruments in his possession, the writer is able to carry on telephonic conversations better by placing the knob of the ossiphone against his finger knuckle than by using the ordinary telephone receiver. Not only is the sound of a voice much more distinct, but it is less interfered with by other sounds foreign to the conversation.

A Boon to Amateurs.

This is a remarkable and interesting point, and brings home more forcibly than any other experience the fact that sound is a sensation produced by power waves; for, after all, even to whisper means the exercise of force. It is a common experience that very loud sounds, such as the report of a gun, and certain sounds, such as the scratching of metal on glass, produce actual physical pain, and may break one's ear-drum.

Apart from deaf persons, the instrument should prove an asset in the hands of wireless experts and amateurs, for, instead of "listening in" for long periods with an uncomfortable and trying telephone headpiece on, one can hold the ossiphone and change its point of application as often as desired. Prolonged pressure on the head in the neighbourhood of the ear is itself liable to cause partial deafness, if only of a temporary character. An interesting example of this came within the writer's knowledge.

A friend of his wore spectacles and suffered from a considerable degree of deafness. Subsequently he went blind, and discarded his glasses, and the deafness almost immediately ceased. The pressure of the spectacle wires had caused his deafness.

The ossiphone contains no accumulator or dry cell, the current from the telephone circuit or the wireless receiving set serving to energise the electro-magnets. The case measures 2¾ inches by 1¼ inches by 1¼ inches, and, as already mentioned, can be carried in the waistcoat pocket. There is a neat little socket on one side into which the flex plug is inserted.

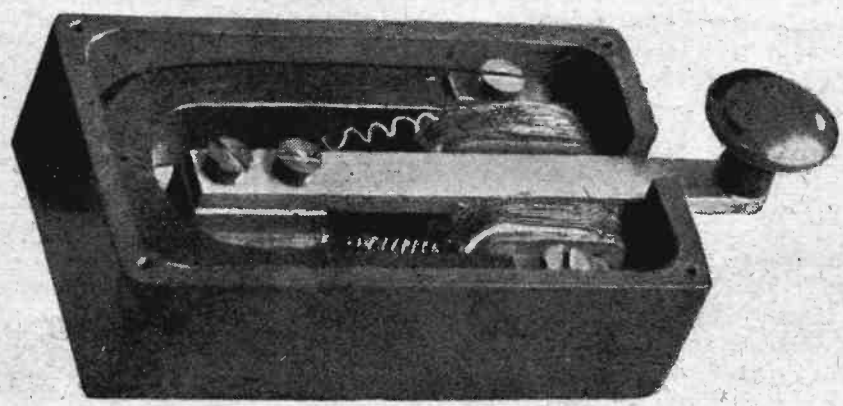
By using a relay and an aural box, sounds may be magnified enormously. Thus, I have held the ossiphone knob against my knuckle, and listened to the soft ticking of a watch that sounded like sledge-hammer blows.

Hearing without Ears.

The aural box is a separate instrument, and is used for carrying on a conversation with a deaf person in the same room. It comprises a box measuring about 8½ inches by 4½ inches by 7 inches high, with an opening on one side that diminishes in a scientifically proportioned curve, terminating at a microphone. Current is supplied by dry cells inside the aural box, and the aural box is connected to the ossiphone by any convenient length of "flex." The deaf person holds and uses the ossiphone as already described, and the other person faces the opening in the aural box—a good distance is about eighteen inches or two feet—and converses in the ordinary manner without any raising of the voice.

When a "loud speaker" is employed in conjunction with a wireless receiving set, the aural box and ossiphone may both be used by a deaf person, or, alternatively, the ossiphone alone may be used as already described.

Wireless has become so common that its wonders are apt to be overlooked. It is an amazing reflection that when a person speaks the power waves of his voice may be converted into electro-magnetic waves that course through the ether with the speed of light; and that with the aid of the ossiphone a deaf man may hear a man talking hundreds of miles away, independently of his very ears!



The ossiphone, by which deaf people may hear through their bones.

Wireless Voices for the Films

Our Contributor has a good imagination, but for all that there is a distinct possibility in the future he prophesies for the Cinema.

YET another wonder is about to be performed by wireless. The cinema audience of the near future will be able to watch the figures on the screen. and at the same time listen to the voices of the actors filling the hall.

Nor will the voices emanate from a gramophone, as has been tried in the past ; they will be the actual voices of the performers carried direct to the cinema theatres by wireless.

After many experiments a method has been evolved by means of which the film projection machines in any number of cinematograph theatres, in no matter how scattered an area, can be synchronised with a key projection machine at the wireless broadcasting base.

At the broadcasting station the key projection machine throws the same picture on the screen as the other projectors in theatres all over the country are showing on their screens.

Working to Time.

To the very second, every cinema theatre in the scheme is showing exactly the same film. B-r-r-r-h ! goes the signal to start from the wireless broadcasting station, and forty, fifty, or a hundred skilled operators in as many theatres commence projecting the film on the screen, and all the films thus started at the same moment are kept in perfect time with each other through the play, right up to the last moment.

In the meantime, at the broadcasting station, actors, supers, chorus, stage hands, orchestra, and all the other people necessary to make a play a success, have been assembled together.

The scenario writer has supplied speaking parts and sound effects just as though the production were to be given behind the footlights.

Every actor and actress, and every member of the chorus has his or her microphone, and, with their eyes on the screen, speak or sing their parts into the instrument, keeping their voices in time with their actions as portrayed by the film.

The audiences in the various picture theatres hear and see the actors in their parts in the play simultaneously.

If the play is of the musical type, the strains of the music will also be conveyed by wireless from one grand and special orchestra at the broadcasting station. An orchestra in the cinematograph theatre will not be necessary.

How it Will be Done.

Just imagine, while the screen is still dark, an invisible orchestra which seems to come from all parts of the cinematograph theatre at once—for loud-speakers will be placed all along the sides of the hall—striking up the overture, prior to the play actually commencing.

Once the actual film commences the success of the scheme depends upon the film operators at the various theatres keeping strict time with the signals sent out from the operator at the broadcasting station, and with the actors speaking or singing the parts keeping strict time with the actions of the characters on the screen.

Generally the actors will have taken part in the making of the film, and in speaking will be re-acting the play, and therefore keeping time to their own movements. This should not be difficult.

As they speak into their microphones their voices will be transferred to the wireless telephone station, where they are passed through the usual amplifiers, until the sounds are finally magnified many hundreds of times.

Every cinematograph theatre will have its receiving apparatus, and maybe six or a dozen loud-speakers distributed about the hall.

Once the actual performance begins the operator will find no difficulty in keeping time with the incoming sounds of voices or music. All he will have to do is to moderate or increase the speed of his machine as occasion demands. It will not even require highly exacting concentration, as the sounds will not be coming in with various speeds, but in regular time because both sounds and films are being synchronised at the base where they originate.

If the operator finds that he gets ahead for a second, he can readily slow up, or if he gets behind, one second speeding-up will rectify the fault, and once he has acquired the requisite speed he will probably maintain it without any further effort whatever.

At any rate, with a very little practice even the operator most distant from the broadcasting base will be able to time his machine perfectly, and the patrons of his cinema will enjoy an ideal performance.

When the Heroine Screams.

At the present time, an important part of an actor's art—the voice—is lost upon the screen. The heroine screams—at least. we surmise she screams—but the incident is robbed of more than half its realism because all we see is a soundless yawn.

We see the hero addressing sobering words of advice to a mob seething with desire to wage destruction, but we are not in the least affected by his speech, not knowing what words he is actually speaking. At times we are left to wonder how the crowd on the screen could have been prevailed upon to melt away so quietly as it does.

But when there are actors at broadcasting stations speaking, as the film is projected, the words to suit their actions as if they were performing before a crowded house, then the films will receive a very big " boost."

