

No. 1 All about Wireless" - A New Paper for ALL

POPULAR PWIRELESS

3d

No. 1 Vol. 1
June 3
1922

Weekly



THE WORLD'S
LATEST HOBBY
FULLY EXPLAINED

PUBLISHED
EVERY
FRIDAY
ORDER IN
ADVANCE

PACKED WITH
PICTURES AND
EXPERT ADVICE

?

WHY PAY POUNDS FOR A SET OF LATTICE WOUND INDUCTANCES

?

You can easily make as many as you wish for the price of the wire only by possessing a

BRITISH
MADE.

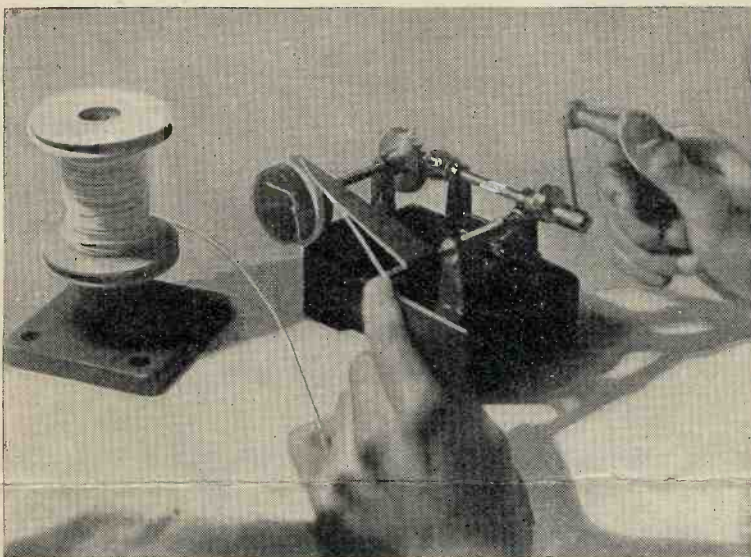
LOKAP LATTICE COIL WINDER.

STURDY
and
SIMPLE.

The only simple machine for winding coils giving the Sine Wave Lattice Lay.

Reg. No. 686889. Patents Pending. (Pro-Patents 1834/22 & 1838/22).

LOKAP COILS are $1\frac{1}{2}$ in. inside diam. and wind up to 6 in. external. Thickness $\frac{1}{4}$ in., $\frac{3}{8}$ in. or $\frac{1}{2}$ in.



DIRECTIONS FOR GENERAL USE OF THE "LOKAP" WINDER.

Screw the machine down firmly to the table or bench, making sure that the set screws holding gears and cams are tight. Have the bobbin with the wire upon it behind you, mounted in any convenient way, so that when winding is commenced it has a fairly free feed.

Pass the end of the wire through the small hole in the BRASS FEEDING DEVICE on to the pin on the drum. Hold the wire as shown by the illustration, keeping the forefinger on to the end of the CAM SHAFT, so as to assist the spring, tension being unconsciously applied by the wire passing through the fingers. Start the winding two or three times, if it is your first attempt to use the machine, to grasp its working principles. A slip on the first layer is not at all detrimental but helpful, as will be seen later. Continue winding until you think the coil is large enough, maintaining the tension on the wire, drop a little hot sealing-wax or Chatterton's Compound on to the finishing end, and wait a few seconds until you are sure this end is being held securely, then cut off. TO REMOVE FINISHED COIL FROM THE DRUM, pass a piece of thin string or twine through the slots on drum and tie off, do not use undue pressure or you will spoil your handiwork, then carefully slide off the drum. THE COMPLETED COIL can be used as it is, or preferably, soak well in hot paraffin wax or shellac varnish it. When dry it is ready for use. If coil has been wound too tightly, and difficulty is experienced in removing from drum, carefully pull the end of the commencing winding, thus taking out one or two turns, and it will easily come away.

PRICE - 25s. POST FREE U.K. FOREIGN 5s. extra.
(Including set of Three Cams).

Being sturdily built, with ordinary care it will not wear out.

INSTRUCTIONS FOR USE OF THE "LOKAP" WINDER.

Decide upon the wave length you want before winding. For long waves use fine wires, for short wave lengths use thicker wires. The following examples will help you to select :-

1. Coils suitable for, say, 200 metre Tuner. Use Cam No. 3 and a 22 gauge wire either cotton or silk covered.
2. Coils suitable to tune, say, 200 to 800 metres. Use Cam No. 2 and a 24 gauge wire.
3. Coil suitable to tune from 400 to 4,000 metres. Use Cam No. 2 and a 24, 25, or 26 gauge wire.
4. Coils to tune from 1,000 to 20,000 metres. Use No. 1 Cam, either 26, 27, or 28 gauge wire.

Other gauges may be substituted for those given.

IT IS IMPORTANT TO NOTE that if two exactly similar coils are connected in series, and mutually coupled, the LC value of the two is much greater than twice the LC value of either. Thus : 2 coils designed to tune with a given condenser a range, say, of 600 metres each, coupled in series with the condenser in shunt will tune to about 1,200 metres.

INSTRUMENT WIRES.

All wire wound on bobbins free.	Postage extra.	
S.W.G. S.C.C. D.C.C. Sgle. Silk. Dbl. Silk. Emd.		
12 1/10 1/11 4/-	5/4 1/8	AERIAL
14 1/11 2/- 4/-	5/4 1/9	WIRE - 7/23.
16 2/- 2/1 4/2	5/6 1/10	6/6 100 ft.
18 2/1 2/2 4/4	5/6 1/11	
20 2/2 2/3 4/8	6/2 2/8	
22 2/6 2/11 5/-	6/8 2/8	
24 3/- 3/6 5/6	7/4 2/8	
26 3/7 4/1 6/8	8/2 3/2	5/24, 5/ 100 ft.
28 4/4 4/7 7/2	9/- 3/6	
30 5/- 5/6 8/-	10/- 3/10	
32 6/- 7/3 9/2	13/- 4/2	AERIAL
34 7/- 8/3 11/6	14/- 4/4	INSULATORS,
36 8/8 10/2 14/-	15/3 4/8	1/- each,
38 11/3 13/2 16/-	19/- 5/3	
40 15/- 18/- 18/6	22/3 6/6	
42 17/3 21/- 31/6	34/- 9/-	

At per lb.

All orders of 1 lb. or over wound on reels free. For less than 1 lb. reel 3d. extra.

48 PAGE PROFUSELY ILLUSTRATED WIRELESS CATALOGUE - Post Free - SIXPENCE

LONDONERS SHOULD PAY US A VISIT.

MITCHELL'S are the Pioneers of THE HOME WIRELESS OUTFIT at £5 0s. 0d.

Look out for our Advertisement in the next issue of COMPONENT PARTS FOR THE EXPERIMENTER

MITCHELL'S ELECTRICAL & WIRELESS CO., LTD.,
188, Rye Lane, Peckham, London, S.E. 15.

WHOLESALE SECTION :- MACDERMOTT ROAD, S.E. 15.
(At rear of Main Stores).

TELEPHONES :- NEW CROSS 1540.
NEW CROSS 1541.



Popular Wireless

TOPICAL NEWS AND NOTES



Wireless in Ireland.

"WIRELESS telephone licences are not to be issued in Northern Ireland until conditions are more settled," said Mr. Kellaway, the Postmaster-General, in a written Parliamentary answer to Major O'Neill.

In any case, if permission is eventually given, Ulster will be well within range of the Glasgow broadcasting station.

Journalistic Enterprise.

WIRELESS telephonic journalism was started in Holland as far back as last February, and so far the results have been very good. Fifty different newspaper subscribers of the Vasdiar Agency at Amsterdam, equipped with receiving sets, receive news throughout the day.

This is a good commencement, and although this service has not been welcomed over here, there is no denying the fact that it will eventually come—and come to stay.

The "Boom" in Canada.

WIRELESS is booming in Canada, as in the States. Many hundreds of receiving sets are in regular use in such places as Montreal, Toronto, and Winnipeg, by enthusiastic amateurs. Business concerns, specially in lumber operation, have been working over wide stretches of forest, using the wireless telephone with excellent results.

In the reporting of forest fires the radiophone has proved invaluable, and lumber companies are installing powerful apparatus connecting their offices with portable sets placed in the woods, thus opening up a wide field of commercial usefulness in the vast forests of Canada.

Recording Signals.

MESSAGES received by your wireless set when you are not present need not be lost. Signals can now be recorded on a special form of tape machine, or can be made to reproduce themselves on a gramophone record.

Broadcasting.

AN agreement has been arrived at between the Radio Communication Co. and the Metropolitan-Vickers Electrical Co. whereby these concerns propose to establish and jointly operate broadcasting stations. Big things are expected of these two firms.

Schoolboy's Enterprise.

THE record for erecting the first amateur wireless station in North Devon has fallen to a schoolboy at the Devon County School, West Buckland, Master John B. Joyce, son of the Rev. Walter W. Joyce, Rector of Charles. The rector is the holder of the licence, and Joyce junior is the operator, the latter having been largely responsible for the construction of the apparatus, which consists of a single valve set, with necessary running coils, etc. The aerial is a single wire "inverted L," 80 feet long, height 35 feet, with 25 feet lead-in. The most interesting receptions are telephony and time signals from the Eiffel Tower. Both the 1,800 and the 2,600 metre transmissions of music and speech are plainly audible. The operator would be pleased to communicate at any time with any other genuine wireless amateur in the district.

Come, Birdy, Come!

"WHAT effect will the establishment of several new broadcasting stations have upon the birds?" asked one of our contemporaries a few days ago. "It is strange," thought the writer, "that an unseen influence, manipulated by man, can deflect the sure, instinctive flight of the birds. Nevertheless, it is a fact that our feathered friends are disturbed in a singular way by the wireless waves."

"Gulls appear to be the principal sufferers but large numbers of doves are in some way prevented from finding their way home when there are wireless stations in the line of flight. This strange phenomenon is attributed to some effect of the ether waves not yet understood."

I suggest the doves take out a licence at the nearest post-office and erect a direction finder at the earliest possible moment.

Amateur Wave Lengths.

THE decision of the committee which the Postmaster-General appointed has now removed some of the restrictions on the operations of wireless amateurs. A new wave length of 440 metres has been sanctioned for transmission, and the wireless amateur is to be exempt from inspection of his receiving station, and will no longer be restricted as to the length of receiving aerials.

Wireless on Trains.

THE Chicago, Milwaukee, and St. Paul Railway has equipped its trains with a radio system for the benefit of passengers. Arrangements have been made for the installation of complete radio systems in the club cars of the Pioneer Limited trains between Chicago, St. Paul, and Minneapolis. All news of the day will be received.

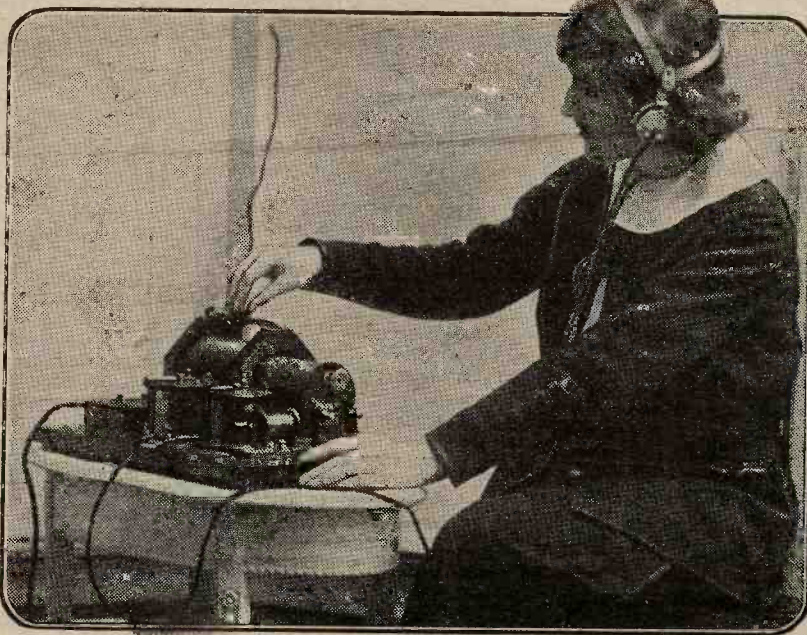
Wireless and Fishing Boats.

QUITE a number of North Sea trawlers and steam drifters are fitted with wireless telegraphy. Although their transmitting radius is small, the receiving capabilities are good. The purpose of the installations is said to be receiving, and most of the messages handled by them are in relation to the state of the fish market. When the market is glutted and the price of fish is low they are instructed to stay out and continue their fishing for another day or two. Similarly, when conditions force dealers to sell fish as manure, the fishing hauls can be diverted to other parts more fortunately situated.

Our Australian Confreeres.

