KDKA ON A CRYSTAL!

SOLVING THE PROBLEM OF CURRENT SUPPLY

Amateur Wireless
And Electrics

Vol. VI. No. 143. SATURDAY, FEBRUARY 28, 1925 Price 3d

PRINCIPAL CONTENTS

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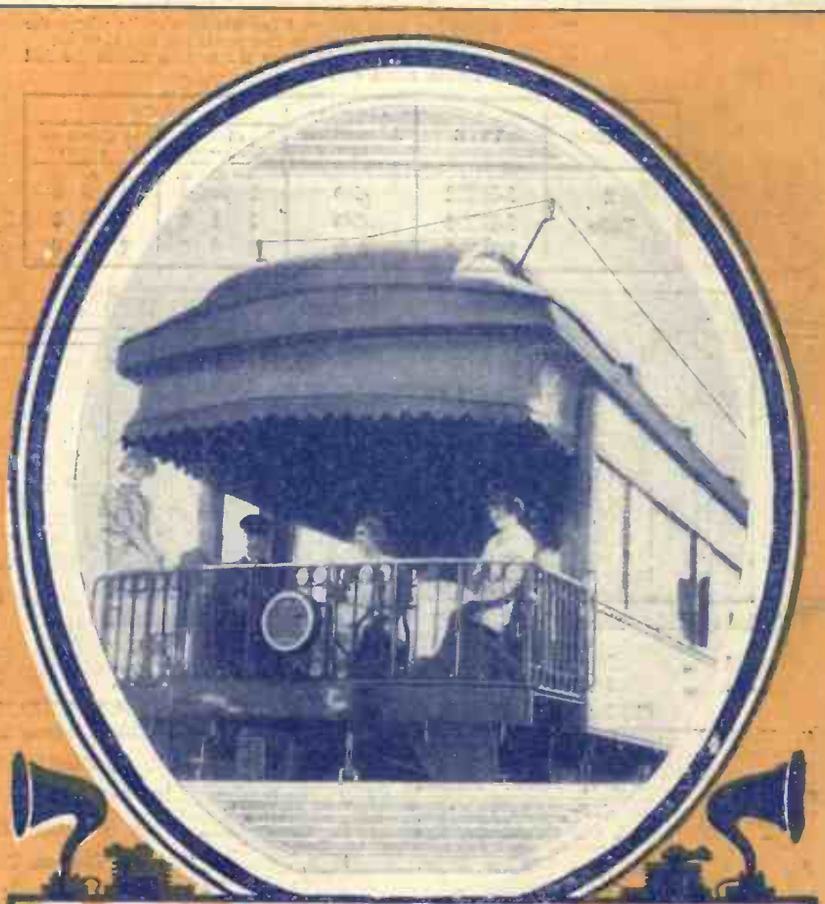

WIRELESS ON CANADIAN RAILWAYS

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This type is a development of the DTG, having more than double the capacity of the 5/- cell.
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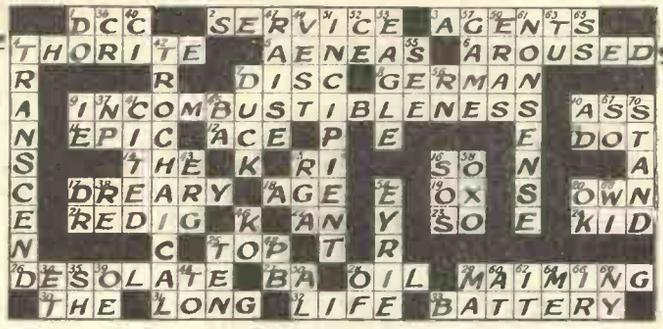
VOLTAGE	TYPE	ACTUAL Ampere-Hour Capacity	PRICE Cell only Un harged	PRICE In Container Type "O"
			£ s. d.	£ s. d.
2 Volts	1-H Z 2	40	0 17 6	1 3 6
	1-H Z 3	60	1 1 0	1 8 0
	1-H Z 4	80	1 4 6	1 12 6

Type HZ



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2nd „ Mr. Hugh MARWICK, 10, King Street, Kirkwall.
3rd „ Mr. J. KIER, Schoolhouse, Auchtermuchty, Fifeshire.

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Amateur Wireless and Electrics

Vol. VI. No. 143 February 28, 1925

KDKA ON A CRYSTAL!

A Personal Account of a Remarkable Achievement

PROBABLY many readers will have seen brief reports in the daily press upon my reception of K D K A on a crystal set without any means of amplification. The Editor of AMATEUR WIRELESS has asked me to give further details of this achievement, which surely must constitute a record, and it is with pleasure that I do so in the following short notes.

A Difficult Task

To convince amateurs of the genuineness of my claim is a difficult task, but I will endeavour to do so as briefly as possible.

While searching for stations on my variometer and tapped-inductance tuned crystal set I established contact with K D K A (East Pittsburgh, U.S.A.) on approximately 326 metres at 24.55 G.M.T. on January 2. Apparently a speech or lecture was in progress. The speaker's voice was very distorted; it faded quickly three minutes later. Numerous oscillators then came in (rather faintly) and faded entirely with the speech at 01.01.

The Second Reception

Nothing more was heard but powerful oscillation at 01.05, 01.20 and 01.27 until 01.35, when speech was again heard. At 01.38 speech came in much stronger and without oscillation, but distortion prevailed, and at 01.41 the speech faded rapidly.