And the time is at hand when natural sounds will be supplied for the screen by wireless. In this direction the cinema may far outstride the theatre of the footlights. As the hero speeds to the rescue of the heroine in his powerful motor-car, the sound of the car may be the real thing and not the improvised " noises " now employed.

Pistol shots, banging of doors, can be reproduced " from life," and the quieter sounds, which even on the stage cannot be rendered so as to be audible all over the theatre, may possibly be reproduced most realistically by wireless.

The sound of a glass breaking as it rolls off a table, the laboured breathing of a struggling man, the stealthy footsteps that the hero hears as he lays awake—all these and many others may be reproduced in the future by wireless telephony.

Mary Pickford enjoys a little wireless music while resting between the filming of a new play.

All About Batteries

This is the second and concluding article describing the action and upkeep of batteries

CELLS may be connected together in various ways to form a battery. If we join the positive terminal of the first cell to one end of a wire and connect the negative terminal to the positive terminal of the second cell, and so on, connecting positive terminals to negative terminals until we have as many cells as we require, finally connecting the negative terminal of the last cell to the other end of the wire, we have a complete electrical circuit, and the cells are said to be connected together "in series." If all the cells are of the same type, and, taken individually, give the same voltage, the number of volts obtained in an electrical circuit by joining them together as described above will be the voltage of one cell, multiplied by the number of cells being used. See Fig. (1, A). Thus, if we had 4 cells so connected, and each cell supplied 2 volts, we should have a circuit containing 8 volts. A circuit of this nature contains a good amount of electrical pressure, or electro-motive force, but the strength of the current flowing in it is comparatively weak, and will not exceed the amount of current which would be given by any one cell singly. If we take the four cells and connect the four positive terminals to one end of the wire, and the four negative terminals to the other, as in Fig. (1, B), the cells are joined together "in parallel." The result of this arrangement is to give us different electrical values in the circuit. The electro-motive force or pressure is now reduced to the number of volts which would be given by any one cell singly, namely, 2, but the amount of current flowing in the circuit will now be the current given by one cell, multiplied by the number of cells we are using.

Various Combinations.

A combination of the above two methods is known as a "series-parallel" arrangement and consists of two batteries of cells connected in series, and the two batteries finally connected in parallel, as in Fig. (1, C). This style of connecting cells gives us a circuit which contains a good voltage, and a fairly good flow of electricity as well, and might therefore be supposed to be the best method of the three. In some cases, however, it is desirable to have a circuit where the strength of the current is of paramount importance, and in this case a "parallel" battery would obviously be the best to use. Likewise, a good voltage might be the only consideration necessary in a circuit, and in this instance the battery would consist of a group of cells connected together "in series." It is a battery of this nature, generally composed of dry cells, that is almost invariably used to supply the necessary voltage to the plate of the valve used on wireless receiving sets. It is then called an "anode battery," or more frequently a "high-tension battery." (Amateurs should be warned against trying to light the present type of valve with dry cells. The resistance of the filament is so great that this kind of cell will speedily become "discharged" if utilised to heat the filament to a satisfactory point.)

Faults in Cells.

One of the most prevalent faults in ordinary cells is "sulphating." When the cell is supplying a current for any purpose, lead sulphate is formed on the plates. When the cell is recharged, the lead sulphate is disposed by the action of the charging current. If a cell is neglected or left idle, the lead sulphate will crystallise on the surface of the plate, and, being a bad conductor of electricity, affect the action of the cell. A sulphated cell should be given a good charge of long duration, the sulphate being difficult to remove. If this does not have the desired effect, it may be necessary to obtain fresh plates.

Local Action.

Great care should be taken, when the cover or lid of an accumulator is removed for any reason, to see that no foreign substance, like an iron filing or a pin, falls into the acid. If it does it will set up a process in the cell known as "local action." If we refer to the part of this article which deals with primary cells, we shall see the reason. We have introduced another tiny plate of dissimilar metal, and the acid will affect the pin or filing in the same manner as either the copper or zinc. Unequal action between the inadvertently introduced scrap of metal and one or more of the plates will take place, and a decrease in efficiency will result. It may even cause the disintegration of some of the plates, which will have to be replaced. When an accumulator or storage battery is delivering current to an external circuit, a tendency to expand is exhibited by both banks of plates. If a cell of this type is excessively discharged, the plates will begin to bend or buckle, and eventually will become so distorted in shape as to render impossible their removal from the container. This fault is known as "buckling," and is to some extent obviated by the inclusion of thin sheets of wood or glass placed between the plates.

Finally, when it is observed that the liquid in the cell is evaporating, and that the plates are beginning to show clear of the acid, do not remedy the deficiency by adding more acid. Distilled water should be used for this purpose, the plates being covered until they are at least half an inch below the level of the acid.

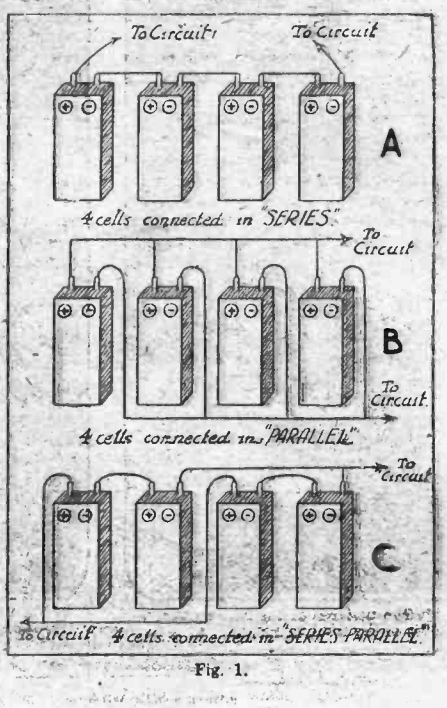


Fig. 1.

The Electrolyte or Acid.

The acid used in a storage battery is diluted by mixing it with water until it is of the right strength to give the best results. The strength of the solution varies for different types of cell, but is usually about 1 part of acid to 5 of water. The *specific gravity* or specified weight of the solution depends upon a comparison of it with the weight of pure water. As acid is heavier than water, a given quantity of the diluted acid in the cell would be heavier than a similar quantity of water. Thus, if a definite quantity of water be taken as 1, the basis for the values, the specific gravity of the solution will be approximately 1·2. The larger the proportion of acid to water in the solution, the greater will be the specific gravity of the electrolyte.

The Hydrometer.

The gravity of the solution in a cell is measured by an instrument called a "hydrometer." A simple form of hydrometer is a thin glass tube six to eight inches long, filled at one end with small shot or mercury, having various values of specific gravity calibrated upon it. If the hydrometer is dropped into a cell containing absolutely pure water, it will sink to the bottom and remain there. If, however, it is placed into a cell containing acid, it will only sink to a certain depth dependent upon the density or gravity of the acid. The specific gravity of the cell can then be read off from the calibrations marked on the hydrometer, at the surface of the liquid. We can thus easily ascertain if the cell has the correct strength of electrolyte. The terminals of a cell are usually plainly marked to prevent any error occurring when they are being connected up. The positive terminal is usually painted red in addition to the + mark, and the negative terminal black in addition to the — mark.

THE PROPER ADJUSTMENT OF AMPLIFIER AND DETECTOR.

SIGNALS can only be received when your detector is correctly adjusted, and it is therefore necessary to understand the proper methods of adjusting.

Mineral detectors depend for clarity of note upon the pressure and spot of the contact crystal. This must be varied until the clearest note is obtained through the 'phones from the test buzzer.

To adjust "soft" detector valves, connect the high-tension battery to the plate and raise the filament current gradually; then, when a slight hiss is heard in the 'phones, reduce the current until the hiss just stops.

The inductance must be set at its minimum value. Either by means of a potentiometer, which is the best way, or by variable battery taps, the plate battery voltage should at the same time be so adjusted that this hiss begins at as low a filament current as possible.