IN Australia to-day there are between 1,500 and 2,500 wireless experimenters, and it is anticipated that the number will grow very rapidly. It is

WHY WIRELESS IS POPULAR.



A fair amateur "tunes in" the Marconi concert.

NEWS AND NOTES

(Continued)

a well-proven fact that the private experimenter has made valuable contributions to the advancement of this art, while his services in the war were invaluable because the ranks of experimenters provided a large number of men who could be quickly brought up to the stage of experts for naval and military purposes. There has been a tendency in Australia to legislate against the private experimenter, but that has been happily overcome, and regulations were recently passed through the Federal House which provide for licensing privately-owned experimental stations.

The s.s. Leviathan.

THE steamship Leviathan, when she starts again in the transatlantic service next year, will have a wireless telephone in every state-room. The plans for the reconditioning of the huge liner call for the finest wireless equipment ever put on a passenger vessel.

The Leaffield Radio.

THE wireless station at Leaffield is about 600 feet above sea-level. The power plant consists of two 250-kilowatt arcs and auxiliaries. The main aerial system is supported on ten tubular steel masts, each 300 feet high. The ground wires are buried



Constance Talmadge, the famous film star, broadcasting film gossip.

at a depth of about 9 inches. For reception a separate aerial, supported on 75-foot poles, is to be used. It is necessary for this aerial to be grounded and the receiving apparatus protected during transmission on the main aerial. This operation is performed by a remote-controlled switch, which is operated by the stop on the arc controller immediately preceding the stops operating the 1,000-volt contractors of the arc supply current.

Charabancs and Wireless.

A SOWERBY Bridge charabanc proprietor has had one of his vehicles fitted with a complete wireless installation, the preliminary tests with the instrument having proved quite satisfactory. While on a trip the passengers will be in constant communication with the home station, while, when the broadcasting scheme is in full swing, the charabanc party, when out on the moor tops, will be able to stop and be entertained with wireless concerts.

An Odd Thing.

AN odd thing happened the other day in America in connection with a sermon being delivered as part of a radio programme. By what is known as "jamming"

the ether, some man, evidently a rabid atheist, cut in and literally blew the sermon out of the air.

Wireless to Lonely Outposts.

WIRELESS news that will reach lonely Canadian outposts thousands of miles beyond telegraph lines is being broadcasted in Alberta by the "Edmonton Journal" to demonstrate the possibilities of bringing remote areas into the civilised zone.

What this means to fur traders of the north is shown by the fact that last winter in the Mackenzie River basin, which stretches beyond the Peace River country for more than 1,000 miles to the Arctic Ocean, a fur trading company lost £100,000 because its buyers had been instructed to pay the Indians a certain price for raw furs and there were no means of informing them that in the meanwhile the furs had dropped to a quarter of their former value.

Others who will benefit by the wireless news will be the lonely trading posts along the banks of the Mackenzie River and the pioneers of trade development as far distant as 1,200 miles north of Edmonton.

For the Farmers.

THE Central Landowners' Association have asked the Postmaster-General to allow a wireless telephone news service to be broadcasted. They are particularly anxious that, for the benefit of farmers in areas remote from towns, the service should include weather forecasts, now broadcasted by wireless telegraphy, besides market reports and general news.

The "Early Bird" Radio.

AN interesting wireless development has been reported at Croydon, where a young amateur has installed a home-made receiver at his bedside, and is wakened sharp at six-thirty every morning by the first call-up at the aerodrome.



Within a month, it is hoped, the national wireless telephony broadcasting scheme will be in operation.

Already much preparatory work has been done towards the preparation of a scheme. The financial side has been thoroughly investigated, and it has been ascertained that the cost of the daily programme from each station will be about £20,000 a year—that is, £160,000 a year for the eight stations. In addition, there will be the cost of the equipment and maintenance of the stations.

All expenses are to be borne by the manufacturers. The sole cost to "listeners-in" will be that of the installation in their homes or offices, which may vary from £5 5s. to £105.

I understand that twenty-three firms have applied to the Government for broadcasting licences, and it is these firms which have been requested to present a scheme to the Postmaster-General.

The daily programme, which will be different from each station, will include, according to present arrangements, vocal music

His instrument is a very cheap and simple set, and is fitted with a crystal detector.

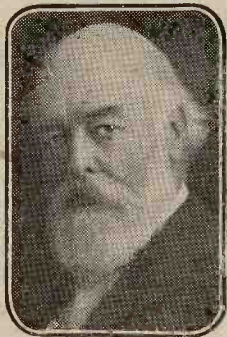
Private Wireless?

CONSIDERABLE speculation has been caused in the wireless world by the announcement that Mr. John Hays Hammond, son of the well-known engineer, has perfected an invention to make wireless messages private.

Such an invention would have very far-reaching effects, particularly in the commercial world.

It would mean that the sending of news, by great national and international agencies, by wireless would become a practical proposition.

The same applies to business houses where absolute secrecy is necessary. The invention would also be of immense value for police work. Experts, however, are sceptical about the invention.



Sir Oliver Lodge whose experiments and inventions have proved of the greatest value in wireless problems.

Future of Telephony.

SIR Oliver Lodge is devoting himself largely to wireless and the telephone amplifier since he left Birmingham and settled upon Salisbury Plain. He was able recently to contrive an appliance by which he could hear a watch ticking seventy feet away. He thinks that we stand upon the threshold of amazing developments.

A Music-Hall Innovation.

Listening-in sets are to be installed in the Palm Court of the Palladium Music Hall, London.

Here some 300 people, waiting for the commencement of Mr. Harry Day's revue, "Rockets," will be able to hear, through the loud-speaker apparatus, news and music from all parts of the world.

If the innovation is appreciated, Mr. Gulliver intends to extend it to all his theatres throughout the country. Mr. Harry Day will do the same.

ARIEL.

Broadcasting Programmes

and musical entertainments at intervals during the day, addresses by experts on their own particular subjects.

At the time of going to press there are two regular weekly concerts which the amateur may pick up.

One is from The Hague (official call P C C G) on Sundays, from three to five p.m. on a wave length of 1,070 metres. Music from this station has been clearly heard in Aberdeen, using three valves. Good results, however, may be expected using only two valves, providing a good aerial system is employed.

The Marconi Co. broadcast a twenty-five minute concert every Tuesday evening from Writtle, near Chelmsford, at eight p.m., B S T, on a wave length of 400 metres.

Amateurs in Scotland have had excellent music and speeches from this station (official call sign 2 M T), using three valves.

Telephony from the Eiffel Tower is regularly sent out on Sunday afternoons on a wave length of 2,600 metres. The official call of this station is F L.

Wireless Wonders to Come

Shall we ever see by Radio? And can Nature's wireless supply us with an unlimited source of power? Both these great ambitions are within the realms of practical possibility.

By THE EDITOR.

THE radio telephone has brought speech and music to our homes on the back of wireless waves. That alone is something to marvel at—the fact that we can hear a man singing to a piano accompaniment fifty or a hundred miles away. But what will the general public think when they instal apparatus which will enable them to see as well as hear by wireless? To the novice in wireless work this suggestion must savour very much of black magic or the ravings of a second Munchausen and De Rougemont rolled into one. Jules Verne himself would have paused before suggesting such a possibility.

Photographs have already been successfully transmitted by wireless, but the fascinating problem of transmitting living pictures by wireless is still in its undeveloped stages. Yet it is a possibility—a distinct possibility, amazing as it may seem.

Inventors have already made crude attempts at the accomplishment of this great feat, and there is little doubt in the minds of scientists that a radio telephonic vision will be an actual fact before very many years have passed us by.

The first step in the realisation of this invention has already been reached by the transmission of wireless photographs.

Mr. Edward Belin, a French scientist, recently invented a system of telephonic telegraphy which has thrown light on many dark problems surrounding wireless vision, and Knudsen, a Dane, has made interesting experiments in sending pictures by wireless. Creed has done even better in helping to rend the veil and reach the desired goal of radio vision.

Another interesting wireless experiment lately carried out in the United States was connected with the battleship Iowa.

She was manoeuvred at sea entirely by radio during bombing tests.

The captain, safe on shore, had only to transmit waves in a certain sequence, and the ship would answer to her helm as readily as if a man was actually controlling her from the bridge.

Will naval battles of the future be fought by crewless ships—the respective commanders controlling the vessels from wireless stations ashore? It is quite possible.

And what if we could harness Nature's wireless to do our bidding? Whenever lightning flashes, a terrific radio signal is being sent out. Can we use this energy to drive motors and other machines?

The problem is to find a way to drain the vast atmospheric reservoir of electricity that exists all about us. Undoubtedly the man who invents a means of doing this will die a millionaire many times over.

He will revolutionise civilisation. Imagine the millions of machines we now drive by artificially-generated current being supplied indefinitely by Nature's natural storage battery! Think of the effect it would have on our everyday life!

But however fantastic this may seem,

remember the principle is a sound one, and that the harnessing of lightning is a proposition which scientists are seriously studying. If they solve the problem— But it is a big "if," and, meanwhile, one's imagination is apt to fail when considering the results.

When you have installed your receiver and are getting along with your wireless studies, and the approach of a thunderstorm is heralded in your telephone-receivers by loud, incessant atmospheric "crackers," just pause and think of the titanic energy Nature is letting loose, and try to feel that, however far man has progressed with wireless research, there is still a problem left which will tax his ingenuity to the utmost and will cry shame on his so-called "high-power" wireless transmitters.

Nature's wireless!—people hear it working a lot nowadays—but I wonder if they realise exactly what it means, and what are the possibilities it has in store for us?

THE EDITOR.



Our artist depicts a scene in the wireless future. A breakfast, the owner of the radiophone listens to the latest news; at his office, to the latest stock market quotations; but back home again in the evening he sees, as well as hears, the opera being performed at Covent Garden.

A Badly Insulated
Aerial Means Weak
Signals in Your Phones

Write to Our Technical
Expert if in Doubt
—Editor.

WHATEVER type of receiver you buy you will want an aerial. Even the portable receivers—which do not have an outside aerial wire—will give far better results, if connected up to a good aerial.

The aerial is really a "feeler"—it is sometimes called an "antenna"—because it detects and conveys to the receiving apparatus the current set up in it when wireless waves are sent out.

The aerial is a wire which "picks up" the wireless waves and utilises some of their electrical energy.

It is an accepted fact that the higher your aerial, the better the resultant signals in your receiver, and, therefore, it is always as well to have your aerial as high up as possible.

Indoor aerials are usually wound round a wooden frame, but when used in conjunction with a crystal receiver, they are practically useless. With valve sets the results are better.

When erecting the aerial, see that it is free from contact with the branches of trees and that it is well insulated.

Wherever there are two buildings or one building and a tree, or two trees, one of which is near to the house, the erection of an aerial pole is unnecessary. (See diagrams.)

For the best results the aerial should be a fair height from the ground—say, not less than 40 feet, whilst its overall length, in order to comply with the Post Office regulations, must not exceed 100 feet.

Wherever possible a plane not less than a horizontal position should be maintained for approximately 75 feet (see Fig. 1), the remaining 25 feet being used for the drop-wire, or "leading-in" wire, to the terminal marked "aerial" or "A" on the receiver.

Should the distance between the two chosen points for swinging the aerial be greater than 75 feet, any surplus distance can be made up by increasing the rope at B; any increase at A would, of course, tend to lengthen the "lead-in" F, which is undesirable.

In so far as fittings are concerned, two supports of rope should be made at A and B, to which are attached two porcelain insulators, one to each support, as at C and D.

These insulators are obtainable at most electrical shops. One end of the aerial wire should now be secured to the insulator D. The other end should be fixed to the insulator C until there is 75 feet of wire between C and D.

The remaining aerial-wire constitutes the "lead-in," F, and should be long enough to reach the "leading-in" tube G, with a few feet to spare in order to reach the receiver.

The tube G is used as a suitable means of carrying the aerial wire into the room where the receiver is to be used and can be purchased at any of the many shops selling wireless apparatus.

How to Erect

By STANLEY G. RATTEE.

A good "leading-in" tube can be made from several thin pieces of cardboard, about 6 inches long and 4 inches wide, rolled together so as to form a hollow cylinder, and then bound with string, the whole being soaked in paraffin wax after completion.

The end of the lead F should be attached to the terminal of the receiver marked "aerial" or "A."

In the majority of cases the erection of a good aerial depends on back garden space, and if it is impossible to erect a 100-foot horizontal aerial, a twin aerial is a good alternative (see Fig. 2).

In this case 140 feet of wire may be used.

(NOTE.—The Postmaster-General has stated that amateurs will be allowed to erect aerials more than 100 feet long, but for practical purposes 100 feet of wire will suit the average amateur quite well to begin with.)

The wires of a twin aerial should not be less than 5 feet apart. Better results will be achieved if they are separated by 7 or 8 feet. Bamboo spreaders are recommended on account of their strength and lightness.