Listening was continued until 02.45, but nothing more was heard, conditions apparently developing unfavourably judging by the slight decrease in signal strength of familiar morse stations on 600 metres, one of which, I may mention, could be heard eighteen inches from the phones.

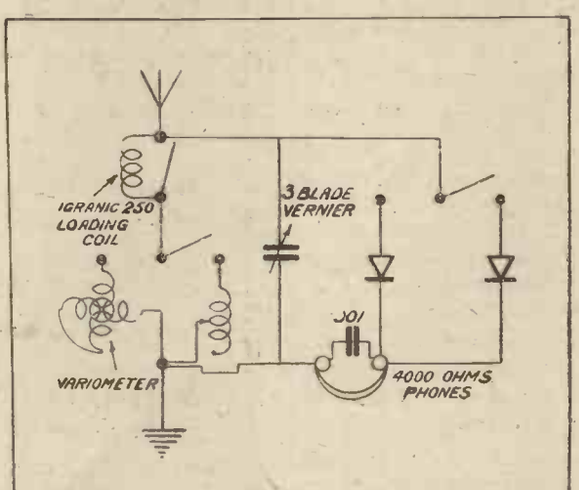
The actual time during which speech was heard was 9 minutes 20 seconds. I should like to point out that this was not freak reception, and it is the second time I have heard America within a week, though on the first occasion reception was too weak to be absolutely sure. Apart from this, I have tuned in all the B.B.C. stations and six Continental stations.

I made a point of visiting all owners of valve sets in the village later that morning, to ascertain whether they were working at the time that I received K D K A, but they were not; therefore the results could not be due to them.

Nothing appears to be impossible in wireless. A couple of years ago we had accounts of crystal reception of a few hundred miles, and many doubts were expressed as to whether the results were not probably due to some near-by valve set. Anyhow we heard much of "freak" reception on crystal sets. Here we have the personal account of Mr. Stafford, who lives near Thrapston, Northants, who claims to have received K D K A of Pittsburgh, U.S.A., on a crystal set of somewhat unusual design.

Success After Three Months

I have been trying to receive an American station for the past three months, listening on an average three nights per week, and am astonished to think I had not received one before, considering the exceptionally good strength of signals on the date mentioned. A notable feature of this reception was that for the first two minutes of reception two degrees movement to the right or left of the variometer would cut out speech, but a few seconds later it became stronger and could be heard anywhere between 250 and 500 metres.



Circuit Diagram of the Crystal Receiver with which the author received K D K A of Pittsburgh, U.S.A.

Possibilities of the Crystal

I am not quite convinced that the actual possibilities of the crystal under favourable conditions are yet realised, and think that as now experimenters may be assured that it is possible to bridge the Atlantic we shall soon hear of more receptions.

My own success I attribute to exceptionally good conditions at the time and the circuit used, which is the result of twelve months of experiment. Also, there is the possibility that K D K A might have been employing more power than usual in view of the fact that it was transmitting a special programme to this country a little earlier. The circuit is shown by the illustration.

Aerial and Earth

The crystals in use at the time were midite (with phosphor-bronze catwhisker) and hertzite (with german silver catwhisker). I have a 100-ft. aerial, 80 ft. in length and 20 ft. high.

My earth consists of a biscuit-tin, a cycle wheel and a tin of water (each with a separate lead to the set) buried in natural iron-ore upon which the house is built. My house is near Thrapston, Northants.

S. M. S.

DX AND THE CRYSTAL

THE sensitivity of a crystal set depends on the efficiency of the aerial, crystal combination and phones.

A gold or steel catwhisker when used in conjunction with a silicon crystal provides a sensitive stable detector.

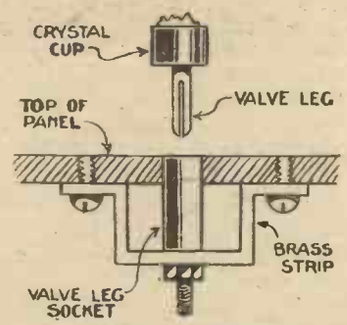
The aerial should be as high and unshielded as possible, because any leaking away of current means less strength in the headphones and a few more miles off that D X station you are trying to get.

PRACTICAL ODDS AND ENDS

Changing Crystals

A USEFUL hint for a quick-change crystal cup is shown in the sketch.

Many people find that the drawback to using up their small pieces of crystal by



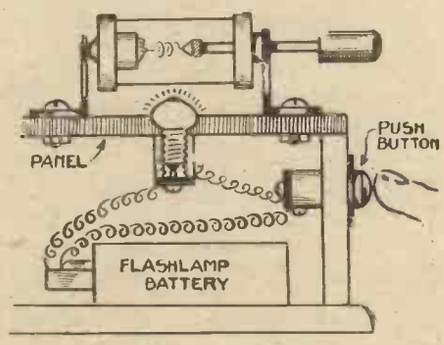
Details of Crystal Cup Mounting.

soldering them into a cup with Wood's metal is the fact that much trouble is entailed in interchanging them. The following is a convenient method for overcoming this difficulty. A valve pin is screwed into the crystal cup before soldering in the crystal, and a valve leg socket is fitted in the panel by means of a brass strip set away from the under side and secured by two screws. The socket should be flush with the panel when fitted.