The majority of soft valves require a critical plate voltage of between 18 and 22 volts.

Many amateurs prefer a "hard" valve—*i.e.*, one possessing a high vacuum.

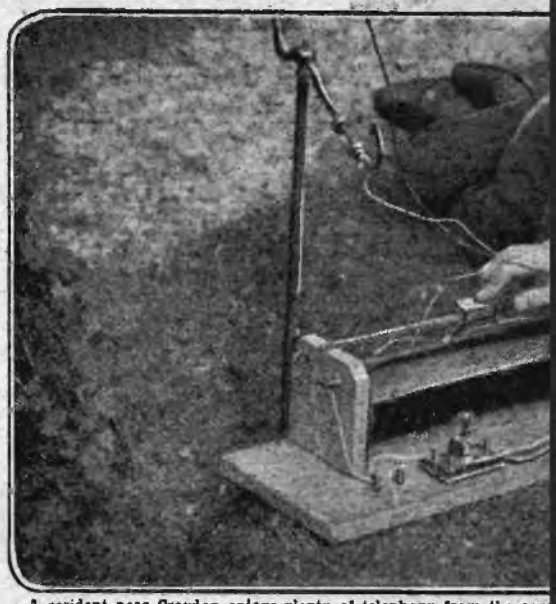
These hard valves have no "hissing" point. The best plate voltage should be found by trial, and is usually about 20 to 40 volts for a single valve.

Hard valve filaments are burned with just sufficient brilliancy to afford the highest signal strength. The amount of voltage required by the filament will depend upon the voltage applied to the plate.

Higher values of plate voltage usually give rather increased amplification of signals, though any voltage within the limits specified may be used on the plate valves.

GARDEN WIRELESS SECRETS

A little while ago the universal question was : "Do you jazz?" To-day it is "Do you wireless?" And, if you don't, why not? Wireless in the garden, as will be seen from the above photograph, is ideal in the summer.



A resident near Croydon enjoys plenty of telephony from the aero receiver, with an iron rod stuck in the grass for an "earth." Am si

The latest Parisian novelty is a vanity bag wireless set. The aerial is of the frame variety, and is concealed at the back of the bag. This type of set is of the freak genus, and, as such, is amusingly unique.

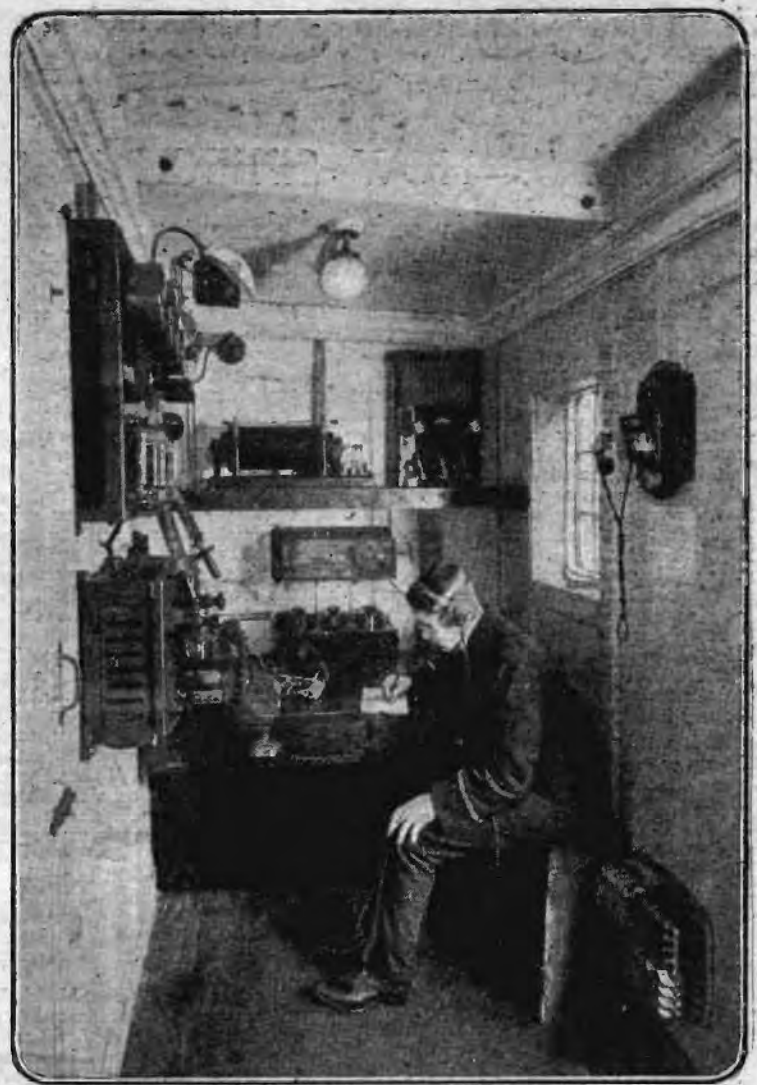
You can enjoy plenty of wireless "stunts" if you live near a wireless station. This Croydon resident uses a wire fence for an aerial and an accommodating dustbin for an "earth."

FROM THE ETHER

drome wireless station and from aeroplanes on the Continental air routes. He uses a crystal ateurs who live close to wireless stations can amuse themselves in a variety of ways with a very mple type of crystal detector.

In this case he gets quite ingenious. The garden rake comes in handy as the aerial, but amateurs living in Scotland are not advised to try to pick up signals in this way from a station in London!

A SHIP'S WIRELESS CABIN



This photograph shows the interior of a wireless room on board a ship. The old magnetic detector, with the glass case front and the multiple tuner directly beneath, are used as an emergency receiver, the crystal detector being placed on the left of the table. The emergency 10" spark coil is also shown.

Boys will be boys—but they are out of mischief for a time. The new hobby has taken its hold, and thousands of keen amateurs are now hard at work constructing their own apparatus.

Step by Step in Wireless

No. 5.—HOW SPEECH IS SENT BY WIRELESS.

In this series of elementary articles the beginner will find the mysteries of wireless explained in simple, non-technical language.

TO convey simply, and without the use of technical phraseology, the principle underlying the radiation of speech by wireless is by no means a simple matter.

The writer trusts, however, that a perusal of this article will leave the reader with some idea of the manner in which wireless communication by speech is established.

To the amateur with a rudimentary understanding of wireless telegraphy, and to the more advanced student with a theoretical knowledge of the continuous wave system of wireless transmission, the following explanation will be readily understood.

We are all too familiar with ordinary speech to give much attention to the fact that it is just ordinary, every-day wireless telephony. Nature has supplied our bodies with a transmitter and receiver, and the air which surrounds us is the connecting link by which we convey intelligible sounds to each other.

It is not necessary for two persons to clasp hands, or in any other way to be tangibly connected, before information can pass between them.

A Simple Analogy.

Our transmitters, however, have a very limited range. Compared with wired or wireless telephony, the distance over which the human voice can travel to be understood, is negligible. Our receivers also, which are our ears, have a limited range of sensitivity, there being many sounds, in fact, which we cannot hear at all.

We all know that a small child can walk a certain distance, say half a mile, and then its strength is exhausted. If the child is perched on the shoulders of its father, however, its strength does not enter into our calculations.

The distance it can cover will depend upon the strength of the father. This analogy is a very rough one, but it serves to illustrate the manner in which ordinary land-wire telephony and wireless speech over long distances is accomplished.

The ordinary wired telephone which is used so extensively to-day is a complete circuit of wire connected up to an electrical source of supply which gives a continuous flow of electricity through the circuit.

The circuit also contains a transmitter and receiver.

So long as the current of electricity remains at a steady rate of flow in the circuit, the receiver is unaffected by it; but when we speak into the transmitter, the diaphragm at the back of the mouthpiece vibrates, and causes variations in the otherwise steady current.