The twin aerial must have a down lead from each wire. These can be made to meet as they enter the house via the lead-in tube.

Copper or phosphor-bronze wire is the best for aerials. Iron or steel wire should not be used.

The aerial *must* be well insulated, and the down leads should be soldered at the point where they leave the aerial.

Scrape the end of the down lead wire before attaching it to the aerial terminal of the receiver.

Do not keep the aerial taut, but allow it to sag a little.

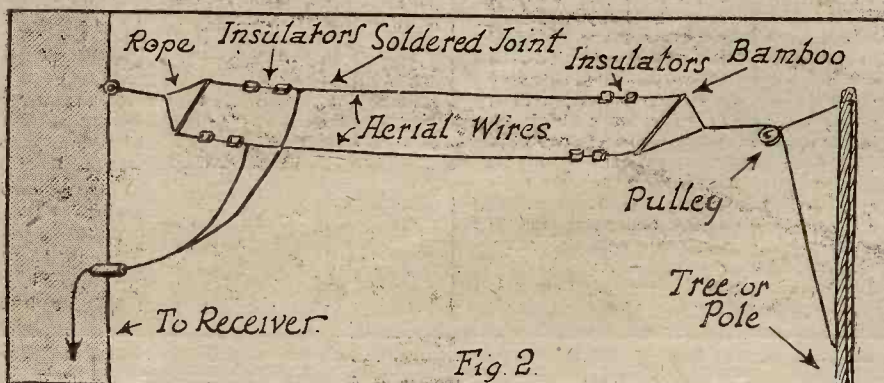
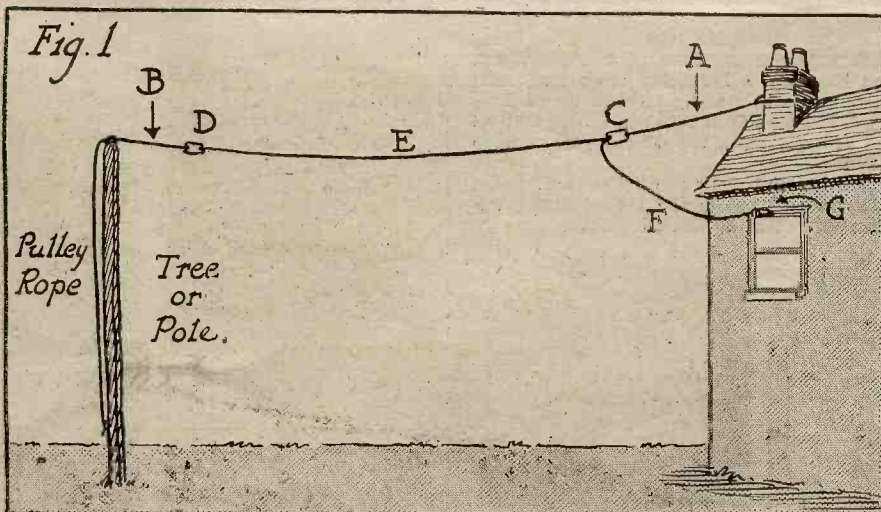
On the receiver will usually be found a terminal marked "E," or "Earth." From this must be led by the shortest possible way a wire to an earth connection. A good soldered connection to a water-pipe makes the best "earth" in the majority of houses.

The approximate cost of a single wire aerial is as follows:

	s.	d.
100 feet copper wire (No. 14 gauge) ...	7	6
2 insulators	3	0
1 lead-in tube	5	0
Rope	0	6
	16	0

This price will vary, of course, with the facilities afforded by the amateur's own collection of materials, which may, with a little ingenuity, be utilised for aerial construction.

Note.—Next week an expert will deal with the construction of a frame aerial, with full details of how it may best be used for wireless reception.