C. A. C.

A Crystal Tip

CRYSTAL users may have found difficulty in adjusting the crystal contact when the set is placed in a dark corner or is shaded from the light. The diagram illustrates a simple method of overcoming



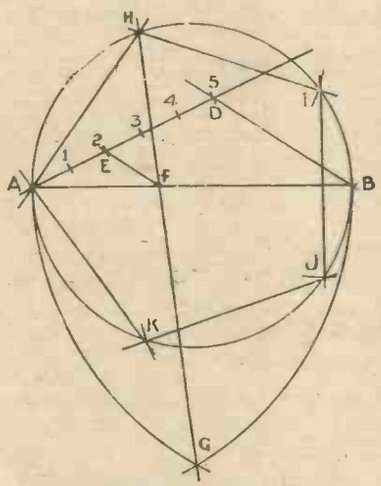
Illuminating the Crystal.

this difficulty. The simple method of "counter-sinking" the flashlamp bulb is clearly shown, and sufficient light will be given by this method to illuminate the catwhisker.

J. B.

Marking Out Formers

THOSE who have retained some of the geometrical training of their school days find the making of basket-coil formers very simple. This need not involve the use of a ruler, as it is only our old school-day's problem of drawing a polygon inside a circle. The sketch shows a pentagon so inscribed, the method of working being as follows: Draw a circle, divide centrally at AB; at an angle to AB draw line AC and mark off from A the number of equal parts necessary to correspond to number of sides required (in this case five). From No. 5 (D) draw line DB; parallel to this draw the line EF at No. 2; with radius AB draw the intersections AG, BG, through F draw the line GFH, then



Marking Out Formers.

AH gives the radius for marking off IJK, and connect. The parallel lines are easily drawn with two set-squares.

J. W.

Condensers

ONLY the best mica should be used as the dielectric for making up fixed condensers. Celluloid is liable to catch fire should a heavy static discharge break down the insulation of the aerial condenser.

K.

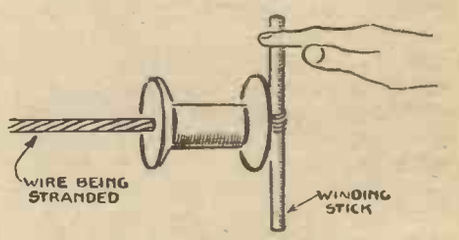
Stranding Wire

LITZENDRAHT or other similar stranded wire is highly efficient for wireless use, but the cost of such wire often makes its use prohibitive.

The diagram illustrates a method of stranding a number of lengths of "straight" copper wire of fairly fine gauge.

The cotton-reel is placed over the strands, as it facilitates the final straightening out, and forms a convenient holder which may be supported in the left hand, while the winding stick is rotated with the right.

The number of strands should be limited to about seven or the finished wire will be lacking in flexibility.



Method of Stranding Wire.

Stranded wire of this description is very suitable for winding low-loss coils.

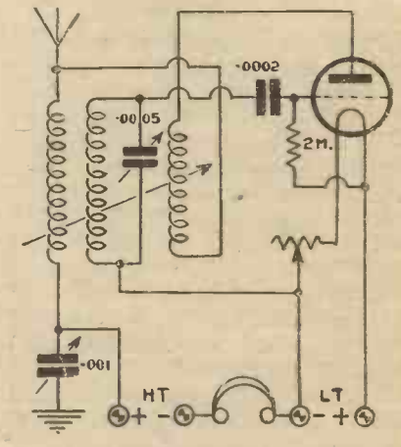
Y. L. B.

A Novel Circuit

MANY experimenters who own single-valve receivers are on the look-out for a circuit which will give selectivity and sharp tuning combined with a greater volume of sound than is usually obtainable with a one-valve set.

The diagram illustrates an interesting circuit which, it is claimed, gives excellent results.

The values of the condensers are marked

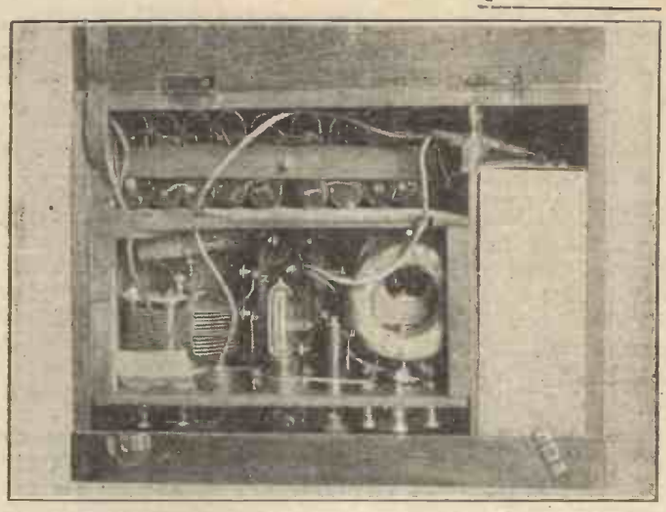


A Novel Circuit.

in, but the sizes of the coils will, of course, depend on the length of the aerial.

On an aerial of only 45 ft., double wire, very satisfactory results are obtainable.

R. F.



Figs. 1 and 2.—Two Views of the "All-In" Portable Receiver.

AN "ALL-IN" PORTABLE RECEIVER

THE type of portable set which includes a small frame aerial, with its three or four valves, has its uses on the rare occasions when one cannot throw up some kind of makeshift aerial. But at a picnic, on the tennis courts, or in the general run of places where portable sets are most in use, it is not generally difficult to sling up a length of insulated wire.

The little set illustrated on this page contains enough dry cells to run it for about six months, and, besides being easily portable, is the most economical type of receiver when attached to the permanent aerial at home. What is much more important, it will stand a great deal of rough use without sustaining serious injury. A set such as this, using one peanut valve, has, to the writer's knowledge, been dropped three or four feet on a number of occasions without loss of efficiency. Moreover, it can be (and is) left adjusted for the family to switch the L.T. current on and off as required for listening.