These variations travel round the electrical circuit until they reach the diaphragm of the receiver, which vibrates in a similar manner to that of the transmitter, and conveys the speech to the listener. The voice might be likened to the small child, and the electrical current to the father which carries it.

Continuous Waves.

The analogy, as stated, is only a very crude one, and given principally because of its simplicity. We will now deal with wireless telephony, and use as an analogy something which comes nearer to the actual conditions prevailing in wireless telephony.

If we look at the wax disc of a gramophone record we see that the numerous circular indentations upon it are in reality only one groove which starts at the edge of the record, and by a gradually diminishing circular path travels to the centre of the disc.

If, when the record is first constructed, we start it revolving on our gramophone, the application of the needle will produce no results in the sound box, and therefore we hear nothing. This is because the small groove in the record is uniform, and, like the steady current in the telephone circuit, gives no result.

When the record is prepared, however, the voice of the singer causes vibrations in the instrument which are carried to the disc and imposed upon the soft wax.

The record is then ready for use, because the uniformity of the wax has been varied by the acoustic properties of the voice, and if we now place the record on a machine and set it in motion, the small needle reproduces the variations, and the original song or speech issues from the instrument.

The variety of little marks visible on a gramophone record, each stand for a note or a word, or something which under the action of the needle is rendered intelligible to the human ear. We can see the wax and feel it; it is tangible.

But the something used in wireless telephony that corresponds to the wax in the case of the record, cannot be seen. It is a *continuous wave* such as is used in ordinary wireless telegraphy for transmission of "C.W." signals.

"Carrying" the Speech.

This wave corresponds to the father's back in one case, and to the wax of the gramophone record in the other. Continuous waves are propagated by means of a rapidly alternating or oscillating current of electricity generated in the aerial of the transmitting station.

They are uniform; in other words, they have the same amplitude, length, and velocity, and follow one another, as their name implies, continuously.

They also have a uniform frequency, which is much above the range of sensitivity possessed by the human ear, or the diaphragm of the telephones, and are therefore inaudible at the receiving station, as will be understood.

The vibrations of the human voice are extremely slow compared with the vibrations set up by the continuous waves, and if speech is imposed upon the waves the oscillations are modulated or moulded, in a similar manner to the wax, by the acoustic frequencies of the voice.

When we listen to wireless telephony the "carrier waves," which are "carrying" the speech or music to us, are inaudible, because of their rapidly oscillating and uniform character.

When the waves that have been modulated by the speaker or singer at the transmitting station arrive upon the receiving aerial, the regular sequence of the waves is varied, and this variation is immediately registered by the detector of the receiving set and converted back into speech.

There is much to be said in favour of wireless telephony when comparing it with wired telephony or even wireless telegraphy.

Wireless versus the Telephone.

It has an undoubted advantage over telephony of the wired order, in so far as the distortion of the voice so frequently encountered on the ordinary telephone, especially when communicating over long distances, is entirely absent when "wireless" is used.

This is due to the fact that the "carrier wave" employed in wireless telephony remains unaltered, *irrespective of the distance over which it has to travel.* The intonation of the voice is therefore unaffected.

In wired telephony, even a slight variation of the current flowing in the telephone circuit will cause irregularities to occur, which may render the speech quite unintelligible to the listener.

Wireless telephony also possesses the great advantage over wireless telegraphy of being immediately understood by all, without the need for tedious lessons in the Morse code.

A few years ago the bridging of vast distances by wireless could only be accomplished by skilled telegraphists who also had to be well versed in the technicalities and theory of the science.

To-day, given the requisite apparatus, it is within the power of all of us to converse across the boundless spaces of the ether. To-morrow—who knows?

HINTS TO AMATEURS.

IF you use pocket-lamp dry batteries for your "B" or Plate Battery, sandwich a piece of old inner tube between each section, and, above all, keep the cells away from damp.

* * *

Don't fix a galena crystal in heated metal, as the heat impairs the sensitivity of the crystal. The crystal should be held in its cup by three set-screws.

* * *

If you have a garden long enough, one line of 14-gauge copper wire is more efficient than a number of shorter wires, and is easier to erect.

Sometimes the tuning switch may grate or squeak on the contact studs. Cure this by keeping the studs clean and free from dirt.

* * *

Keep the spaces between contact studs free from dust or metallic particles. Use a small dry camel-hair brush when dusting.

* * *

A lead-covered roof will make a good "earth." This is due to a "dissipating" effect.

* * *

Aerials may not be slung across streets.

* * *

Loose connections mean bad faults.

WIRELESS CLUB REPORTS.

The Editor will be pleased to publish concise reports of the meetings of wireless clubs and associations, reserving the right to curtail the reports if necessary. An asterisk denotes affiliation with the Wireless Society of London.

The South London Wireless and Scientific Club.*

OUR meetings on Wednesday and Monday each week evidently "caught on," for our numbers have increased rapidly this last two or three weeks, and with the ever-increasing demand for expert practical and technical knowledge, we hope within a very short period to have created a new record.

The members have responded so well since our formation, in November, 1921, that demonstrations, lectures, etc., have entirely eclipsed any idea that imagination may have credited us with, and we hope that we shall be able to further our activities of being such a live organisation, solely devoted to the amateur in South London.

Recently our old friend Mr. Walsh gave us a very interesting lecture on "High Frequency," accompanied by practical demonstrations with a ten-inch spark coil, glass plate condensers, oudin coils, etc., besides furnishing us with very interesting data regarding the construction formulæ for this type of wireless transmission, and to whom we must tender our very best thanks.

This lecture was followed by Mr. Wilkinson, on "Cinematography," with special reference to kinematics, and this gentleman proved a most distinguished lecturer, as well as a very good linguist.

Forthcoming events, which include every date up to July, and full details as regards subscriptions, entrance fees, etc., may be had of the Assistant Secretary, Mr. Ansell, 69, Larcom Street, S.E. 17, or to the Headquarters, St. John's Institute, Larcom Street, S.E.17, where all meetings take place.

* * *

Bradford Wireless Society.*

A meeting was held in the clubroom at 7.45 p.m. on Friday, June 16th, with Mr. W. C. Ramshaw in the chair. The minutes of the previous meeting were read and passed, following which a few new members were elected.

The chairman then called upon Mr. J. Bever to give his lecture on "General Wireless Matters." This consisted in the main of a description of his own four-valve set, and was extremely interesting. During the course of his remarks Mr. Bever made several references to the increasing number of people using valve sets, who, not having the necessary knowledge to operate them, cause interference by allowing their apparatus to oscillate unnecessarily. Mr. Bever's set was on view, and is a very small, well-made piece of apparatus, fitting, as it does, in a moderate sized attaché case. The set was connected to the society's aerial, and excellent signals were obtained on short wave, including telephony from a local station. These signals were easily readable with the telephones lying on the table at the other end of the meeting-room.

Our next meeting on June 30th concludes the present session, but the committee have decided to continue the fortnightly meetings throughout the recess, when short elementary lectures and discussions will be given for the benefit of new members. Morse practices will also be held.

The chairman made an announcement urging all new members desirous of purchasing apparatus to consult members of the committee before deciding on what to buy, in view of the fact that there is a considerable amount of junk gear now being sold.

Hon. Sec.: Mr. J. Bever, 85, Emm Lane, Heaton, Bradford.

The Hackney and District Radio Society.

The first general meeting to discuss the formation of a Radio Society was held at 111, Chatsworth Road, Clapton, E.5, on June 8th, at 8 p.m.

It being the first meeting, the following officers were elected: Mr. D. Street, as chairman; Mr. E. R. Walker, secretary; Messrs. A. V. Morgan, D. R. Ison, A. Valins, T. Kuman, and F. Jenkins as the committee. Having agreed upon the above title, we settled down to work out a foundation. After making several resolutions, the committee stayed to a later hour, to bring them into motion at the next meeting.