an Aerial

The Higher Your Aerial
the Better the Signals
You will Receive.

~~~~~

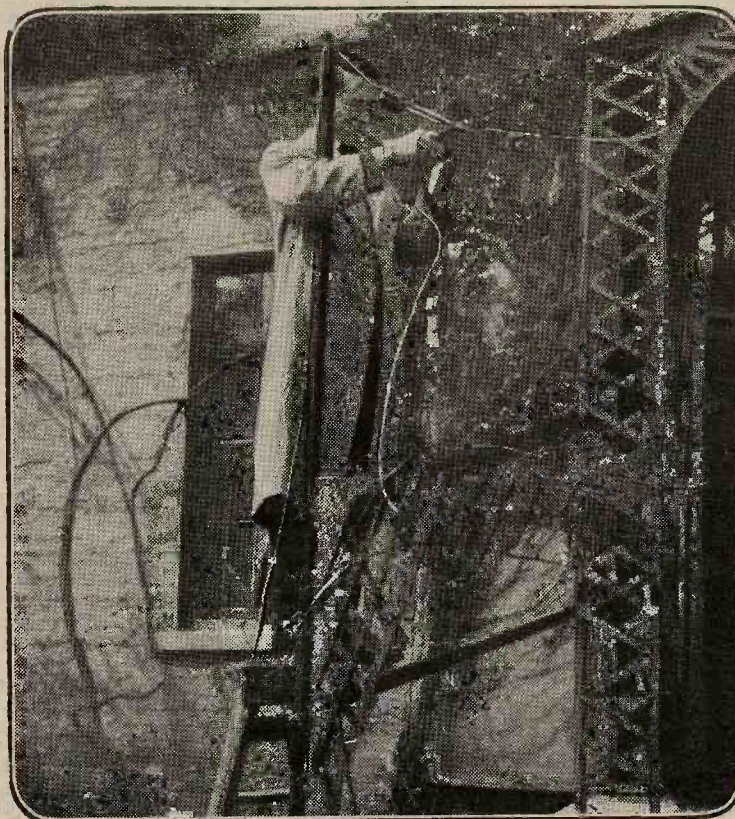
Keep the Wire Free  
from Tree Tops and  
Neighbouring Roofs.



A chimney stack will make a good support for your Aerial. Care should be taken that the rope does not fray against the brickwork.



When you are hauling up your aerial, see that the wire is not too taut but sags a little to allow for stress and strain.



The insulation of the lead in wire is very important indeed. A fault at the lead in tube means a "Short" to earth, and consequently your received signals will be dead weak, if any get through at all.



Attach the Aerial securely to the insulators. When the aerial is aloft it will have to take a big strain, and a bad connection will mean a collapsed aerial when you wake up one fine morning.



# HOW TO MAKE A RECEIVER FOR 35/-

This set is purely an experimental one. It has a receiving range of only a few miles, but will make clear to the novice how easily signals can be detected.

By GEORGE SUTTON, A.M.I.E.E.

THE construction of a very simple receiving set capable of "picking up" the wireless concerts is an interesting and instructive pastime.

Except for the telephone headpieces, which cost anything from 25s. upwards, the set described here can be made for a few shillings.

Carefully made, it will give good results, and when completed will prove an amusing example of a "rag-and-bone" type of receiver which, at present, is not to be found on the market!

A few yards of enamelled copper wire, a broken bottle or two, a piece of silicon crystal, a sheet of cardboard, a piece or two of wood, a strip of brass, and a thimble will complete the requirements for making this set.

Roll the cardboard into a tube five inches in diameter and six inches long, and glue it together. If you can get a piece of cardboard postal tube to these dimensions, save yourself the trouble of making it.

Buy at a shop where electrical sundries are sold one pound of Gauge No. 20 enamelled copper wire (about 2s. 6d. per lb.). Wind this closely, tightly, and evenly, each turn side by side, on the outside of the tube, for about 120 turns. This will occupy a space of about five inches in length, so you will start half an inch from one end and leave off half an inch from the other end.

Make both ends of the wire secure by threading through a small hole in the cardboard tube, and the part called the inductance is done. The drier this is kept the better the signals will be.

Now take a piece of wood six inches long and five and a half or six inches wide and one half to one inch thick. Screw the cardboard tube to this through the free half-inch at either end.

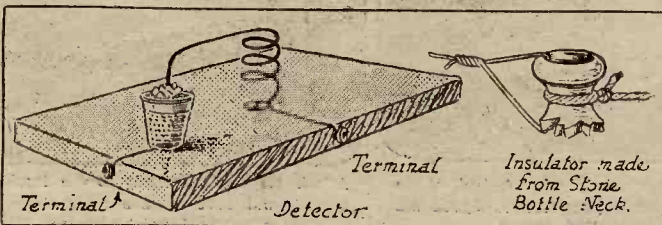
Take a piece of springy brass, half an inch wide, one thirty-second of an inch thick, and four inches long; screw this through one end to the middle of the side of the board and bend it in such a way that the free end scrapes over the enamelled wires on the cylinder from end to end, as indicated in Fig. 1.

The idea is that the brass strip must press firmly upon any selected turn of wire on the whole cylinder. At first the coating of enamel will prevent metallic contact between the brass strip and the wire, but this will soon remedy itself with use, as the brass will rub the enamel off in time and a neater line be made than if the enamel were scraped off by any other means.

Now take a piece of silicon crystal, which you have bought for a few pence at a wireless material shop, and a small metal sewing thimble, into which it will easily go. Get some tinfoil from a chocolate or tobacco packet wrapping, and pack the crystal tightly into the thimble with this after you have screwed or otherwise fixed the thimble on to another piece of wood about three inches long by two inches wide.

Six inches of your Gauge No. 20 copper wire should now be coiled into a spring, one end fixed to the board and the other end just touching the crystal where it is bare (see Fig. II.).

Fig. II. This shows method for mounting the crystal detector and the economic way in which a bottle neck may be used as an insulator.



Next take the neck of a broken ginger-beer bottle (being careful not to cut yourself), and tie a piece of rope or string round it by which you can attach it to your aerial pole or the highest point of the house. Thread the end of the remainder of your enamelled wire through the neck, keeping rope and wire from touching. This will make quite a good insulator. If desired, you might buy one which would look nicer.

Now, from this bottle-neck attached, we will say, to your chimney stack, run the wire to a pole, clothes-post, or tree in the garden, or on to an accommodating neighbour's chimney, insulate with another bottle-neck, and then continue the wire down to where you are making your wireless cabin.

The whole length of the wire so stretched must not exceed 100 ft. Where the wire enters the cabin it must not touch bare wood-work or brickwork. Thread it, if possible, through a glass tube for insulation.

Scrape the enamel off the end of a spare piece of your wire and twist it tightly round a clean brass water-tap, or, if the lead water-pipe is clean, round that. This becomes your "earth wire."

Then attach the lower end of the aerial to the wire at one end of the cylinder, scraping off the enamel where they meet. Attach the other end of the earth wire, one end being on the water-pipe, to the brass strip, also being sure that the enamel is scraped off the wire where it touches the brass (see diagram).

Connect by a piece of wire the junction of the aerial and the "inductance" to the

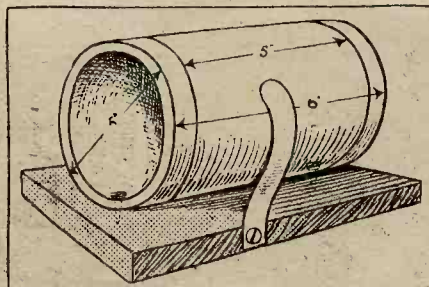


Fig. I.—This shows the inductance former without the coiled wire but with brass arm in position.

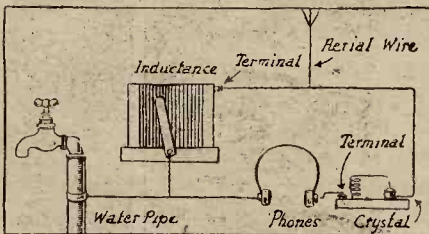


Fig. III.—This shows the complete set wired up in diagram form ready for you to listen-in.

thimble carrying the crystal. Connect the wire which presses on the crystal to one wire which goes to the telephone receivers and the other wire from the receivers to the junction of the brass strip and the earth wire.

Move the brass strip gently and slowly over the copper wire on the cylinder, being sure that it touches the bare copper where the enamel has been scraped off by the movement of the brass strip.

Lastly, listen carefully in the receivers which you have now placed on your head.

Wireless signals should be there in plenty, but if at first you don't succeed in hearing them, try again. This is the most elementary single set which will work. It may be elaborated to any extent by the skilful.

Ebonite may be used instead of wood with advantage. A light spring carrying the tip of an old gold fountain pen nib may replace the copper wire touching the crystal, but in this case remove the usual iridium point from the gold.

Experience will suggest many other improvements, but with the set above described, properly made, you should receive the wireless concerts, and it will be equal in all respects to sets retailed at five pounds.

**EDITORIAL NOTE.—POPULAR WIRELESS** will deal week by week with the methods of constructing wireless receivers from the elementary to the advanced types.

## HAVE YOU A WIRELESS?

### Points for the Novice

**FIRST**, take out a licence. In a week or so this may be obtained direct from any post office, but at present you must apply to the Secretary, the G.P.O., London. The licence will cost you 10s.

If you are within a fifteen-twenty mile radius of a broadcasting station and only wish to receive the concerts sent out, a £5 crystal set will suit your needs. A £5 crystal set requires no upkeep. Batteries are not used.

If you are some distance from a broadcasting station, you will require a valve set. This type of apparatus will cost about £10, inclusive of batteries, which consist of a 6-volt accumulator and a 60-volt dry battery.

The accumulator can be recharged for about 1s. 6d.; the dry battery cannot be recharged. A new one must be purchased, price 15s.

These dry batteries, however, last for several months.

The valve type of receiver will cost a few shillings annually for upkeep of batteries. For increased strength of signals and clarity of telephony, the valve is recommended.

The buyer of wireless apparatus need have no fear about its correct manipulation. Full instructions are usually sent out by wireless manufacturers with every set, and as the various types of receivers now on the market have various ways of tuning, etc., it will serve no good purpose by picking on one particular receiver and describing its adjustments, etc.

Crystal sets are usually the easiest to operate, although the crystal itself requires very sensitive handling.

Readers who are still in doubt as to what type of apparatus they require should state their wants to a wireless manufacturing firm, who would then know exactly the kind of receiver that would prove most suitable.

Write to me if you want to know anything.—Editor.



# MR. SELFRIDGE EXPRESSES HIS VIEWS

Most enthusiastic about future of wireless, but does not think it will supersede telephones.

## The Business Man and Radio.

By Gordon Selfridge.

THE wireless age is upon us. To-day the fantastic romances of Jules Verne seem a little insipid when we think of the wonderful progress made in the science of wireless communication and the vast possibilities it has in store for us. Within a very few years the wireless telephone will play an enormous part in the life of every man and woman in this country, and certainly, if the problem of interference is overcome, it will affect business life considerably. Nevertheless, I do not think the radiophone will ever supersede the telephone.

Many wild predictions have been made on this point, and it has even been said that before long the man in the street will have his pocket wireless transmitter with which to call up friends and business colleagues.

That particular prediction is very far-fetched indeed. The pocket radiophone will never replace the telephone, because it will always be limited by the number of messages that can travel through the ether at the same time.

At the moment, American amateurs are realising the bad effects of unlimited radio transmission. The ether is crammed with their messages, which consequently get so mixed up that it is impossible to hear a coherent sentence when "listening-in." This "jamming," as it is called, has assumed such sinister proportions that laws will shortly be in force limiting the number of amateur transmitting stations in the United States.

With the wireless telephone at its present stage of development, not more than one hundred conversations could be carried on in the London area in any single minute, even assuming that a special wave length was set aside for the sole use of private radiophone subscribers, and that conversation carried out on this wave length did not suffer from interference by ship stations or Government land stations.

This is the great drawback to wireless communication. The service is a restricted one; it can never wholly supersede the ordinary telephone service, which is only limited by the number of wires or cables that can be laid under the streets or between telegraph poles.

But as a means for cross-Channel telephonic communication the wireless telephone has already won its spurs.

Speech by the ordinary telephone, when the wires pass under the sea, is nearly always distorted, and no amount of experiment has yet revealed a way of eliminating the bad effects of under-water cable communication on the clarity of the human voice.

Also, in America, the telephone company operates a radio service between Long Beach, California, and Santa Catalina Island, some twenty-eight miles off the coast. This service has proved extraordinarily successful.

Colonel Carty, a famous American experimenter in long-distance telephonic communication, gave a dinner a few months ago at the Waldorf-Astoria Hotel, New York, at which every guest was provided with a telephone receiver.

Colonel Carty called up relay points across the continent from New York to San Francisco, and finally to Los Angeles, and then spoke from Los Angeles to Santa Catalina.



MR. SELFRIDGE.

This experiment was of more than usual interest, because it showed that ordinary telephone speech, after being relayed from New York to Los Angeles, could be transmitted again, via the ether, to another station, and yet still retain clarity of tone and perfect modulation.

Senatore Marconi has already transmitted and received readable speech by radiophone

between London and Rome, and very shortly he expects to bridge the Atlantic in the same way. As a business utility, this will prove very great indeed.

At the moment, wireless telephony broadcasting has created a popular craze, and the man in the street will soon be able to enjoy a unique form of entertainment.

He will have a constant supply of music, lectures, and sermons, etc., "on tap"—a variety of entertainment, by the way, of far greater scope than that offered by the average gramophone in the home.

Our store in Oxford Street has for some time had its own special wireless department, and judging by the interest taken in the various concerts, etc., which our wireless experts receive for the benefit of customers, the boom in wireless in this country bids fair to equal the American brand in popularity.

By careful adherence to the official regulations we should escape the chaotic "jamming" now rife in the States, and yet still enjoy a fascinating new hobby to its utmost.

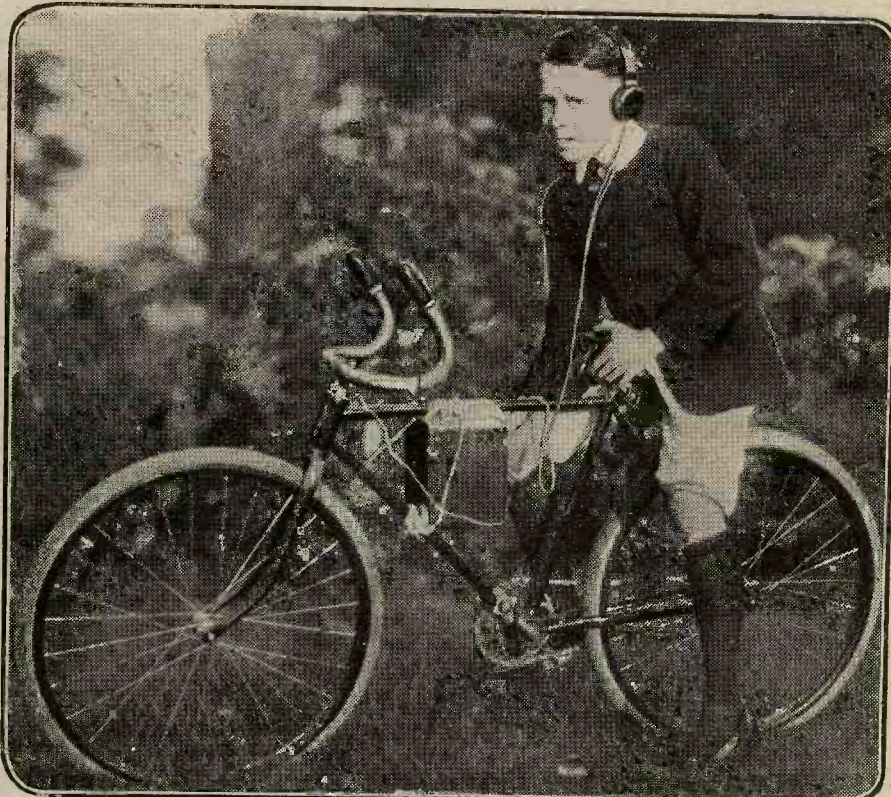
Romance, after all, is the spice of life, and in the radiophone receiver we have romance personified.

Whether you buy a £5 set or a £50 set, the romance is there just the same, and no one should be without this wonderful adjunct to the home.

Many people are asking how great a part wireless telephony will play in the future, but to answer that question off-hand is difficult, and, for me, entirely impossible.

But one thing is certain, as H. G. Wells once declared in one of his books: "This 'ere Progress—it goes on."

GORDON SELFRIDGE.



Here's a youngster with a wireless apparatus fixed to his bicycle. He is able to receive messages on his way to school or play.



## CLUB AMATEURS AT WORK.



Amateurs enjoy a little ragtime, via the ether, at the Stoke-on-Trent Wireless Club. Note the valve amplifiers on the extreme left, and the loud speaker in the centre. If you are interested in wireless, one of the first things you should do is to join a wireless club.

## POLITICS BY RADIO



Wireless will be used at the next General Election for casting the speeches of prospective M.P.'s. The politician in the photo is getting a little practice in by an impromptu speech on Free-Trade.

## A WIRELESS KISS.



This young lady is sending a kiss by wireless. This seems to be rather a dangerous game. Before long every engaged couple will be filing the ether with oscillations, as well as oscillations.

## BROADCASTING.



This lucky amateur possesses a transmitting licence and is allowed to send out speech and music. There are about two hundred and eighty amateur transmitters in this country, and between the hours of eight and twelve, on any evening you will hear their merry chattering.