Many experimenters will "jib" at the crystal, but little trouble need be anticipated if a reliable detector is purchased. It may sound incredible to valve users, but it is not uncommon for a whisker to remain adjusted for a week at a time.

Some readers, too, may be doubtful of the advisability of squeezing the components of a reflex circuit on to a panel only 8¾ in. by 5 in. with a depth of 3⅞ in., particularly when both valve and coils are inside. The arrangement shown in the photograph, however, which is the result of some experimenting, is perfectly stable.

"What will it do?" is always the first test for a set, and here are a few facts about this one. At five miles from 2 L O, using a badly-shielded 6-ft. length of steel gauze only 3 ft. above the ground as an aerial, clear signals are received. A 3-ft. frame aerial at the same distance gave really good reception. At eight miles on an average aerial an Amplion Junior gave pleasant loud speaking in the open. At twenty miles loud speaking was still obtained. The telephone range is probably 100 miles, but both Aberdeen and Glasgow can be picked up in London when 2 L O has closed down.

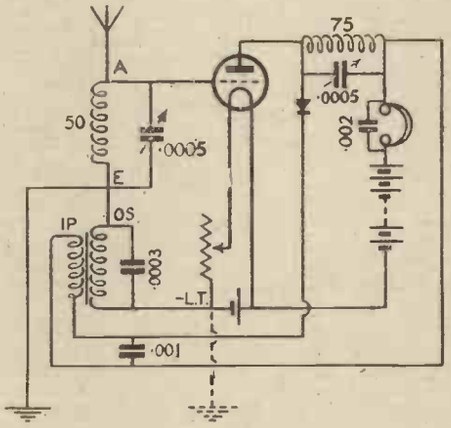


Fig. 4.—Circuit Diagram.

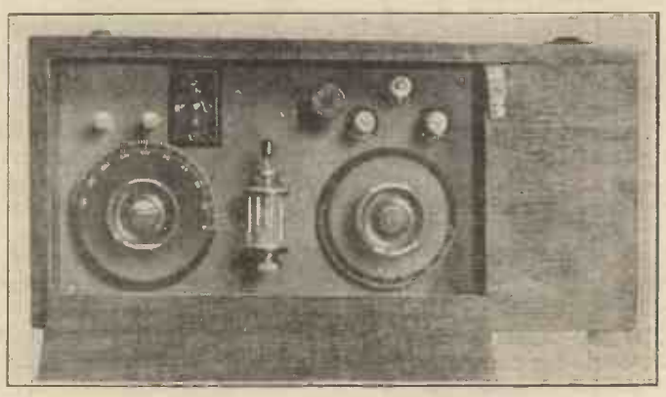


Fig. 3.—View of Panel.

In addition to the usual earth terminal it will be seen there is an alternative connection to the – L.T.; this enables either of the more popular reflex circuits to be used. When the earth terminal is in use the secondary of the transformer is between the – L.T. and the earth; this position appears the more efficient, as besides a greater range there is less fear of A.C. hum and other disturbances being picked up as is commonly the case when, alternately, the transformer is in the aerial circuit. The – L.T. connection places the .0003-microfarad condenser in series with the aerial coil, which should be of 50 or 60 turns to work with small aerials; this connection is therefore useful to cut down the wavelength when a large-capacity aerial is used.

Within reasonable distance of a broadcasting station little difference in volume will be noticed if an earth connection is dispensed with; the aerial tuning will, of course, be different, as the batteries form a capacity earth.

The first photograph (Fig. 1) shows the appearance of the set when closed and gives some idea of its size; the overall measurements are only 12¼ in. by 9 in. by 5¼ in. This might be further reduced if special components were purchased.

In the second photograph (Fig. 2) the top is open, show-

(Concluded at bottom of next page)

FRAME AERIAL AND ONE VALVE

MANY single-valve enthusiasts are deterred from using frame aerials because at least one H.F. valve is usually considered necessary, and because considerable loss of signal strength is experienced when a frame aerial is used with a "straight" valve circuit. Results with a single-valve circuit and frame aerial are often poor when compared with a single-valve with reaction and an out-door aerial. This is chiefly due to the fact that full reaction effects are not obtained.

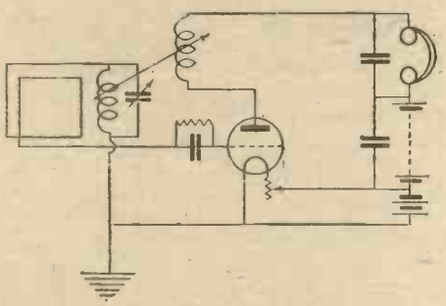


Fig. 2.—A Second Experimental Circuit.

The First Circuit

The circuit Fig. 1 was tried with a view to getting over this difficulty. It will be seen that the frame aerial, which is tuned with a condenser, is connected across the grid and filament of the valve in the usual manner, but that there is included in the anode circuit a coil tuned with a variable condenser. When the anode circuit is thus tuned to the same frequency as the aerial circuit, reaction effects are obtained and oscillations can be produced. At a distance of about five miles from 2 L O this station came in strongly on the phones on one valve, and signals could be heard some eight or ten feet away. There was not quite sufficient strength, however, to work a loud-speaker. A No. 75 duolateral coil was used in the anode circuit, tuned with a small condenser. A variometer covering the broadcast band could be used in the anode circuit instead of the tuned coil where it is desired to receive only broadcasting. A disadvantage of this circuit is that two circuits have to be tuned, and distant stations can easily be missed.