Before the close of the meeting we had a general conversation, covering many working principles in wireless, together with the exhibition of some high-frequency transformers by Mr. A. Valins. It was decided to have a Morse class, also instructional help for our new members.

Considering all members being strange to each other, we got on well, the large attendance being a general surprise.

All inquiries as to membership will be gladly appreciated by the Secretary, at 48, Dagmar Road, South Hackney, E.9.

* * *

Guildford and District Wireless Society.

On Saturday, June 10th, by kind permission of H.M. Air Ministry, a party from the Guildford and District Wireless Society paid a very interesting and instructive visit to the London Terminal Aerodrome, Croydon.

The party travelled to East Croydon by train. The wonderful working and operation of the Croydon wireless station was explained at length by the chief operator. Unfortunately, "atmospherics" were very bad, and listening in was a little disappointing.

Also, for nearly an hour our keen interest was centred on the machines that ply between England and the Continent. A machine passed overhead, and someone remarked:

"That's the joy-'bus, ten shillings a trip."

On the whole, the day was thoroughly enjoyed by all, and undoubtedly all were feeling much wiser on Sunday morning. The society hope at an early date to be able to pay a visit to some other station in the neighbourhood. The secretary would be very pleased to hear from anyone who is interested in wireless, or to introduce them to the society's "set," which is open every Monday evening at 7 p.m., at 46a, High Street, Guildford.

Stoke-on-Trent Wireless and Experimental Society.*

On Thursday, June 15th, J. Gaskell, Esq. (Asst. Hon. Secretary), gave a lecture and demonstration on X-Rays. Questions were asked and answered regarding the relation of X-ray waves to wireless waves, and remarks were made concerning the similarity between the X-ray tube and the thermionic tube used in wireless communication. A vote of thanks was heartily accorded to the lecturer, the chairman expressing a wish that in the coming session we should have the pleasure of hearing Mr. Gaskell again.

We have opened a corresponding members' section for members unable to attend the ordinary meetings, and a technical committee has been formed to deal with questions put forward by them.

Those interested should communicate with the Hon. Secretary, F. T. Jones, 360, Cobridge Road, Hanley, Stoke-on-Trent.

LIST OF PRINCIPAL WIRELESS SOCIETIES IN GREAT BRITAIN.

The following list of the principal wireless clubs and associations in Great Britain has been compiled for the benefit of readers of POPULAR WIRELESS, who wish to join a wireless club. Full particulars, on mentioning this paper, may be had on application to the secretaries of the various clubs.—EDITOR.

WIRELESS SOCIETY OF LONDON.
Hon. Sec.: L. McMichael, 32, Quex Road, West Hampstead.

ALTRINCHAM WIRELESS SOCIETY.
Hon. Sec.: Breeze Crest, Plane Tree Road, Hale, Cheshire.

BIRMINGHAM EXPERIMENTAL WIRELESS CLUB.
Hon. Sec.: 110, Ivor Road, Sparkhill, Birmingham.

BLACKPOOL & FYLDE WIRELESS SOCIETY.
Hon. Sec.: 6, Seventh Avenue, South Shore, Blackpool.

(*Continued on page* 78.)

A demonstration at the Cardiff and South Wales Wireless Society's headquarters.

WIRELESS SOCIETIES IN GREAT BRITAIN.

(Continued from page 77.)

BRADFORD WIRELESS SOCIETY.
Hon. Sec.: 85, Emm Lane, Bradford.

BRIGHTON RADIO CLUB.
Hon. Sec.: 68, Southdown Avenue, Brighton.

BRISTOL & DISTRICT WIRELESS ASSOCIATION.
Hon. Sec.: 5, Pembroke Vale, Clifton, Bristol.

BURTON-ON-TRENT WIRELESS SOCIETY.
Hon. Sec.: 66, Edward Street, Burton-on-Trent.

CAMBRIDGE UNIVERSITY WIRELESS SOCIETY.
Hon. Sec.: D. Wade, Esq., 16, Trumpington Street, Cambridge.

CARDIFF & SOUTH WALES WIRELESS SOCIETY.
Hon. Sec.: 16, Adamsdown Square, Cardiff.

CRYSTAL PALACE & DISTRICT RADIO SOCIETY.
Hon. Sec.: 25, Beckenham Road, Penge, S.E. 20.

CITY & GUILDS WIRELESS SOCIETY.
Hon. Sec.: City & Guilds Engineering College, Exhibition Road, London, S.W. 7.

THE CORINIUM WIRELESS SOCIETY.
Hon. Sec.: The Old Vicarage, Cirencester.

COWES & DISTRICT RADIO SOCIETY.
Hon. Sec.: Pretoria, Castle Street, East Cowes, I.O.W.

CROYDON WIRELESS & PHYSICAL SOCIETY.

Hon. Sec.: Meadnoor, Brighton Road, Purley, Surrey.

DARTFORD & DISTRICT WIRELESS SOCIETY.
Hon. Sec.: 84, Hawley Road, Wilmington, Dartford.

DERBY WIRELESS CLUB.
Hon. Sec.: 1, Littleover Hill, Derby.

EAST KENT WIRELESS SOCIETY.
Hon. Sec.: 8, Longford Terrace, Folkestone.

EDINBURGH & DISTRICT RADIO SOCIETY.
Hon. Sec.: 9, Ettrick Road, Edinburgh.

THE FOLKESTONE & DISTRICT WIRELESS SOCIETY.
Hon. Sec.: 8, Longford Terrace, Folkestone.

GLASGOW & DISTRICT RADIO CLUB.
Hon. Sec.: 7, Queen's Gardens, Glasgow.

GLEVUM RADIO & SCIENTIFIC SOCIETY.
Hon. Sec.: Burfield, St. Paul's Road, Gloucester.

GLOUCESTER WIRELESS & SCIENTIFIC SOCIETY.
Hon. Sec.: 1, Jersey Road, Gloucester.

WIRELESS SOCIETY OF GREENWICH.
Hon. Sec.: 18, Blackheath Rise, S.E.

HALIFAX WIRELESS CLUB.
Hon. Sec.: Y.M.C.A., Clare Hall, Halifax.

WIRELESS SOCIETY OF HULL & DISTRICT.
Hon. Sec.: 16, Portobello Street, Holderness Road, Hull.

LEEDS & DISTRICT WIRELESS SOCIETY.
Hon. Sec.: 37, Moxborough Avenue, Leeds.

LEICESTERSHIRE RADIO SOCIETY.
Hon. Sec.: 269, Mere Road, Leicester.

LINCOLN & DISTRICT WIRELESS SOCIETY.
Hon. Sec.: 168, West Parade, Lincoln.

LIVERPOOL WIRELESS ASSOCIATION.
Hon. Sec.: 98, Ampthill Road, Liverpool.

LUTON WIRELESS SOCIETY.
Hon. Sec.: Hitchin Road Boys' School, Luton.

RADIO SCIENTIFIC SOCIETY OF MANCHESTER.
Hon. Sec.: 16, Todd Street, Manchester.

MANCHESTER WIRELESS SOCIETY.
Hon. Sec.: 1, Parkwood, Victoria Park, Manchester.

NEWARK-ON-TRENT WIRELESS SOCIETY.
Hon. Sec.: 44, Hatton Gardens, Newark-on-Trent.

NEWCASTLE WIRELESS ASSOCIATION.
Hon. Sec.: 51, Grainger Street, Newcastle-on-Tyne.

NORTH LONDON WIRELESS ASSOCIATION.
Hon. Sec.: c/o Superintendent, Peabody Buildings, Essex Road, N.

NORTH MIDDLESEX WIRELESS CLUB.
Hon. Sec.: Nithsdale, Eversley Park Road, Winchmore Hill, N.

NORTH STAFFS RAILWAY ELECTRICAL DEPT. WIRELESS SOCIETY.
Hon. Sec.: 87, Spencer Road, Shelton, Stoke-on-Trent.