# O. THE 'PHONE GIRL. - A PLEASANT CONVALESCENCE.



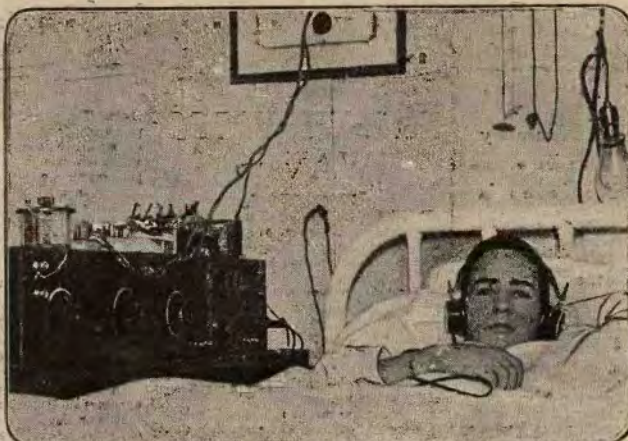
broad-  
casion in  
radio

The ladies find the wireless telephone more fascinating than bargain sales. This fair amateur prefers to spend her luncheon hour listening-in to a concert instead of "doing" the shops or having a lengthy meal.

## THE RADIO GLIDE.



The latest American craze is the "Radio Glide." According to official instructions, all you have to do is: "Take two steps forward, then scuffle, clasp your hands in the air, and then hesitate." If this is the most difficult dance by radio, amateurs won't have much trouble. Sounds easy!



If you are laid up in bed with a broken leg or an attack of radio 'flu, the weary hours will pass the quicker if you have your set close to your bed. "Music bath charms"—especially wireless music, and it certainly is more fascinating than the gramophone.



Important experiments have been carried out by the London Fire Brigade in connection with wireless telephony. The picture shows a motor fire engine fitted up with transmitting and receiving apparatus during a recent test in the country.



This is another American novelty of considerable interest. The motorist has equipped his car with a portable receiver and transmitter, and good speech can be sent and received on using a wide screen type of frame aerial. This will come in handy should you have a breakdown on the road.



# Step by Step in Wireless

An Elementary  
Series of  
Articles in  
Non-Technical  
Language for  
the Beginner.

## No. 1.-WIRELESS WAVES

ONE of the first questions that flash across your mind as you listen to a wireless speech is: "How is it that I can hear a man talking by wireless telephone?"

Many years ago a similar question puzzled investigators. They asked the question: "How is it that light is transmitted to us?"

They saw the sun, the stars, and the moon, but between them and the earth was an immense space. How did the light from the heavenly bodies reach this planet?

Obviously, it was not the air that transmitted the light.

In the end it was assumed that some curious medium afforded the link—a medium that permeated the atoms and molecules of mountains and houses and—everything. It was decided to call this medium "ether."

Later on, experiments were made which proved that light is a wave motion in the ether medium. Atoms in the sun, the stars, and the moon are constantly vibrating, and in doing so generate waves in this mysterious ether.

Practically all energy reaches us in wave shape, and these waves are set up—in some medium—by a body that moves alternately backwards and forwards.

These "alternations" or "oscillations" or "vibrations," as they are sometimes called, create waves.

In wireless we deal with waves set up in the universal sea of ether—waves which, although they resemble light waves, cannot be seen. They can, however, be detected, and made to actuate contrivances whereby they are converted into sound. The radiophoned speech you hear in your telephones has first been transformed into ether waves and then back into human voice sounds by means of the receiver.

Let us, by means of an analogy, show how wave motion may be generated. Imagine a calm surface of water—a pond will do—and a tap, half shut off, allowing drops of water to fall into it.

Each drop starts a little wave as it smacks down on the surface under it, and these waves travel outwards in ever-widening circles until they waste themselves on the edge of the pond, or are reflected back.

We may have two taps side by side, and the two systems of waves will add together or modify each other.

Take the simile further and discharge a machine-gun in a series of

shots. The noise travels out in the same way. Two machine-guns could perform, and the series of reports be kept distinct in the listeners' ear. Or again, in the orchestra, each instrument, by means of its tone, which depends on the form of its sound wave, can be picked out of the performing band; or the music can be considered as a whole.

Now, in wireless, we store up electrical pressure and then let it go suddenly in a prearranged manner, just as we did the drops of water in the pond and the gun explosions in the air.

The accumulation of pressure, when suddenly released, travels outwards in the ether until it comes to a stretched wire—the wireless aerial, to be exact—and is there detected and made appreciable to one or other of our senses.

If we are sending a wireless signal, the series of wave impulses follow one another at the rate of 186,000 miles per second.

Like water waves, wireless waves have crests, and it is the distance between the two crests which determines the "wave length." In wireless, wave length can be artificially regulated. The reason for this will be shown.

In the case of what is called "continuous wave" work, the series of waves is continuous and not separated by periods of inaction.

It is on the back of these continuously vibrating waves that wireless speech or music is carried, and experts use the term "modulating" to describe the effect, because, by suitable means, they set up the continuous waves and then mould or modulate them to carry the irregular waves which we depend upon in the air for the propagation of understandable noises.

To send or receive a wireless message we must take account of wave length.

Wave length in wireless work is always measured in metres. A metre is equivalent to about 3.28 feet. Radio waves may vary from about 100 metres to 30,000 metres in length.

The big transatlantic wireless stations employ wave lengths that measure 30,000 metres from crest to crest—about eighteen miles—and it will be easily seen that such a wave length is not needed when communicating over short distances. Ships usually work on a 600 metre wave length. Wave length in wireless corresponds with pitch in sound and colour in light. Sounds move through the air in the form of waves, and if they come regularly, a musical note is the result.

The pitch depends on how many waves reach us in a second, and this in turn depends on how often the sounding body vibrates in the air.

When we tighten or loosen a violin string, we alter the pitch. This is called "tuning." In wireless it is almost the same.

By wireless tuning we mean that we are adjusting the radio pitch of the receiver to the pitch of the transmitter. As pitch is entirely a matter of wave length, it follows that, if a transmitting station is adjusted to send out a 600 metre wave, we must "tune" our receivers to that wave length before we can hear the signals.



## Workshop Hints

## No. 1. LEARN TO SOLDER

If you are going to experiment with your wireless set, and add to it, and realise the joy of making your own instruments, you will need a working knowledge of the art of soldering.

Again, if your aerial wire snaps in the night, it is a bad policy to make a rough join. The two strands should be soldered together. Bad "joins" are fatal to good results on your receiver.

The most important thing in soldering is to have the ends you wish to connect, clean.

The presence of dirt will retard the fusion of the two metals, and so, before heating either of them, ascertain that they are both scrupulously clean.

You will require the following articles for your soldering outfit:

A soldering-iron, tin of Fluxite, a file, a stick of solder, some emery paper, a pair of small, clean pliers.

With these materials in hand you are ready to start. First, heat the iron. This can be best done in a plumber's blow-lamp.

There is a certain temperature to which to heat the iron, and it is most important that this exact temperature is reached.

This is the most difficult thing. The beginner will be called upon to judge. Experts can tell by the amount of green flame round the hot iron; others withdraw the iron and judge by the "feel" of it when the palm of the hand is placed a few inches away.

Probably the most reliable method is the following:

Withdraw the iron from the flame and dip

it for a second in the Fluxite. Note whether the paste burns off at once or merely melts and runs about the surface of the hot iron. If the iron is ready for use, the paste will begin to fizzle at once, and the iron should not then be made any hotter.

The next thing is to "tin" the iron. Take a file and file up one of the faces of the iron from the point for about half an inch until it is clean and bright.

Do this as quickly as possible, so that the hot surface does not have time to be affected by the air. Next dip the prepared part in the Fluxite and rub it with a stick of solder which has also been dipped in the Fluxite.

You will then have a coating of bright, melted solder, into which you can melt more and apply it to the work in hand as it is required.

Replace the iron in the flame.

Now take the two wires to be joined and smear them with Fluxite; then remove the iron from the flame and make sure that the tinning is still clean and bright.

Prepare enough solder to enable you to dip in it both pieces of the wire. Twist them about until they are well tinned. Dip the tinned ends in Fluxite and with the clean pliers screw them tightly together. Finally, dip them in the melted solder again for a few minutes and the job is done.

(More Workshop Hints next week).



# Messages from Mars

**M**ARS, the Red Planet, is whirling towards us at the approximate speed of 1,000,000 miles a day, and at midnight on June 18th it will be nearer the earth than it has been for a considerable time.

Even then it will be 42,500,000 miles away; but that is close enough to make the astronomers polish their telescope lenses and conjecture about canals.

But astronomers are not the only people who await June 18th with impatience.

Nine months ago, Guglielmo Marconi, from his yacht *Electra*, the best-equipped floating radio laboratory in the world, picked up impulses of wave lengths estimated as high as 150,000 metres—about five times higher than any produced by man-made apparatus.

This opens up most fascinating and romantic possibilities, as the mind pictures the *Electra*, anchored in the Mediterranean, a little speck holding the highest inventive development known to man, receiving mysterious signals from the unknown.

Mars has always intrigued the imagination. Is it another world like ours, peopled by superior intelligences who have so far improved upon our knowledge of wireless that they can bridge the 42,000,000-mile gulf that lies between us? Are they trying to communicate with us? If they are, they will surely make a great effort in June, for if their knowledge of wireless so far exceeds ours, their astronomy must have advanced in proportion and they will know how favourable the conditions will be.

Before we are carried away by the romance of possible interstellar communication, let us examine another theory which has been advanced to account for the mysterious impulses.

Briefly, it may be stated in two words—sun-spots. If the sun is examined through a dark glass and an ordinary telescope, it looks like a molten blob of lava; but sometimes on this blob may be seen a darker speck or two—large at times—often small.

These specks are sun-spots, and are due to violent storms in the surface layers of the sun.

The sun is not a great, red-hot ball of earth, but a whirling mass of gaseous matter, whose atmosphere consists of blazing incandescent flames.

The temperature of the sun's surface is calculated to be, roughly, 6,000 degrees centigrade, besides which the hottest thing devised by our scientists—the crater at the end of one of the carbons of an electric arc—is only moderately hot.

In this inferno of heat, naturally the clouds of boiling gas are perpetually surging, veering backwards and forwards with millions of times the velocity of earthly winds.

But the sun, like the earth, has storms, and sometimes a tremendous tornado sweeps upwards from its surface—a huge, ascending pillar of white-hot gas.

Astronomers have seen these columns of fire and have calculated their height at 300,000 metres above the surface.

But they are formed of gas which cools rapidly, and in cooling becomes incandescent and consequently darker, hiding with its darkness a portion of the flaming gas beneath.

It is then that a sun-spot becomes visible, and it is important to realise the gigantic

state of these results of solar storms. They are as much as 100,000 metres in diameter sometimes, or more than four times the circumference of the earth, and the winds which drive the gas columns upwards blow sometimes as fast as 600 miles an hour.

Now comes a significant fact: these sun-spots are known to be electrical. When their magnitude is taken into consideration it will be seen that they are inconceivably powerful electric sparks which can send out wireless waves as any electric spark can do.

They are the antennæ of the sun's radio system, and so vast a sending station cannot be ignored.

It might be imagined that the 92,000,000 odd miles which separate the earth from the sun would completely cut us off from all possible influence, but meteorologists have proved beyond doubt that solar storms have a great influence upon the storms we experience, and upon the electro-magnetic condition of the earth.

There is a direct connection between the number of sun-spots and the magnetic storms which disturb the ease of wireless communication so seriously.

We have, therefore, a tremendously powerful transmitting station whirling round, whose wireless waves are known to affect the earth. The question now arises, has Mr. Marconi intercepted some of these waves, or can we go back to the more fascinating theory that the planet Mars is peopled by scientists who wish to communicate with us?

The strangest point about the waves which Marconi picked up is that they ended abruptly, and that surely furnishes ground for belief in the Martian theory.

Had they been the result of sun-spots, they would have continued indefinitely, unless it happened by chance that their wave length was abnormal. But it would seem as if these Martian scientists had tried to "call up" the earth, and receiving no reply, had switched off.

But of conjecture there is no end, and perhaps on June 18th we shall be able to give a more decisive answer to this most fascinating question.

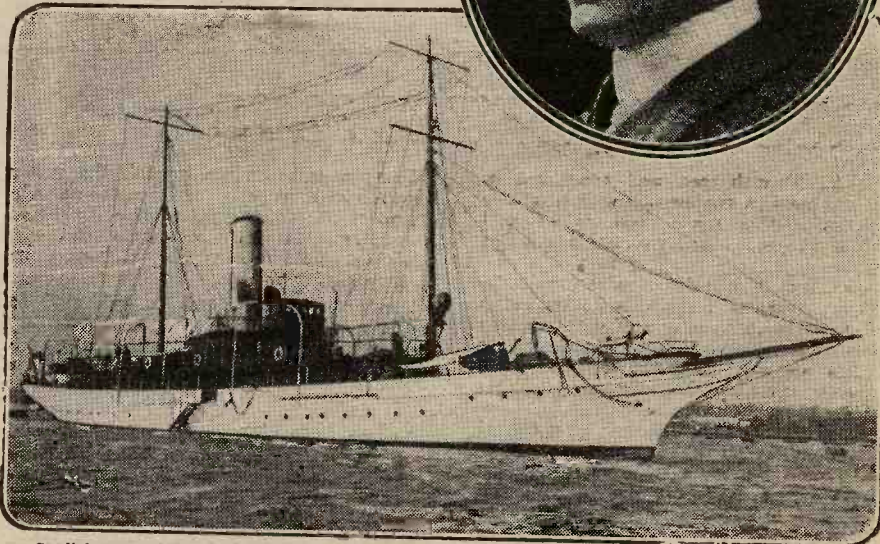
## MR. MARCONI'S VOYAGE.

Mr. Marconi proposes to carry out experiments on the Atlantic with direction finders on short wave and long wave transmission.

At New York he will conduct a number of tests in co-operation with some of the modern American stations, and demonstrate to the Americans what can be accomplished in the high speed despatch and reception of messages.

Over long distances, such as from America to England, messages are now received at a rate of eight to ninety words a minute, and Mr. Marconi will use improved instruments by means of which speed can be increased up to one hundred words a minute and over.