Another Circuit

The circuit Fig. 2 was then tried. In this case one side of the frame aerial is connected through the grid leak and condenser directly to the grid of the valve. The other side of the frame is connected to the A.T.I. and the A.T.I. is connected to earth. A connection is also made between the earth side of the tuning coil and the positive leg of the filament. Tuning is effected by means of a variable condenser connected in parallel with the A.T.I. A reaction coil is included in the anode circuit of the valve and is coupled to the A.T.I. in the usual manner by means of a two-coil holder. With the coupling sufficiently tight, oscillations were readily produced on all wavelengths. In fact the set oscillated rather more easily than it did when connected to an outdoor aerial.

2 L O came through with no appreciable diminution of strength when compared with reception on a 60-ft. outdoor aerial. (It should be mentioned, however, that the outdoor aerial is somewhat screened.) With the addition of a note magnifier strong signals were obtained on a loud-speaker, music and speech being clearly audible over the greater part of the house.

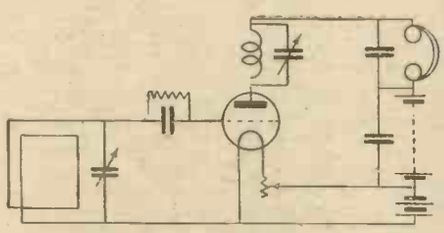


Fig. 1.—An Experimental Frame-aerial Circuit.

High Wavelengths

The higher wavelengths were reached by plugging in larger coils. C.W. stations can be received without fear of causing interference by oscillation, since the radiation from a frame aerial is small.

The Frame

A frame aerial 2 ft. square and with ten turns of wire was used. The turns should be well spaced, and to attain this the wire, instead of being wound round the edge of the frame, is passed through staggered holes as shown in Fig. 3. By this means the distance between adjacent turns of wire is nearly doubled.

The effect of connecting the earth to the negative filament may be tried, but the writer found the positive preferable.

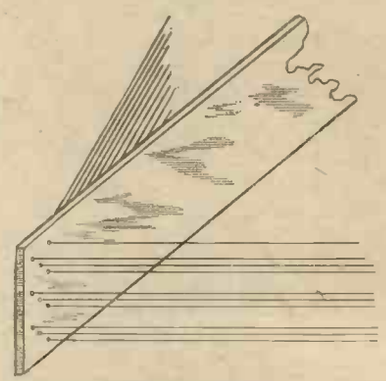


Fig. 3.—Method of Winding Frame.

A number of variations of the circuits given will doubtless suggest themselves to the experimenter. Electrostatic reaction might be tried by connecting a small variable condenser between the anode circuit and the aerial circuit. A combination of electrostatic and magnetic reaction can be tried by using the usual reaction coil and connecting a small variable condenser between the anode circuit and the aerial circuit.

All of the circuits described are stable and can easily be handled by a beginner. E. T. B.

"AN ALL-IN PORTABLE RECEIVER" (*continued from preceding page*)

ing the arrangement of the components. Examining this from left to right, we see the anode coil and tuning condenser, the valve horizontally placed above the transformer and the aerial coil on an ebonite shelf above the condenser tuning it. In separate compartments are two 1.5-volt cells in parallel, and the H.T. composed of four-volt units. The distribution of the components on the vertical panel should be clear from the third photograph (Fig. 3). Fig. 4 shows the circuit diagram.

Readers who intend constructing a similar set will find it advisable to measure their components and draw a scale diagram before drilling the panel or making the cabinet. S. E. N.

INTERFERENCE TROUBLE

DR. DELLINGER, of the American Bureau of Standards, speaking upon a question that exists in even a more acute form in his own country than here, declares that there is no simple cure-all for interference. However, both natural and man-made interference is slowly being coped with, the former being, in fact, the more difficult problem. The slight electrical movements always going on in the atmosphere, similar to tiny lightning discharges, cause a certain background of noise in a receiving set, which will probably never be entirely eliminated any more than variations of weather can be prevented.

To prevent overlap of broadcast programmes in crowded areas he advocates the use of a fewer number of high-powered stations located at a considerable distance away from the big centres of population. This policy is already being seriously considered both in this country and in America by those responsible for the future development of the broadcasting system. M. A. L.

A consignment of Indian Ruby Mica for Dubilier condensers arriving at the London Docks.

Concerning Mica

The "Dielectric" in all Dubilier fixed Condensers is of the best Ruby Mica, especially imported from the quarries of India.

It has long been recognised that there are numerous reasons, both mechanical and electrical, which account for the superiority of Mica over other dielectric materials employed in Fixed Condensers of small capacity.

Perhaps the best known of these are high insulation resistance and high dielectric strength which enable an exceedingly thin sheet of Mica to withstand very high voltages.

The Mica sheets in Dubilier Condensers measure only a few thousandths of an inch in thickness, yet each one of them before it can qualify for a place in a condenser has to withstand an alternating current pressure test of 5,000 Volts.

A Condenser made up of such sheets will resist, for example, the continued application of the full voltage from a High Tension Battery, whereas a condenser with an inferior dielectric may develop a short circuit—a fault which may possibly ruin a succession of H.T. Batteries before it is located.