OLDHAM LYCEUM WIRELESS SOCIETY.
Hon. Sec.: Oldham Lyceum, Union Street, Oldham, Lancs.

PLYMOUTH WIRELESS & SCIENTIFIC SOCIETY.
Hon. Sec.: 9, Ryder Road, Stoke, Devonport.

PRESTON SCIENTIFIC SOCIETY.
Hon. Sec.: 119a, Fishergate, Preston.

SHEFFIELD & DISTRICT WIRELESS SOCIETY.
Hon. Sec.: 18, Linden Avenue, Woodseats, Sheffield.

SOUTHPORT WIRELESS SOCIETY.
Hon. Sec.: 26, Hartwood Road, Southport.

STOCKPORT WIRELESS SOCIETY.
Hon. Sec.: Mersey Chambers, King Street East, Stockport.

SUNDERLAND & DISTRICT AMATEUR RADIO SOCIETY.
Hon. Sec.: 15, Ridley Street, Southwick-on-Wear.

SUSSEX WIRELESS RESEARCH SOCIETY.
Hon. Sec.: Technical College, Brighton.

THREE TOWNS WIRELESS CLUB.
Hon. Sec.: 9, Ryder Road, Stoke, Devonport.

TYNEMOUTH (BOROUGH OF) Y.M.C.A. AMATEUR WIRELESS SOCIETY.
Hon. Sec.: Y.M.C.A. Buildings, Bedford Street, N. Shields.

WANDSWORTH WIRELESS SOCIETY.
Hon. Sec.: Technical Institute, High Street, Wandsworth.

WEST LONDON WIRELESS ASSOCIATION.
Hon. Sec.: 19, Bushey Road, Harlington, Middlesex.

THE WILLESDEN WIRELESS SOCIETY.
Hon. Sec.: 87, Mayo Road, N.W. 10.

WIRELESS & EXPERIMENTAL ASSOCIATION.
Hon. Sec.: 18, Melford Road, S.E. 22.

WOOLWICH RADIO SOCIETY.
Hon. Sec.: 42, Greenvale Road, Eltham, Kent.

YORK WIRELESS CLUB.
Hon. Sec.: 16, Wentworth Road, York.

QUESTIONS ABOUT THE VALVE

What is a valve?

IN outward appearance like an ordinary electric light globe. It lights up from a four-volt accumulator. In addition to the glowing fine wire filament, there is a "grid" and a "plate." Air is extracted from the glass globe, so that the filament, grid, and plate are supported in a vacuum, the latter being an essential condition of the valve.

* * *

What is a grid?

The grid is a tiny spiral of hard wire, one end of which is connected to the aerial tuning coil. The grid is situated between the glowing filament and the plate.

* * *

What is the plate?

The plate is a small nickel tube which surrounds the filament and the grid.

* * *

What is the filament for?

When the valve is alight, electrons are thrown off from the heated filament wire, and pass through the grid to the plate. The whole principle of modern wireless is based on that fact, formerly known as the "Edison Effect."

* * *

What is the plate for?

The plate is connected in the circuit so that by remaining positive it attracts the electrons which are thrown off by the heated filament. The electrons are negative. A small current from dry batteries will work the plate.

* * *

What is the grid for?

The grid is connected to the end of the aerial tuning coil, which is affected by the incoming wireless waves of alternating currents, *i.e.*, they surge to and fro, first positive and then negative. The grid, as part of the aerial circuit, is constantly changing from positive to negative—as frequently as the wireless waves themselves.

* * *

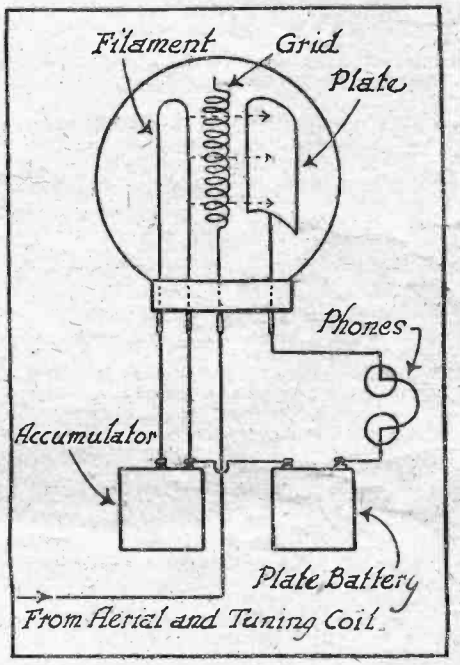
How does the valve detect?

Look at the little sketch and you will see the filament, the grid, and the plate, inside the glass globe. In an actual valve, the filament might be a vertical wire passing through the centre of the coiled wire grid. Surrounding the filament and grid would be the nickel tube which we call the plate. Directly the 4-volt accumulator is switched on, the filament becomes almost white hot, and the electrons, or small charges of negative electricity, are thrown off from the filament and fly to the plate, which, being positive, attracts negative. On the way from the filament to the plate the electrons are bound to pass through the coils of the grid, which remains positive and negative alternately.

* * *

What happens when the grid is positive?

As we already know, the grid rapidly changes from positive to negative, in accordance with the wireless wave which is being received. Now, during the fraction of a moment when the grid is positive, the grid will permit only the negative side of the incoming wireless waves to pass through, and will stop, or repel, the positive side of the incoming waves. In addition to attracting the electrons, the grid, whilst positive, helps them on their way to the plate.



Whilst the grid is negative, what happens to the electrons?

During the time that the grid is negative, the grid does not attract the electrons, which are negative also.

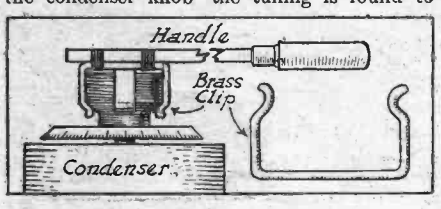
* * *

To sum up—

The original incoming wireless wave, which was alternately positive and negative, is, by the combined functioning of the filament, grid, and plate, converted into a one-way direct current, and thus permits of wireless speech, music, or other signals being heard in the telephone receivers.

A CONDENSER HANDLE

FOR the reception of continuous wave signals, it is necessary to employ either reactance in the circuit, or a separate "heterodyne" system. When the receiving set is thus arranged, it will sometimes be noticed that when adjusting the variable condenser the capacity of the hand gives the condenser what may be termed a false value. The signals are "tuned in" apparently to the proper point, but immediately the hand is removed from the condenser knob the tuning is found to be incorrect. This can be remedied by the addition of a handle about a foot or eighteen inches long, which can be attached to the condenser knob in the following manner:



Two strips of brass are cut to fit closely over the condenser handle when bent as shown in the illustration. By bending them in this manner they will be found to act as clips, and should be placed over the condenser knob at right-angles to each other after being clamped together at the point where the two strips cross. The handle, which should be made of hardwood or ebonite, can be attached to the top strip of metal by insulating tape or waxed thread. True tuning can then easily be obtained, and it will be found that much finer adjustments of the condenser are possible when use is made of the long handle than when variation is carried out by moving the actual condenser knob with the hand.

The Warning in the Air

So quickly is the application of Wireless to the cause of justice progressing that this article tells of innovations which have been introduced since the first article of this series was written only a few weeks ago.

AS stated in last week's issue, the police of this country are keenly on the alert to the possibilities of adapting wireless to the suppression of crime.

The Chief Commissioner of Police himself is devoting a great deal of attention to the recent rapid progress of the science.

He believes that the portable wireless set has unlimited possibilities, and will be an important and useful factor in the future in the tracking down of a man endeavouring to escape the arm of the law.

Experiments have been going on at Scotland Yard for the last four months, and tests have been made to bring wireless to their aid in the difficult task of maintaining a continuous and constant communication between headquarters and officers on the track of the lawbreaker.