Besides his other experiments, Mr. Marconi will carry out tests for the Meteorological Office in London during his voyage. There will have special reference to the collection of reports of the weather in the areas of the Azores and the Bermudas. He expects to be absent from England until the middle of July. On his return journey, he hopes to visit Canada and Newfoundland. The *Electra*, a steam yacht of 700 tons, will make the Azores her first objective, and thence will proceed to America, or, if the weather proves bad, to Bermuda.



Guglielmo Marconi has left England on his yacht *Electra*. He will make some very important experiments during the voyage in connection with the mysterious signals supposed to emanate from Mars. The *Electra* is the finest equipped floating wireless laboratory in the world.



## WIRELESS PRODIGY

ANY boy who is enthusiastic about radio will surely start to work very seriously to study it when he reads the official confirmation by the U.S. Radio Inspector at San Francisco of Robert Garcia's success in passing the amateur's examination in America, with a percentage of ninety-two. For Robert is only seven years old! A licensed radio operator at seven—his career, to put it mildly, promises to be interesting!

His father, Allen Garcia, is Charlie Chaplin's director, and in November, 1920, began to take an interest in radio which proved to be infectious, for young Robert, then four years old, found a wireless catalogue lying about—and read it.

Ideas started in his young brain, and he began to study everything he could find in the mass of advertising matter his father brought home.

The names of various parts of the instruments puzzled him, but by deluging his father with questions on oscillations and frequencies and everything else he couldn't understand, he soon found that the mysteries were becoming simple.

From theory he passed to practice, and during the daytime he listened—sometimes

for hours at a stretch—on his father's set, trying to learn the code so that he could copy. The code he mastered in twenty-four hours, and then waited for signals at speeds which he could follow.

Soon his father took out a transmitting licence, and Robert became so interested that he would not rest until he had been shown the workings of every part of the transmission set.

Circuits next demanded his attention, and the house was covered with drawings of them—his father's stiff shirts had to be jealously guarded—and he showed an amazing memory.

He was so interested that he begged his father to let him take the amateur test, although he had only four weeks to work for it, and could not copy even five words a minute.

It seemed hopeless, but his father thought that such enterprise ought to be encouraged, and decided to give Robert a chance. He put him through a strict course of training, and, by using a buzzer, gradually improved his Morse until he could copy from fifty to a hundred words in succession.

Of course, it was not easy to explain the intricacies of technicalities to so young a

child, but by using simple illustrations, he conveyed the meaning of all the technical terms, as well as the theory of both transmitting and receiving sets to the avid Robert.

Then Robert's memory came to his aid again. It was necessary for him to know the regulations about the transmission of signals, etc., and his father gave him a copy of them. He not only learnt them by heart so thoroughly that he could write them down word for word, but, even more important, he understood what they meant. His father was astonished, but he was not to be alone in his astonishment.

The four weeks passed and the test came—an examination of three hours' duration.

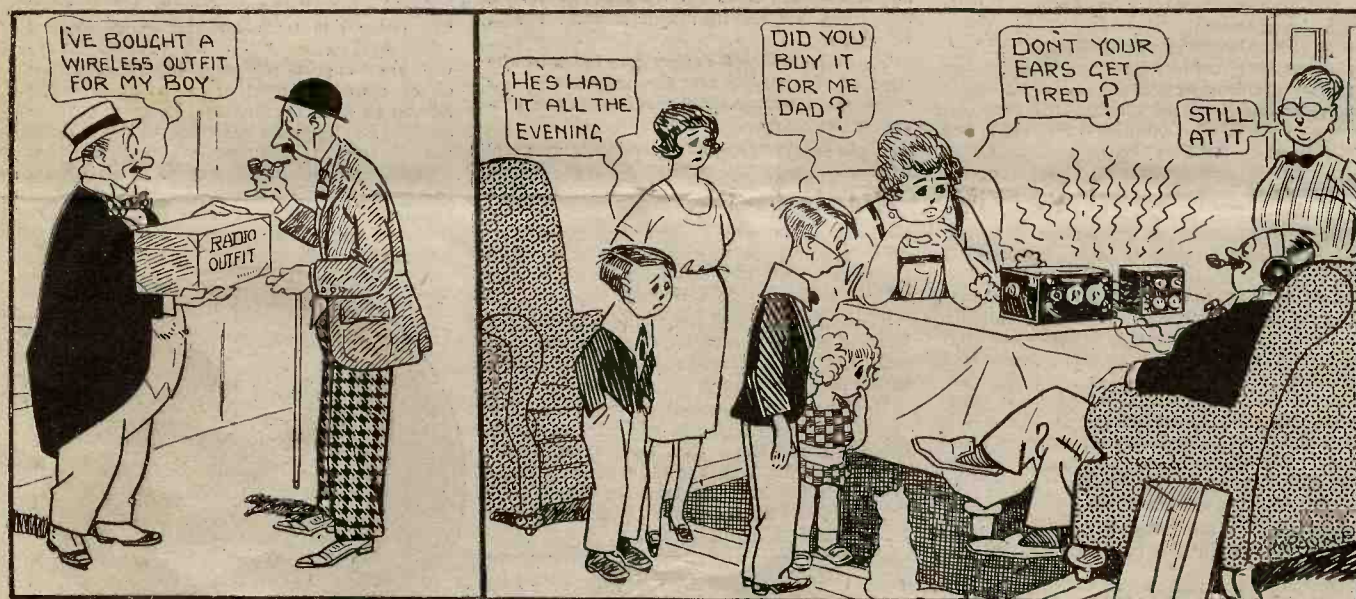
Robert caused a great deal of quiet amusement—to see him sitting among grown men must have been more like watching the fulfilment of a bet than a serious attempt to pass.

Several men—and many youths—failed; but young Robert did not. He smiled all through the examination and passed with ninety-two per cent marks to his credit!

He has now filed an application for a station licence, and is going to put it up himself.

When Sir James Barrie made his speech about the power of youth the other day, he must surely have heard about young Robert!

### FATHER BUYS A WIRELESS OUTFIT FOR THE BOYS!



## CRYSTAL DETECTORS

TREATED with care and consideration, and used in conjunction with a reliable tuner, the much scorned crystal detector is capable of really sound and efficient work.

Nowadays, it is valves, valves, valves—and the poor crystal is apt to be left out in the cold, as the majority of amateurs have valves on the brain—this, despite the fact that many of them are only interested in getting the Marconi concerts, and that they are well within "crystal range" of Writtle.

The writer has found the use of a crystal detector more than sufficient for clear reception of speech and music from Writtle—which is, roughly, twenty miles distant from his receiver.

A "stand-by" valve set for long-distance work is, of course, useful, but why waste battery current on a valve for short distance reception?

Using a carborundum crystal, the writer has received very clear signals—on the ordinary 100-foot single wire aerial—from Paris, Nauen, Dover, Cullercoats, Chelmsford, Cadiz, and Poldhu, etc! Ship stations come in very clearly indeed.

The crystal should not be subjected to rough handling: grease, dust, or dirt of any form will rob it of its sensitiveness, but once a good adjustment is made, the little fellow in the brass cup will respond nobly for weeks at a time.

During the war, the writer, using a Marconi type 16 crystal receiver on board a Naval transport, found one perfect gem of a carborundum crystal.

For two months it remained in one position, guarded against the designs of careless cabin-boys and other evil spirits.

Using a 200-foot twin wire aerial, barely

sixty-feet high, signals were received clearly from Paris while anchored in Montreal Harbour, at Ashar, on the Tigris, and in the Suez Canal. The radio station at Rinella Bay, Malta—BYZ, nee S D—could be clearly heard at a distance of 3,000 miles. This with a crystal detector, mark you!

Now that the amateur is to be allowed to erect an aerial more than 100 feet long, the crystal detector will perhaps come into its own again. At any rate, it deserves to.

There are many minerals that may be used for the crystal. Galena is the best—with the possible exception of carborundum—but it has the disadvantage of being produced in such a way that it is impossible to tell the bad from the good except by actual experiment.

The easiest way is to get several specimens and test the lot until the beau ideal is found. When you have found it, look after its health as you would your own. It will repay you in the long run.



# WIRED WIRELESS

Experiments are being made for using the ordinary House Electric Light System for the conveying of messages.

**G**ENERAL GEORGE O. SQUIER, the Chief of the Signal Corps of the U.S. Army, has made a discovery which, if it fulfils all its promises, will give to broadcasting an even greater number of possibilities and double its value to the general community.

He has been experimenting with a view to using the ordinary electric-light system fitted to a house for lighting or heating purposes for the conveying of messages.

Before a number of experts he gave a demonstration in his office in which he had fitted a radio receiving telephone set to a socket of an electric lamp on his desk.

By merely pulling the plug in and out of the socket, General Squier started and stopped the messages.

During the course of the demonstration news, music, and conversation were received from a distant room in the building, where a radiophone transmitter had been fitted to another part of the lighting system of the building.

The invention is a further adaptation of the general's scheme of "line radio," or "wired wireless," which he first considered in the days of the war.

Ordinary wires used for the transmission of electric light current are used as a guide, although the message does not go through the wire, but on wireless waves, which merely follow the line. The turning of a switch will cut the circuit, and the sound ceases at once.

This system, perfected and applied for practical purposes, will permit of an hotel giving every guest music in their bed-rooms, one orchestra playing in a basement at the sending station being all that will be required.

Moreover, the tape-machine will become out of date. All the guest at the hotel will have to do is to connect his radiophone receiving set to the electric standard lamp near his bed and listen to all the latest news as it is received at the hotel by wireless and passed into the electric-lighting system.

"Every home and every room where there is an electric lamp can now keep in touch with the world," claims General Squier.

At present, however, a word of caution is necessary. Experts are not quite convinced that the system can be used over the large lighting cable systems under city streets. Amateurs are advised not to experiment with this new idea until it has been further tested.

It is interesting to read how General Squier first made this discovery. During the war he was confronted with the task of supplying 100,000 miles of insulated telegraph and telephone wire a month. The task was impossible, chiefly owing to the lack of the necessary machinery to make the braided covering for the wire.

"Then," said General Squier, "let us try a substitute instead. I will try electron tubes. I will give you an unlimited quantity of electro-magnetic waves instead."

He ran a bare wire across a river from the Army War College to the opposite shore...

The wire was allowed to sink to the bottom and lie with no protective covering at all. A radiophone set was connected with each end of the wire. Transmitting was done from one side of the river, and receiving at the other.

At the receiving end the bare wire was connected directly to the grid terminal of an electron tube of the receiving set. The usual ground connection was left open.

A wire was tuned to a frequency of approximately 600,000 cycles a second, and the results were all that were desired.

General Squier continued his experiments with submerged wires and then tried to direct a message along a wire lying on the ground. A bare wire was laid on the earth connecting two stations, one mile and three-quarters apart. Radiophone instruments were attached and excellent telephonic communication was achieved.

The wire was next buried in soil of a moist and sandy loam nature about eight inches beneath the surface, and a few feet above water level. Electro-magnetic currents were conveyed along the line as before, and good telephonic communication was again effected.

To test the experiment still further, the buried wire was not laid in a straight line, but erratically, turning at varying angles. The message conveyed to the line, however, did not leave it, but completed its journey from transmitter to receiving set.

"Wired wireless" was now more than a theory—it was an accomplished fact. By this method several messages can be sent along one wire if different wave lengths are used, and further still, each message can be made indistinguishable except to the particular instrument tuned to receive it.

Such, in brief, is the story of General Squier's invention.

It must be thoroughly understood, however, that

the message does not pass through the wire as an ordinary electric current does, but, for a reason that is unknown, follows a channel of ether that is like an invisible tube round the wire. The message is thus directed to a particular goal instead of being sent, willy-nilly, into the air in every direction.

There will be no possibility of waves conveying different messages interfering with each other. Unlimited broadcasting in America has led to that confusion, but "wired wireless," by keeping the messages to special channels—ordinary electric light wires, whose origination and destination is known—will do away with this dilemma.

Your local power station in the near future will be able to distribute news, music, and other entertainments as well as light, and aerials will not be necessary.

But at present amateurs are not advised to experiment with electric light wires in an attempt to achieve "wired wireless."

General Squier has himself advised amateurs to keep to outdoor aerials for the present, as his new invention is still in its early stages, and its perfection will naturally take time.

## THE MORSE CODE

**M**ANY amateurs enjoy reading the messages constantly being sent out in the Morse Code by ships and land stations.

The Continental-Morse Code is universally used in radio work, and is given here.

Practice can be had by using an ordinary bell, minus the gong. This will produce "buzzes" similar to the Morse signals received in the telephones.

When practising, do not attempt to send or receive too fast until the code is learnt by heart.

Two forms of Morse Code are in use—the "Continental Morse Code," and the "American Morse Code." The latter is used chiefly for use in American land line telegraphs, and the Continental in wireless work. The rules for the formation of Continental Morse Code signals are:

1. The time occupied by a dash should be equal to that occupied by three dots.
2. The time occupied by the interval between elements of one letter or other sign should be equal to the time occupied by three dots.
3. The interval between two letters in a word should be equal to the time occupied by three dots.
4. The interval between two words should be equal to the time occupied by five dots.

### Continental Morse.

|    |             |   |           |
|----|-------------|---|-----------|
| a  | · —         | m | — —       |
| ä  | · — · —     | n | — ·       |
| á  | · — · — · — | ñ | — · — · — |
| ä  | · — · — · — | o | — · — · — |
| b  | — · — · —   | ö | — · — · — |
| c  | — · — · —   | p | — · — · — |
| ch | — · — · —   | q | — · — · — |
| d  | — · — · —   | r | — · — · — |
| e  | · —         | s | · — · —   |
| é  | · — · — · — | t | — · — · — |
| f  | · — · — · — | u | — · — · — |
| g  | — · — · —   | ü | — · — · — |
| h  | · — · — · — | v | — · — · — |
| i  | · — · —     | w | — · — · — |
| j  | · — · — · — | x | — · — · — |
| k  | — · — · —   | y | — · — · — |
| l  | · — · — · — | z | — · — · — |

(Next Friday's POPULAR WIRELESS will contain the Figures, Punctuation, and other Signs for Continental Morse.)

## POPULAR WIRELESS!

EVERY FRIDAY.

GIVE YOUR NEWSAGENT A STANDING ORDER.



## WIRELESS LIGHTHOUSES

**R**ECENTLY, in a lecture on "Short-wave Directional Wireless Telegraphy," Mr. C. S. Franklin described many interesting experiments.

He has proved to complete satisfaction that wave lengths of twenty metres are capable of providing point-to-point directional communication over considerable distances. Moreover, these short waves have increased possibilities of secrecy as compared with the usual non-directional method of transmission.

The range of wave lengths at which it is possible to send messages is rapidly becoming fully occupied, and once the range is full, the only way to enable a further increase in the number of possible services will be by employing systems of directional control.