Apart from insulation resistance, however, there are still very powerful arguments in favour of the Mica Condenser. The use of Mica enables Condenser losses (due to hysteresis, leakage, etc.) to be reduced to a minimum, especially as Mica has a high "specific inductive capacity" so that the volume of the dielectric in a condenser in which losses can occur is reduced to a minimum.

From the above it will be seen that for every receiving circuit the best condenser is a Mica Condenser ; and you will be assured of obtaining the best Mica Condenser if you

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E.P.S. 78

On Your Wavelength!

Now or Never

THE Radio Society of Great Britain is taking a very grave view of the pending parliamentary action concerning the Wireless Telegraphy Act of 1904 so far as it affects the transmitting amateur. The official view is that the legislation is intended to strengthen the existing Act, but every society in the country that is affiliated to the parent society is being circularised and asked to support them in representing that if the Bill passes into law as it stands it will seriously prejudice and hinder research work and lead to stagnation in wireless progress. Strong representations are being made to members of the House of Commons that the effect of the Bill will be such as to give to the Postmaster-General the power to close down at his own pleasure all existing amateur stations and to refuse to grant further licences if he so desires. It is felt in responsible quarters that the whole future of the experimenting amateur is now at stake, and if the Bill is passed through the Commons as it stands his hard-won privileges are gone for ever.

The Amateur Experimenter

The importance of the amateur experimenter cannot be over-emphasised. He formed the nucleus of our wireless men during the Great War. It is entirely due to him that the use of short waves has been developed and their carrying propensities so ably demonstrated.

A year or so ago prominent authorities laughed to scorn the idea that the amateur could ever transmit to America on such a wavelength as 90 metres. Now the boot is on the other leg. Large commercial stations are sending out "feelers" on the short waves, and it is rumoured that they have an eye to adopting them in preference to the long waves at present in use.

This is one of many things due to the "amateur." He has earned his spurs and should be accorded a permanent place in the ether without fear of the sudden curtailment of his activities. It is for him to see that he pulls his weight in the present struggle by signifying to the Radio Society that he is in agreement with the policy of that body. He must secure for himself official recognition of his usefulness to the State now and for ever.

The Poor Transmitter

A kind-hearted correspondent has asked me whether there is such a thing as a Society for the Prevention of Cruelty to Amateur Transmitters. The inquiry was prompted by the recent proposals in the daily press to allow 2 L O to continue to afflict us with the Savoy Havana Band every night of the week until midnight. My thoughtful correspondent points out that the amateur transmitter has had an exceedingly thin time this winter in the way of periods free from broadcasting, and although they are not compelled to close down during broadcasting, they do so out of consideration for their neighbours. He further pointed out that should the broadcast programmes be prolonged as suggested, the amateur transmitter may become as extinct as the proverbial dodo. I lament the loss of the hours available to listen to these hard-working enthusiasts, for they have been considerably curtailed this winter.

What is an Artificial Aerial?

Many would-be amateur transmitters have had their catwhisker knocked off their crystals so to speak by the reception of an artificial aerial licence from the Post Office in lieu of the genuine radiating aerial licence which they wanted. They are further greatly perturbed by the fact that in their "permit to transmit" they are informed that the transmitter must not be connected to earth and is to be as non-radiating as possible. I have no doubt but that many of them have flung the apparently useless document into the fire, suffering under a sense of injustice, and have forthwith turned pirates. The dummy aerial is useful, however. The aerial consists of resistance, inductance and capacity, the three ingredients from which a "true-to-life" aerial is made, and it is easily made up in box form and need not occupy a space greater than ten cubic inches. With it and a couple of instruments one can learn enough to justify a further application for the radiating licence, so why not use it and turn it to account?

An Unkind Joke

Some few months ago several low-power stations in England were greatly surprised to receive a "K" call at terrific strength from an American amateur transmitter, and forthwith replied using power as low as 5 watts in some instances. Great was their amazement and satisfaction when, on changing over, the station promptly replied: "Yr sigs. vry f.b. hr o.m." and they pulled out their pencils and logged the great event. Later several other stations also worked the American amateur with still lower power, and it wasn't until one or two of the real D.X. fiends smelt a rat that it was discovered that the American was really an American—with the difference that he was on a visit to France, from whence came the signals. I'm told that several of our enthusiasts never touched a key again.

Another Fine Feat

Yet another laurel must be added to those already earned by wireless experimenters. On February 13 Mr. G. L. Morrow picked up at his station at Berkhamsted a short-wave signal from the Royal Air Force station at Mosul. The sender stated that he had an important message for the Air Ministry which he could not get through direct, and asked if any amateur who could read him would reply. Mr. Morrow signalled to him to send his message, which he did, and it was duly transmitted to the Air Ministry over the land-line. It seems that owing to jamming, communication could not be established direct between Mosul and the Ministry, and as his message was of great urgence it was extremely fortunate that the operator at Mosul had the inspiration of trying the short waves and that there was an experimenter able to pick up what he said. It just shows how extraordinarily useful the work of the amateur wireless enthusiast is and what a bad policy it is on the part of the Post Office authorities not to give more encouragement to his efforts.

The Professional Amateur

Strictly speaking, though, I do not know that Mr. Morrow ought really to be called an amateur, for I think that I am right in saying that he is still one of Captain Eckersley's henchmen at the B.B.C. As Mr. West's assistant, he took a prominent part in the relaying by the B.B.C. of K D K A and other American stations. But in wireless the term amateur seems to be used—by the Post Office, at any rate—in rather a curious way, for you will find in the official lists of amateur call-signs 2 L O, 5 I T, 2 B D and all the other broadcasting stations, both main and relay! In fact every station which does not belong to the Post Office or one of the Ministries, and is neither a shipping nor a commercial plant, is classed as amateur. If you glance through the list of amateur call-signs you will find that it contains the names of a large number of the best-known wireless engineers and research men, all of whom are surely very far from being amateurs at the game.