In one of the upper rooms of the building at New Scotland Yard the Chief Engineer of the Yard is personally supervising experiments with a powerful receiving set.

It is useless for them to try to run before they can walk, but, although the active department of the Yard is quite a young one, the men in charge are aiming at big results which they hope, in the fulness of time, to achieve.

Many problems will have to be entertained and solved before every police motor has its own portable set by means of which its occupants can report their every movement to headquarters, and in return receive later instructions, or even advice of news coming in from other quarters. Nevertheless, the London police hope to have this scheme in working order eventually.

The advantages of such a scheme are obviously apparent, and its inauguration is anxiously awaited by the members of the "Flying Squad," than whom no one can greater appreciate its utility.

This "squad" is a separate and mobile body of officers, whose base is Scotland Yard, but, with motor-cars at their disposal, hold themselves in constant readiness to go to any part of London to take up a case or pursue a fleeing fugitive.

It has proved its value on many occasions since its inauguration, but the equipping of its cars with wireless, and thereby making communications possible with H.Q. even after the cars have left the Yard, would greatly enhance the "squad's" utility and mobility.

Another great use to which portable wireless sets could be put is the equipping of the cars of the most important heads of the Yard. The "Big Four," as the area superintendents have been popularly termed, would find wireless very useful if their cars were fitted with it, to enable them to keep in close touch with their areas at all times.

If the perfecting of wireless communication proceeds at the rate it is now progressing, small portable transmitting sets may be invented to more than double the use of the wireless sets in the police cars.

But there are many more difficulties in the way here. The task of preventing interference is one. As they pursue their way at top speed on varying roads, cars must be able to talk to each other without either interfering with, or having their own messages rendered indistinct by interference of any sort from other privileged transmitting sources.

Then, again, will crop up the problem of secrecy. The messages sent out between C.I.D., H.Q. and its officers, if broadcasted, will stand every chance of being picked up by the criminal himself, for modern lawbreakers arm themselves with the very latest scientific improvements. If the police are making high endeavours to benefit themselves by the power that wireless can give them, you can rely on the fact that the modern crook is studying the subject too.

These are only a few of the problems the police of this and other countries are devoting great attention to.

In the U.S.A., the New York and Chicago Police Departments report yet another step forward in this adaptation of wireless to the causes of law and order.

Like London, both these cities have fitted their police headquarters with a very full wireless equipment, and have inaugurated special departments for experimental and research work in the possibilities of wireless in the detection of crime.

The headquarters of the police in both these towns have wireless transmitting stations, which broadcast the news of every fresh crime over an area of thousands of miles directly it is reported to them.

Both police forces, too, possess motor squads similar to our "Flying Squad," and have their cars fitted with both transmitting and receiving wireless sets. By means of these, communications have been kept between cars travelling at fifty miles an hour.

They have a miniature set, with which, as soon as they can be manufactured in sufficient numbers, every policeman in Chicago will be equipped.

Owing to very generous, but nevertheless unwise, lack of restrictions, permissions to broadcast have been granted in America to far too many people. Interference is a bugbear over in the States through the air being overcrowded with etheric messages.

In Paris the police are calling wireless to their aid in new directions every day. Additional patrol motor-cars are being equipped with wireless apparatus as quickly as circumstances permit.

Already reports from the French capital prove that wireless has had very big effects in checking the crime wave within its walls.

It is quite possible that in the future, in this and in other countries, as soon as a big crime is reported *all* wireless communications will be suspended for a period, except police calls.

FATHER TRIES THE A.C. MAIN FOR VALVES.

RADIOTORIAL

All Editorial Communications to be addressed The Editor, POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

I must say right away how very much I appreciate the letters sent to me by readers of POPULAR WIRELESS.

Judging by their general tone I gather that this paper supplies a long-felt want. If that is so, I am at least repaid tenfold.

It is impossible to reply to every individual reader who sends in his or her congratulations, because my staff are already overworked in answering technical queries sent in by readers.

But I want to take this opportunity of thanking all those who so kindly wrote to me and gave their frank and candid opinions of POPULAR WIRELESS. There is nothing so stimulating as criticism.

I will admit that I was a little alarmed when I saw the enormous number of letters and queries that arrived with every post; but the loyal co-operation of my staff soon dispelled those fears.

If readers who sent in queries failed to get their replies by an early date, I ask them to be patient and remember that if they had been answered in the pages of POPULAR WIRELESS, IT WOULD HAVE TAKEN MONTHS TO DEAL WITH ALL THE QUESTIONS.

The response to my invitation for readers to send in photographs has been so good that I am making a further offer. I will award 10s. 6d. to the owner of every photograph printed in POPULAR WIRELESS, and £2 2s. to the reader who sends in a photograph most suitable for publication on the cover.

Address your photographs to:

The EDITOR,
POPULAR WIRELESS,
Fleetway House,
Farringdon Street,
London, E.C.4,

and mark the envelope "Photo" on the left-hand corner.

T. H. H. (Upper Tooting) says he is going to erect an aerial from a chimney stack to that of a neighbour's, a distance of about 50 feet, and about 30 feet high. By taking the aerial to another stack further away, he can get an aerial of 100 feet, one end of which will be only 25 feet high instead of 30. Which would be better; to lose height or length?

Height is very important, but in these circumstances it would not justify the loss of 50 feet in length in order to avoid the reduction in height at one end by 5 feet.

K. L. D. (East Sheen).—How can I charge my accumulator from 210-volt direct current house supply?

Unless you have considerable experience of electrical work, don't. 210 volts can give you a shock, and you might blow the fuse. The charging rate of an accumulator might coincide with or be above the usual current consumption of the lights. If so it can be placed in series with the main, but this sort of thing is very dangerous for the amateur to meddle with.

* * *

W. T. (Hartshill).—Does the wire run under the ground past the length of the aerial? If so, how can you communicate with anyone if the wire under the ground does not reach the person to whom you wish to speak?

Why is it called *Wireless*? There is no metallic connection between the transmitting and receiving stations. An earth connection is necessary only to get some good connection with the earth, which is a universal conductor. A water pipe is excellent, but an iron rod driven into the ground would do.

* * *

C. V. (Dulwich).—Must an aerial wire be level, or could one point be, say, 30 feet high, and the other 20 feet?

Horizontal aerials are to be preferred, but do not reduce height to do this; height is all-important.

* * *

M. C. G. (Essex).—What are "honeycomb" coils used for, and why?

Primary, secondary, and reactance in valve receiving circuits. By the use of these coils the self capacity of the circuit is reduced to a minimum.

* * *

L. H. (Durham).—Can ordinary telephones be used for wireless?

Not successfully.

* * *

H. A. T. (London).—If I replaced the telephones for a buzzer, would it work and repeat the Morse signals received on the aerial?

It would not.

* * *

G. M. (Croydon).—What value would an inductance have to be to bring my tune side (Mark III receiving set) up to 1,500 metres? The condenser is ·001 mfds.

630 microhenrys.

* * *

"CURIOUS" (Eltham).—How do aeroplanes make their earth connections?

An aeroplane uses its engine, to which most of the bracing wires are electrically connected, as an earth. This is known as a capacity earth. All aerials and earths can be likened to condensers, the aerial forming one plate and the earth, whatever it is, the other.

* * *

E. C. M. (London).—Up till quite recently I have been receiving excellent telephony on my Mk. II. A few days ago it commenced "howling" every time I switched the current on, completely preventing the hearing of signals.

Without doubt, a broken or faulty connection. Examine both exterior and interior connections thoroughly.

* * *

B. M. (London).—My earth lead to the water pipe is 20 feet, but to get down to the earth it will have to go down this pipe at least another 70 feet. Is this taken into account?

No; "earth" in this case is the water pipe.