Senatore Marconi began experiments in this direction in 1916. He tried waves of only two or three metres' length, but found that, although they were satisfactory in many ways, they were disturbed by waves from motor-cars and motor-boats.

The ordinary motor engine apparently creates waves from near nought to approximately forty metres in length. Possibly, in the future, these engines will have to carry a Post Office licence for transmitting!

In 1919 further experiments were carried out at Carnarvon with valve transmitters and a fifteen-metre wave. Speech of a strong and clear nature was obtained at Holyhead, twenty miles distant, and after a little adjustment, communication was effected with Kingstown Harbour, a distance of about seventy nautical miles.

The centre of experimental action was then transferred to Hendon, and tests were made over all-land distances from a reflector, and with a transmitter of fifteen-metre waves. The reflector was pointed in the direction of Birmingham.

A portable receiving set was then fitted up in a motor-car, and messages were sent from Hendon and received in the car. Very good speech was heard up to a distance of 66 miles, and quite fair results in the neighbourhood of Birmingham.

In the autumn of last year a reflector station was erected near Birmingham at a place called Frankley. This is about ninety-seven miles from Hendon, but speech of strong and good quality was received. Reflectors were used at both ends.

The transmitter consisted of two medium-sized power valves working in parallel, and the power used was roughly 700 watts.

So good have been the directional effects obtained with reflectors that are large compared with the waves length that suggestions have been made that this method might be of use for ships for finding their positions when they approached dangerous localities.

(Continued at foot of right hand column.)

## Useful Radio Terms

**AERIAL, or "ANTENNA."**—A term used to designate the wire from which electro-magnetic energy is radiated into the ether, and also the wire by which the radiated energy is "picked up" and conveyed to the receiving apparatus.

**ALTERNATING CURRENT.**—A current which flows, not like water in a pipe in one direction, but first in one direction and then in the opposite. A single alternation is called a cycle. The number of cycles in the alternating currents used in radio is many thousands per second.

**AMPLIFIER.**—A term used to designate the means of amplifying the electrical effect detected—i.e., an electron valve.

**AMPLITUDE.**—Every wave grows from zero to a minimum value at its crest. The maximum value is the amplitude, and is found by measuring the height of the wave crest.

**AUDIO FREQUENCY.**—Vibrations may or may not be audible to the human ear. When they are audible they have audio frequency. Frequencies below 10,000 cycles a second are called radio frequencies.

**AUDION.**—A name given to a form of electron valve.

**BATTERY.**—A primary or secondary cell for producing electric current, or a collection of such units.

**CAPACITY.**—A term used chiefly in connection with condensers. A condenser stores up electricity, the amount of which depends upon its capacity. Capacities are measured in farads, but as the farad is much too large for practical wireless purposes, the unit generally employed is the micro-farad (m.f.d.) or one millionth of a farad.

**CASCADE AMPLIFICATION.**—One electron valve may be added to another, so that the second amplifies the effect magnified by the first, and the third that magnified by the second, etc. Valves used this way are said to be in cascade.

**CHOKE-COIL.**—A coil wound to have high self-induction. The "choking" action is called "impedance."

**CLOSE COUPLING.**—When mutual inductance is caused by mounting the primary and secondary of a tuning coil very close together, the effect of "close coupling" is obtained.

**CONTINUOUS WAVE.**—A continuous wave is a wave in the ether which has a constant amplitude. It is a wave which travels very far, and is used to "carry" radio telephoned speech, etc.

**CRYSTAL DETECTOR.**—A form of detector in which a rectifying crystal is used to receive electrical impulses in such a fashion that they become audible in a telephone receiver.

**DETECTOR.**—Any contrivance whereby electrical vibrations are transformed into visible or audible vibrations.

**DIRECT CURRENT.**—An electric current with a constant flow in one direction only.

**ELECTRON.**—The elementary basis of electricity. All electrons are negative.

**E.M.F.**—Electro-motive force. The unit of "E.M.F." is the volt.

**ETHER.**—A mysterious medium supposed to permeate all space. It serves as a medium whereby radiant energy may be transmitted in the form of wave motion.

**FREQUENCY.**—The number of oscillations per second.

**GRID-LEAK.**—A high non-inductive resistance connected across the grid condenser or between the grid and the filament of a valve. Its function is to permit excessive electrical charges to leak off to an external source, thus assuming good control under working conditions.

**HARMONICS.**—Every tone is composed of a fundamental and overtones or "harmonics." Harmonics vary in length and frequency from the fundamental. Sometimes amateurs will hear the harmonics of high-power stations on a long wave length, although the amateur set is tuned for short wave lengths.

**HENRY.**—The unit of inductance.

**HERTZIAN WAVES.**—Electro-magnetic waves in the ether named after the German scientist who discovered them.

**INDUCTANCE.**—Inductance is the name given to the effect of transferring a current from an electrified to an un electrified conducting body without actual contact.

**KILOWATT.**—One thousand watts. Amateurs are allowed 10 watts for transmitting purposes.

**LOUD SPEAKER.**—A contrivance for magnifying received signals so that they can be heard without the use of telephone ear-pieces.

**RADIO FREQUENCY.**—Frequencies corresponding with vibrations beyond audibility. All frequencies above 10,000 cycles per second are termed radio frequencies.

**RECTIFIER.**—A device which suppresses one of the pulses of alternating current so that the resultant current consists of a series of jumps in one direction only.

**RESISTANCE.**—Opposition to the flow of currents.

**RESONANCE.**—Resonance exists in a given circuit when its natural frequency has the same value as the frequency of the current introduced in it.

**SELECTIVITY.**—The ability of selecting any wave length to the exclusion of other wave lengths.

**TRANSFORMER.**—Any contrivance for transferring electric energy from one state to another.

**TUNING.**—The selection of a certain wave length, effected by the alteration of capacity or inductance.

**WAVE LENGTH.**—The distance between the crests of two waves. "X's."—Abbreviated sign for "atmospherics" or "static" disturbances caused by Nature's own wireless transmitter.

## 'RADIO' OR 'WIRELESS'?

**W**HAT is the difference in the meanings of the two words "radio" and "wireless"?

Radio is wireless—up to a point, but the latter word applies to so many other kinds of free communication that the former word was coined to describe more accurately the particular activity of the broadcasting stations as they function to-day.

Radio applies specifically to electric communications by means of ether waves. The novice may have been under the impression that all wireless messages were conveyed by ether waves. This is not so.

Electric discharges may be conducted through water or through the earth, and even through light waves. Ether waves can be employed for a similar purpose.

Telegraphic communication has been established between a moving train and the telegraph wires running alongside the track by simply placing thin metal sheets on the roof of the train.

Also, communication has been established between balloons fitted with a covering of tinfoil.

All these methods may be called by the name of wireless. Radio may also be so termed, but it has its specific meaning as well.

## WIRELESS LIGHTHOUSES

(Continued.)

With this object in view trials are being made at Inchkeith Island with a transmitter and revolving reflector. The machine installed forms a kind of wireless lighthouse.

Its range of utility at present is not intended to be great, but the suggestion is that reflectors should be put up in position such as are occupied to-day by fog signals, and that wireless warnings of position should be given to ships when they are within ten miles of the danger-point.

In 1920 tests were made between Inchkeith Island and a lighthouse tender of the Northern Lights Commissioners, the Pharos. A working range of seven nautical miles was obtained, using a four-metre wave, a spark transmitter, a reflector of eight-metre aperture, and a single valve receiver on the tender.

The reflector made a complete revolution once in two minutes, and clear and distinct signals were easily sent to every point of the compass.

From the tender it was found that the bearing of the transmitter could be determined to within one quarter point of the compass, or within 2.8 degrees.

Further experiments are being made and a new and larger reflector has just been finished.

**NOTE.** In a subsequent issue a Marconi Company expert will write a special article on wireless direction finding.





# About Your Set

**T**HE tuner is an instrument by which we are able to receive signals from a desired station to the best advantage—that is to say, to be “tuned in,” to the exclusion, as far as possible, of all other signals.

The detector then converts the electric impulses received into currents which will actuate the diaphragms of the telephones. A valve amplifier inserted between the detector and the telephones may be used to increase the intensity of signals.

Recently, the crystal detector was generally used for reception. This detector consists of a metallic contact touching lightly a small piece of galena, silicon, or carborundum. A test buzzer circuit with dry cell, to indicate the correct sensitive adjustment of the detector, is essential when this type of detector is used.

Among the recent radio developments come the more sensitive valve type of detector which is now in general use. It consists of an exhausted electric bulb which needs a source of filament current, generally supplied by a six-volt accumulator, and a high-tension battery to furnish the plate voltage, which usually consists of a number of small dry cells assembled in a unit.

For detection purposes either a gas content valve (or “soft” valve), or a highly-exhausted valve (or “hard” valve) may be employed.

Many amateurs prefer the less-sensitive hard valves, as they do not require such delicate adjustment as the soft.

Naturally the accumulator needs recharging periodically, and since most electron valves used for reception need a filament current of about one ampere, a six-volt sixty ampere accumulator, for instance, supplying filament current for a two-valve amplifier and a detector, would have to be changed completely after every twenty hours’ constant use.

If large size dry cells are used for intermittent operation of valve detectors, it will be as well to use two or three cells in parallel for each valve employed, consisting in turn of four cells connected in series. Eight or twelve dry cells would thus operate a valve receiver.

It has been found possible, by using special radio amplifiers, to amplify, or magnify, the received impulses before they reach the detector.

Novices, however, are not recommended to use these amplifiers, as the study of them is still developing, and not much is known about them as yet.

The term receiver is variously used. Sometimes it means the combined tuner and detector; sometimes it also includes the amplifier; and sometimes it denotes the tuner only.

One or more electric circuits are contained in the tuner, which are so adjusted that they catch impulses of the desired wave length only.

A coil of wire, cylindrical in shape, with one or more sliding contacts, is the simplest form

of tuner, of which there are two general types in use—the single and multi-circuit tuners.

The former are the less expensive and more easily operated, though the latter give greater freedom from interference, and are, therefore, preferred by the experienced amateur.

Everyone knows the standard telephone detector—which is essentially the same as the receivers used for radio telephone reception, though their type is distinctive.

Made in the watchcase form, they are attached to bands which pass over the head, and hence derive their name—head-receivers.

In order that they may follow and respond to rapid pulsations of current, the diaphragms are very light—while a far greater number of wire turns are round the magnetic pole.

This causes a proportionally greater magnetic

field with a feeble current, and the result is an extremely sensitive receiver.

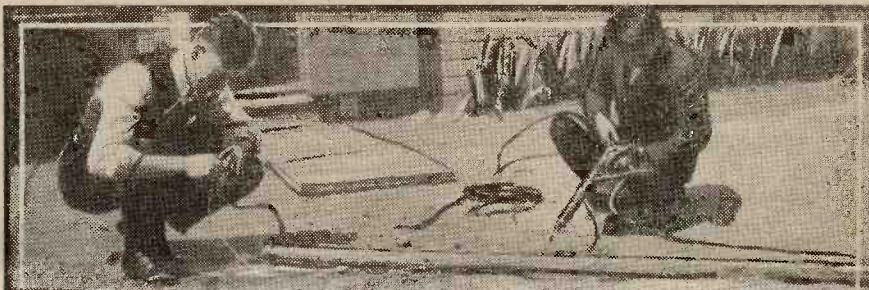
Comparatively high resistance telephones are desirable for valve reception.

The two receivers are generally connected in series, those of fair sensitiveness having 1,000 ohms resistance in each receiver, while 1,500 to 2,000 ohms are found in the better ones.

One or more stages of amplification, each needing an additional electron circuit, will further increase the strength of signals received and thus the range of “picking up.”

The same accumulator which operates the detector valve filament will operate the amplifier valve filaments, and, if proper connections are made, an ordinary sixty-volt high-tension battery may be used for the plate in both amplifiers and detectors.

Except in cases where exceptional signal intensity is needed, two stages of audio-frequency amplification will suffice.



## HINTS TO AMATEURS

Don't meddle with the electric light mains when erecting your receiver. You will only blow a fuse, and perhaps treat yourself to an unpleasant shock.

Leave your receiver alone when there is thunder about. A ground switch in your aerial circuit is well worth while. It may save your set from utter destruction.

Keep your accumulators upright. Sulphuric acid has an undesirable effect on one's best carpet.

Look after your accumulators. Don't “drain” them utterly. Have them charged regularly, whether they want it or not.

Use clean rainwater for them if you can't get distilled water. Don't add acid to water. It's bad for your health.

If you are very close to a transmitting station, don't tune in for loudest signals. It is not good for the 'phones.

Keep your high-tension batteries well ventilated or they will begin to “sweat,” and, consequently, deteriorate.

Hang the 'phones on a wall when you have done with them. This allows the moisture on the diaphragms to dry. Never tap the diaphragms with a pencil. Once they get bent they are useless.

Keep an eye on your lead-in tube. Damp will cause bad insulation and poor signals.

See that your valve circuits are not causing radiation. By this is meant, don't experiment with strange circuits until you know what you are doing.