A Fine Situation

Mr. Morrow's station is at the top of a spur of the Chiltern Hills and stands about 500 feet above sea-level. His aerial, which is of the sausage type, is suspended from very high masts and is not screened by buildings, trees or hills from any direction. I have heard it said that when he wanted to build a house he chose a site that was first rate from a wireless point

On Your Wavelength! (continued)

of view, then decided where the aerial must be, and told the architect to design a house to fit in with it. Whether this is so or not I cannot say, but the fact remains that the position of his station is such as to make the mouth of any less fortunately (or should I say wisely?) situated amateur water. Readers of AMATEUR WIRELESS may remember that he contributed some months ago a series of articles on transmission, and that he is part author of the little book "Wireless Telephony Explained." Those who indulge in the fascinating pastime of searching round for amateur transmissions are probably familiar with his call-sign 6 U V.

An Old Friend

I have had rather an amusing experience lately. My big set being out of action for a few days for alterations, I rigged up an old one that had not been used for more than a year to take its place temporarily. The big set contains what I have heard described as "every modern inconvenience." It has potentiometers and variable grid leaks, and a separate grid-bias arrangement for each of the note magnifiers and different high-tension positive leads for each class of valve, and square-law condensers, and in fact everything that the wit of man can devise to obtain stability, sensitiveness, signal strength and purity of tone.

When, therefore, I fished out the poor old set which contains comparatively few of these improvements I explained apologetically to the members of my household that they must not expect too much from it. Then when all the connections were complete, I switched on and tuned in, expecting to find 2 L O weak and rather harsh. But to tell you the truth, reader, I found him amazingly strong, and there was so little difference in the purity of the reception that it was hardly worth talking about.

Comparison

Stability was really the only thing in the old set which was not quite up to the mark, for it showed a proneness to those annoying hand-capacity effects which we all know and which are conspicuous by their absence in the more up-to-date set. Now here is a very curious point: I had expected noticeable distortion because the low-frequency intervalve transformer used in the old set is one of the earliest patterns of good make that were available for amateur constructors. Actually it was purchased at the beginning of 1922. In those days low-frequency transformers were supposed not to have advanced much beyond the standard required for the reception of telegraphy. The big set contains a first-rate modern transformer specially-designed not to over emphasise any frequency. As a matter of fact the ancient transformer performs so amazingly well that I think it would take a very acute musical ear to detect any difference between the quality of its reproductions and those of the late 1924 model.

I am a thorough believer in making every set as efficient as possible by incorporating in it any circuit or gadget likely to improve its performances. Still, I think that possibly we can overdo things a little; I mean that we may fit up any number of variables in a receiving set without obtaining any very marked advantage from their use. I have seen a set with nearly forty controls, and I must confess that my own possesses twenty-three. I should mention, by the way, that before I brought the old set into play I fitted up a grid-bias battery, for without this distortion is simply bound to occur on anything like a strong signal. What does rather nonplus me is that, though the old set is provided with coils and variable condensers of kinds which we now regard as inefficient owing to the losses for which they are reputed to be responsible, I had not the slightest difficulty in bringing in distant foreign stations at extremely good strength. Truly wireless is full of mysteries!

The New 2 L O

Very soon now, possibly even before these notes appear in print, the new 2 L O will be working and we shall know the best—or the worst. From a purely selfish point of view I could wish that there was not to be any increase in his power, for with his present 1.5 kilowatts, though he is nearly thirty miles from me, his tuning is far from sharp even on a receiving set fitted with four tuned circuits. On the best of nights it is exceedingly difficult to bring in either Manchester or Cardiff when 2 L O is working, and one often finds that the blotting-out effect which he exercises extends to Bournemouth as well. Will the increase in power mean a still wider band for 2 L O? I rather fancy that it will. If it does I shall be sorry, for I must say that I do like to be able to pick up at will any station which is sending out a particularly interesting programme or single item.

At the same time it must not be forgotten that most wireless folk in this country are crystal users, and anything which will extend the range of crystal reception is to be welcomed. We all want to see wireless becoming more and more popular as a hobby. The best way of ensuring this is to bring it within the reach of every purse. The valve set, even of the simplest kind, costs a certain amount of money, for valves themselves and the batteries which are needed for running them are expensive. A home-made crystal set, however, which will give good results indeed can be rigged up by anyone complete for less than a pound. And there is another side, too, that is worth thinking about: Apart from purely experimental work, it is really best to confine your reception to your nearest broadcasting station if you want to get results that are as near perfection as possible as regards purity, clearness and freedom from interference.

The Ideal Broadcast Set

I believe that the ideal set for broadcast reception on the loud-speaker consists of a crystal detector followed by one, two or three note magnifiers, according to the distance between the broadcasting station and the receiving aerial. A transformer should be used between the crystal and the first valve, whilst the other two should be coupled by the resistance-capacity method. A receiver made on these lines will give wonderful results provided that the components are thoroughly good, and with 2 L O's increased power it will be possible to use it at much greater distances from London.