* * *

S. P. (Walsall).—Would it be possible to detect Morse signals on a buzzer using a crystal receiver?

No, it would not. The received current is extremely small and the only buzzer it would actuate is the high resistance telephones that are used. In that sense these are buzzers, aren't they?

* * *

R. T. (B'ham).—Would a frame aerial be suitable for use with a crystal receiver?

No, not at all suitable. The range would be extremely small, only a mile or so.

* * *

"PUZZLED" (Glasgow).—Should not your sketch on page 17 have four wires leading to the receiver instead of one? I note that each wire has been insulated.

This sketch heading "Topical News and Notes," is not intended to be diagrammatical. In any case, the four wires would group to one common lead-in.

* * *

W. H. P. (L'pool).—Do you think the P.M.G. would object if I fixed my aerial to a telegraph pole?

Yes. And, in any case, it would not be a very sound scheme. With the three-valve set you intend to use, you would hear much more land line conversation than wireless signals.

* * *

W. F. G. (Bushey).—Are any batteries or accumulators required with the 35s. receiving set described in number one?

No.

* * *

W. S. (Farnborough).—I wish to communicate at will with a friend 75 miles away by wireless.

The P.M.G. will only issue transmitting licences for stated and definite experimental purposes. The power is limited to 10 watts, and this, in any case, would not allow of communication over this distance.

(*Continued on page* 84.)

WIRELESS QUESTIONS ANSWERED.

(*Continued from page 82.*)

H. R. H. (Rock Ferry).—Does light or darkness affect wireless waves ?

Yes. Signals are much stronger at night, and the range of transmission considerably increased.

* * *

Does the direction in which the aerial points in relation to that of the transmitting station affect the strength of the signals received ?

Yes. Signals will be stronger from a certain station if the instrument or lead-in end is pointing towards it. This is the principle of wireless direction finding.

* * *

P. H. (Darlaston).—Would putting two crystals "in cascade" improve reception ?

No. By doing so the received current would be greatly reduced owing to the increased resistance offered.

* * *

W. D. (Walsall).—Having seen how simple it is to erect a receiver in number one, I wish to know whether if I increased everything in proportion using same materials I could receive up to, say, 100 miles.

No. By increasing the size of the inductance, for instance, you would increase the wave-length maximum of the set. The range of reception does not depend on this, however. It is the sensitiveness of the crystal detector and the efficiency of the aerial that count.

* * *

C. J. B. (Essex) asks if a potentiometer is necessary in a crystal set.

Not every type of crystal needs a local battery circuit and potentiometer. Carborundum does, but silicon and many other crystals do not. (See article on crystal detectors.)

* * *

"Novice" (Grantham) asks how stations working in the Morse code may be recognised, and how the origin of telephony may also be determined.

All stations are given call signs. The majority of stations have three-letter call signs, although some have two and four.

Paris, for example, has a two-letter call sign, F L, and when you hear "C Q, C Q, C Q *de* F L," the following is the explanation :

"C Q" is a call sign meaning "All stations." Paris calls C Q and separates this call by the sign "de" (— . . — . in the Morse code), and then gives her own call sign, F L, to indicate the name of the station that is calling all other stations. The station calling always gives its own call sign *after* the sign *de*.

The call sign of the station to whom another station wishes to communicate is always given first, *i.e.*, B R M *de* G L D, or, Land's End Wireless Station calling the steamer "Hunnie."

"George Hague" (Doncaster) asks what sort of receiver he would require for signals from the Hague and Paris.

You will get Morse from Paris on a good crystal set, but for telephony reception you will require a valve receiver. Using one valve you would get only poor results from Paris and the Hague in Doncaster, but with two or three stages of amplification you should get excellent results. The Hague concert is only sent on Sundays, but Paris sends regular Morse and telephony every day. (See Broadcasting Programmes.)

* * *

M. H. (Leeds) asks how "deep down" he should bury his "earth" plate, and whether old tin cans, etc., would make a good "earth."

Two or three feet would be a good depth. Choose your ground plot where there is plenty of damp. The "tin can" type of earth you suggest would not act at all well, unless you connected each can, etc., together. By soldering them (a long job if you use small tins) together you could construct a fairly good earth, but it would be simpler to use a "one piece" earth. A sheet of copper or some good wire netting would do very well.

* * *

"Pessimist" (Lincoln) says he heard telephony last Tuesday from a station called "Two Emma Top." He expresses weary resignation at this enigma, and asks for a translation.

If you are a beginner you may well be surprised. "Two Emma Top" is not a lady amateur as you suggest, but is the Marconi station at Writtle, near Chelmsford. The call sign of this station is 2 M T, and the operator, in stating the sign, announces it as "Two Emma Top" in order that the individual letters may not be misunderstood. Army signallers started this game. They referred to A as "Ack" and B as "Beer," so that A B would be spoken over the 'phone as "Ack Beer," which often startled the novice. Letters are sometimes so distorted when spoken by 'phone or wireless (though very rarely in the latter case) that these precautions are necessary Therefore, we cannot give you an introduction to "Miss Two Emma Top."

* * *

"New Hand" (New Cross) asks the meaning of the following mystic letters : H.F. ; L.F. ; A.T.I. ; H.T. ; L.T. ; E.M.F.

H.F. = High Frequency ; L.F. = Low Frequency ; A.T.I. = Aerial Tuning Inductance ; H.T. = High Tension ; L.T. = Low Tension ; E.M.F. = Electro-Motive Force. The unit of E.M.F. is the Volt.

* * *

E. A. W. (Manchester).—In the article "How to Make a Receiver for 35s." the diagram Fig. 3 shows no battery. Is this correct ?

Yes. No battery is required with a receiver of this type.

* * *

F. L. (Sheffield).—Can music be received on a crystal detector set ?

Yes, quite well within a range of 15-20 miles.

* * *

C. J. R. V. (Newcastle-on-Tyne).—Does the Post Office licence entitle one to erect an aerial across a street ?

No.

* * *

S. A. (Darlington).—Will our electric light supply (250-volt A.C.) interfere with reception ?

Yes. Using valves you will doubtless experience some interference. Endeavour to keep all the apparatus and leads as far away from the wiring as possible.

* * *

G. F. M. (Woodford).—Can amateurs have an official call ?

Only in the case where a licence is granted for the purpose of transmission.

* * *

G. D. (Dulverton).—The main supply is 230 volts direct current. Could I use this for my plate current ?

No. The pressure is too great. Even should you reduce this by inserting resistance it would not be suitable. It would be too "noisy."

* * *

T. T. T. T. (Birmingham).—Should I be compelled to get out a licence if I have no fixed aerial ?

You would.

D. W. D. (Strood).—I have wound my inductance with 28 d.c.c. Is there any way of testing the winding to make sure that there is no break in the wire ?

Connect one terminal of a dry battery to the one end, and the other terminal to one of the telephone receiver leads. You can then test the continuity of the winding by touching the other receiver lead to the free end of the coil. If it is O.K. a distinct click will be heard.

* * *

J. T. (Redcar).—What is galena, silicon, and carborundum, and where can they be obtained, and at what price ?

Galena and silicon are mineral crystals, and carborundum a chemical combination of carbon and silica. If required for wireless purposes they should be procured from a firm specialising in this apparatus, as all specimens are not suitable. Price is 6d. to 1s. per specimen.

* * *

"Rag Time" (Dorking).—I am constructing the "rag and bone" set. To what wave length could I tune ?

With 100 feet aerial about 800 metres.

COMPETITION RESULTS.

The entries for the second Broadcasting Competition were even more numerous than those for number one, but I have finally decided to award prizes to :

Mr. Peter Dow,
23, Graham Avenue,
Kilbowiehill,
Clydebank.

Mr. G. Parsons,
51, Brettell Street,
Dudley, Worcester.

Mr. J. L. Wright,
8, Norbury Parade,
London, S.W. 16.