Don't varnish or paint your apparatus. It won't look any the handsomer in the end, and will probably spoil it.

Avoid a gas-pipe earth—especially if you have a transmitter. The reason is obvious.

If you have a valve set and it suddenly ceases to function, don't jump to the conclusion that it is a “dud.” Probably your filament accumulator wants charging.

Keep your earth lead as short as possible. This applies to aerial down leads as well.

Don't confuse Greenwich mean-time with British summer-time.

Refrain from taking your receiver to pieces in order to satisfy your curiosity as to how it works. If you are a novice the results will probably be fatal, and you will be none the wiser in the end.

Don't jump up suddenly when you hear wireless concerts. Remember, you will have the telephones on, and a sudden jerk will probably upset the whole of your apparatus.



# RADIO TUTORIAL

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

The first number of POPULAR WIRELESS has made its appearance in response to the great demand for a paper devoted to the interests of the wireless amateur.

POPULAR WIRELESS is in no sense a technical paper, although, of course, as my readers progress in their study of wireless they will become more familiar with the many technically interesting radio problems of the day.

But the boom in wireless has created a large public—hitherto not very interested, from a personal point of view, in wireless work—which now realises the absorbing fascination of the wireless telephone.

And the fact that broadcasting stations will soon supply them with a constant programme every evening has had the effect of stimulating interest to an enormous degree.

Many people will install receiving sets purely for the sake of the broadcasting programmes. They will not have the time or the inclination to make a deep study of wireless. Nevertheless, POPULAR WIRELESS will be indispensable to them, because it will, week by week, give the latest broadcasting news, with full particulars as to the times of the various items to be transmitted and the adjustments necessary to "tune in" to the particular wave length employed.

The experimenter—the man or woman who is handy with his or her fingers—will find fascinating constructional articles by the best experts available.

The receiving set dealt with in this week's constructional article will interest many, not only because of its cheapness, but because of its unique simplicity of design. Above all, the set works!

From time to time useful constructional articles will be given for the benefit of amateurs, so that they will be able to see the various stages between a very elementary set and a first-class receiver.

The amateur who has advanced in his study of wireless will not be forgotten, and from time to time experts will cater for his needs.

In fact, POPULAR WIRELESS justifies its title. After all, "popular" is a word only to be applied to something in the majority, and I feel that the majority of my readers will find this paper very popular indeed.

Everyone is talking about the broadcasting stations shortly to be in operation, and I find a good deal of argument going on about the types of programme which will be supplied.

What is your ideal of a wireless concert programme? I will award three prizes of £5 each, or the present of a £5 receiver, to the three best examples of programmes submitted to me. Write your suggested items on a postcard, and address to The Editor, POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.

Only one list may be sent. The Editor's decision must be final. Postcards should be sent not later than Friday, June 16th.

I have retained the services of several experts to answer queries sent in by my readers. If you are in doubt, or have any difficulty at all with your set, no matter how little or how big, let me know your troubles, for troubles shared are troubles halved, especially in wireless work, although I hope they will be more than halved when you send them to me!

THE EDITOR.

## WIRELESS QUESTIONS ANSWERED

The questions dealt with on this page are ones that our Technical Experts received recently from the readers of a well-known weekly journal. Naturally, subsequent issues of POPULAR WIRELESS will deal only with questions received from its own readers. It is thought, however, that we could not do better for a first issue than show readers the kind of questions that we are prepared to answer.

Q. I am unable to put up an outside aerial, but I have a room forty feet above the ground, and I am wondering if I would get any results if I put up an indoor aerial in it. I am only ten miles from one of the proposed broadcasting stations, and that is all I care about hearing.

A. You should expect to have very fair results with an indoor aerial, using a valve.

Q. Will I be able to receive on a frame aerial with a crystal detector set?

A. No. You will require two or three stages of amplification in order to increase the weak signals that are received when using a frame aerial.

Q. What is the best kind of a set to purchase for valve reception?

A. We suggest that you write to concerns that advertise in this and other magazines, and to others if you care to, and send for catalogues and quotations. Study these carefully with your own requirements in mind. Also communicate with radio amateurs in your district and have them tell you about local conditions. Apparatus that works in one part of the country may not work so well in other parts. Of course, you will want to bring in the short wave concerts, lectures, and other entertainments. Sets for this purpose have a tuning range of from 150 to 600 metres. The receiving range varies with atmospheric conditions. One night you may hear a station two thousand miles away with one valve, and the next night you may not be able to get it with six stages of amplification.

Q. Why are inductances for crystal receivers wound so that they are in single layers, whereas in valve sets the inductance wire is in bundles of layers?

A. Crystal receiver inductances are wound in single layers to keep down self-capacity losses.

Valve receiver coils are always wound in single layers, and not in "bundles." Don't get mixed up with high or low frequency amplifiers, in which super-imposed coils may be used.

A single layer coil is used when strong signals on a particular wave length are required.

Q. Please give me list of parts for a fairly good receiving set.

A. For building the valve detector receiver you will need:

- 100 to 150 feet No. 14 gauge copper wire, for aerial, and usual insulators and lead-in tube.
- 1 tuner, 180-2,000 metres.
- 1 filament rheostat.
- 1 accumulator, 6 volts and as many ampere-hours capacity as you want to pay for. Smaller ones need recharging oftener.
- 1 high tension battery, 60 volts.
- 1 pair 4,000 ohm phones.
- 1 valve holder, with valve.
- 1 grid leak and grid condenser, .00025 microfarad capacity. Wire for connections should be insulated. Stranded wire has better conductivity. The larger it is, the less resistance, but don't get it so large and stiff that it is hard to manage. Look at a ready-made set and see how it is wired.

If you are going to build a set we suggest that you read radio advertisements, secure catalogues, compare goods and prices.

Q. I am situated midway between two stations to which I listen every evening. When these two stations are both transmitting telephony I hear an extremely high-pitched whistle going continuously; when either of them stops the whistle ceases. Both stations are listed as transmitting on a wave length of 360 metres. Is there something wrong with my receiver or is this some unexplained electrical phenomena?

A. The trouble is not in your receiving set. All modern stations now use the valve tube oscillator for generating the extremely high frequency currents that are used in radio telephony. The frequency of these currents lies above the frequency that the human ear can detect; that is why we hear nothing when the speech stops, although the radio wave is still being sent out. When two stations are generating two sets of currents of nearly the same frequency, the two currents interfere with each other and produce the peculiar whistle that you hear in the receivers. At present there has been suggested no remedy for this phenomenon except to change the wave length of one of the transmitting stations.

Q. Can a 120 volt a.c. supply be used for a valve filament, with a suitable series resistance?

A. No; there would be too much induction in the phones.

Q. Would four Leclanche cells do for a carborundum crystal?

A. We should say one too many.

Q. Can I really hear a man speaking by wireless?

A. You can. Try it and see.

## WIRELESS CLUBS

Publicity in the columns of POPULAR WIRELESS is open to all Amateur Wireless Clubs in Great Britain and the Colonies.

Secretaries are invited to send weekly reports of their club activities to the Editor, together with photographs of interest to amateurs.

The latter will be paid for at our usual rates.

Q. Can I reduce the wave length of my set by putting a variable condenser in series with the aerial?

A. You can. We suggest putting the condenser in series with your earth as more preferable.

Q. Is a condenser of 0.00045 mfd. suitable for use with a crystal?

A. Yes.

Q. Which is best for reception, a single wire aerial or a twin wire aerial?

A. A single wire aerial. See article on how to erect an aerial in this magazine.

Q. Can small pancake coils be used for a loose coupler for a crystal receiver?

A. Yes.

Q. Will telephones of 2,500 ohms do for wireless telephony reception?

A. Moderately well; 4,000 ohms would be best.

Q. Can you give a formula for working out the dimensions for capacities of variable condensers?

A. For a condenser with equal parallel plates, the capacity is approximately given by the formula:

$$c = k \frac{a^2}{d}$$

$$4\pi \epsilon$$

where  $c$  = capacity of condenser.

$k$  = dielectric constant of material between the plates (air = 1).

$n$  = total number of plates, minus 1.

$a$  = area of overlap of plates.

$d$  = distance between plates.

Q. Is it possible to hear Australian stations with one valve?

A. It is not.

Q. Do you think I could learn morse code at fifteen words a minute over the week-end?

A. We don't.

Questions should be clearly and explicitly written, and should be numbered and written on one side of the paper only. All queries must be accompanied by the full name and address of the sender, which is for reference and not for publication. Queries will be answered under the initials and town of the correspondent, or, if so desired, under a "nom de plume." Address The Editor, POPULAR WIRELESS, The Fleetway House, Farringdon St., London, E.C.

No. 2  
POPULAR  
WIRELESS.

Packed with pictures  
and expert advice

OUT  
FRIDAY,  
JUNE 9th.



# WIRELESS.

## COMPLETE RECEIVING SETS

and accessories of all makes.

### WE HOLD

the largest stock of ex-Government wireless apparatus in the country.

### SPECIAL ATTENTION

and assistance given to all interested in receiving *broadcast* wireless music, telephony and Morse signals.

### ILLUSTRATED CATALOGUE

POST 4d. FREE

When writing, please mention this publication.

**LESLIE McMICHAEL**

M. I. Radio E.

Providence Place, West End Lane, KILBURN, N.W.6

(Bus Services 1, 8, 16, 28, 31, all pass West End Lane.)

Telephone: HAMPSTEAD 1261. Nearest Tube Station: KILBURN PARK (Bakerloo)

## HAMBLING, CLAPP & Co.

### Wireless Specialists

#### Single Valve Detector Panel

This will make a complete receiving set when usual accessories are connected to same, viz.: Batteries, phones, coils, condenser

Price  
**32/-**



#### Single Valve H.F. Panel

This can easily be attached to any receiving set and will greatly increase the strength and clearness of music

Price  
**35/-**  
(As illustrated)

These two panels together give you a complete 2-Valve Receiving Set capable of clearly receiving all music, speech, etc., from all British Broadcasting Stations.

We stock every Wireless Accessory for the beginner and will give every assistance to those who wish to construct their own set.

**110, STRAND, W.C. 2**

## The DAILY MAIL and WIRELESS



*The Daily Mail* proposes to provide readers possessing wireless sets with good music and other entertainment by wireless.

*The Daily Mail* has hitherto led the way in advancing the growth of wireless telegraphy and telephony, as it did in the case of motoring and flying, and it intends to maintain this lead for the advantage of its readers.

It is beyond doubt that there will be imitators in this enterprise as in others, but readers of *The Daily Mail* may be assured that everything possible will be done to give a perfect wireless service of music and entertainment. Also as the science develops *The Daily Mail* will be in the forefront in taking advantage of improvements that will undoubtedly be made as the result of fresh knowledge, and the scope of the scheme will be extended to increasing numbers by means of new devices.

Further announcements will be made in *The Daily Mail* from time to time.

**Watch  
The Daily Mail  
for the latest  
developments of  
wireless and the  
latest news of  
broadcasting**



**BUY NOW! DO NOT PAY MORE!!**

CHEAP, EFFICIENT INSTRUMENTS FOR "THE MAN IN THE STREET"

# RADIOPHONES

For the Reception of

# WIRELESS

TELEGRAPHY, TELEPHONY, MUSIC, CONCERTS,  
NEWS, LECTURES, SPEECHES, TIME SIGNALS, Etc.

Instructions sent with each set—Technical knowledge unnecessary—

**YOU CAN "LISTEN IN" AT ONCE!**

*Remember the Actual Voice is Heard—Not a Reproduction.*

## THE "POPULAR" (CRYSTAL) RECEIVER

**35/-** (Receiver only).

Despatched complete. Ready for immediate use, including Head 'Phones. 100ft. Aerial, Insulators, etc.

**£3 15 0**

Send your order with cash to "Sales Manager." Cross Cheques, M.O.'s, etc., "Barclays." Register Treasury Notes.

## THE "PRINCE" SINGLE VALVE RECEIVER

**63/-** (Receiver only).

Complete with Valve, Batteries, Accumulator, 'Phones, Tuner with Coils (Wavelengths 200/20,000 metres), Aerial, Insulators, complete instructions, etc.

**£7 17 6**

## "KING RADIO"

**TWO VALVE RECEIVER (1 HF. & 1 Rect.) ...**

**84/-** (Receiver only.)

or with Two Valves, 'Phones, Batteries, Accumulator, Tuner with Coils (Wavelengths 200/20,000 metres), Transformer, Aerial, Insulator, etc., etc. ...

**£9 17 6**

**STRONGLY RECOMMENDED**

**EFFICIENT INSTRUMENTS AT MASS PRODUCTION PRICES.**

**GREAT SHORTAGE OF MATERIALS EXPECTED.**

**BUY YOUR SET NOW.**

All above receivers tested on Standard Aerial before despatch and guaranteed in thorough working order.

**Over 1,000,000 Receiving Sets Sold in U.S.A.**

The "Popular" receives wireless telegraphy easily from considerable distances, but is only suitable for the reception of telephony at 5/10 miles. The "Prince" is very good, and the "King Radio" excellent, for the reception of all broadcasting in this country.

**H. STANLEY PRINCE & Co. (Dept. 2), 126, BISHOPSGATE, LONDON, E.C.2**

All Applications for Advertisement Space in POPULAR WIRELESS to be made to JOHN H. LILE, Ltd. (Sole Agents), 4, Ludgate Circus, London, E.C.4.