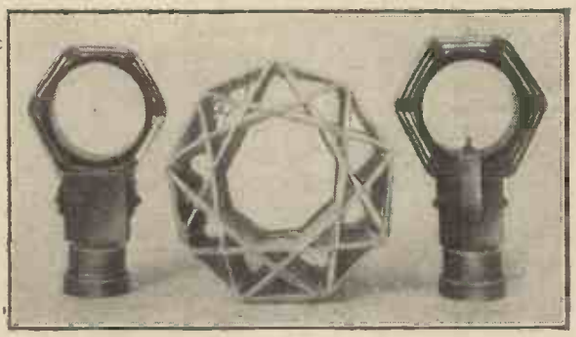
Expert Transatlantic Reception

The time is now coming gradually nearer when expert experimenters in Transatlantic reception will be able to prove their worth. When all is said and done the comparative merits of receivers for this work cannot be judged in the winter period, for American stations can then be tuned in by most people and the comparison is one of degree rather than of fact. Now it is the man who gets W G Y loudest; in a month or so it will be the man who gets America at all.

Birmingham "High-brows"

I am so glad that Mr. Hayes, of the Birmingham and Midland Institute, was kind enough to translate that first Act of *Boris Godounov* from the original of Alèxander Pushkin, for the Russian language is very hard to distinguish from bad "atmospherics," and I might have blamed my next-door neighbour again. Performed by the University of Birmingham Literary and Dramatic Society, with special music by Professor Granville Bantock, to most high-brows it would be certainly interesting, if not really entertaining. Personally I admit I felt more inclined to tune in to Manchester, where the 2 Z Y Dramatic Company was announced to produce *The Case of Lady Camber*. We most of us remember Horace Annesley Vachell's play when it was at the Savoy Theatre, London, in 1915; it was a success, even in war-time, and as its charm, like most of Mr. Vachell's works, depends most on literary dialogure rather than actual situation, I consider it a very wise choice for broadcasting purposes. THERMION.

LOW-LOSS COILS



MANY wireless enthusiasts find themselves rather puzzled by the question of coil efficiency. How is it, for instance, that one coil gives better results than another? What exactly are the losses of which we hear so much nowadays? How do they occur? What can be done to prevent them? To find answers to these questions and others upon the same subject we must first of all see briefly something of the functions of the inductance coil.

The main thing to bear in mind is that the valve, for whatever purpose it may be employed, is a potential-operated device. In a circuit such as that shown in Fig. 1 tiny differences in grid potential produce enormously greater effects in the plate circuit. To obtain the highest efficiency from the valve we must ensure that incoming oscillations make the greatest possible changes in its grid potential. In other words, we require the largest potential differences that we can obtain between the points X and Y across the inductance coil L in Fig. 1. If the coil is a good one these potential differences will have a maximum value, but if it is of poor design they will be reduced and the valve cannot give its best results.

A simple analogy is shown in Fig. 2. Here we have a wheel worked by a stream of water brought to its vanes by a pipe leading from a tank placed at a much higher level. At A the conducting pipe is sound, and the full measure of the water is delivered to the vanes of the wheel. At B, on the other hand, the pipe is shown full of leaks, so that the pressure of the water upon the vanes is a very small one. Obviously A is a very much more efficient arrangement than B; B owes its inefficiency to the leaks which allow the water to escape without doing useful work. Difference of potential electrically is just the same thing as a head of water mechanically. It will suffer in precisely the same way from losses or leaks in the conductor.

Current Leak

Now let us see how oscillating currents can leak away in a coil. For all practical purposes we may take it that alternating or oscillating currents pass through a condenser. I make this statement with some diffidence, for when I did so in a recent article I was immediately attacked by a correspondent for stating what he described as "this ancient fallacy." Actually currents do not pass through the condenser, but the effect is precisely the same as if they did.

Let us take it, then, that oscillating currents do pass through a condenser. Any two conductors whose potential is different form a condenser if placed reasonably close to one another; in other words, there is capacity between them. Now let us think of what happens in a coil of twelve turns, such as that shown in Fig. 3, across which there is a potential difference of 3 volts. The fall in potential is quite regular from top to bottom of the coil. That is between turn No. 1 and turn No. 6 there will be a P.D. of 1½ volts and so on. Between each pair of adjacent turns the potential difference will be one-twelfth of 3 volts, or a quarter of a volt. If we place the turns in a single layer, as seen in Fig. 3, there will be no great amount of capacity between them, since each turn lies next to the one between which and itself there is the smallest potential difference. But the capacity will be very much increased if we arrange them in two layers, as shown in Fig. 4, placing turn No. 7 over turn No. 1, for here we shall have a potential

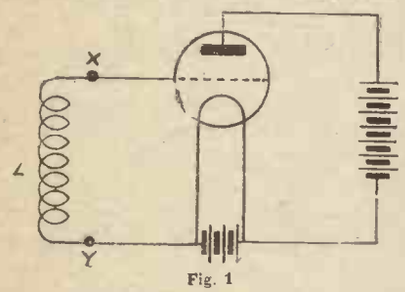


Fig. 1

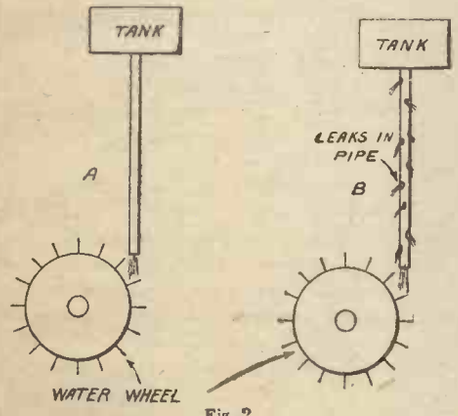


Fig. 2

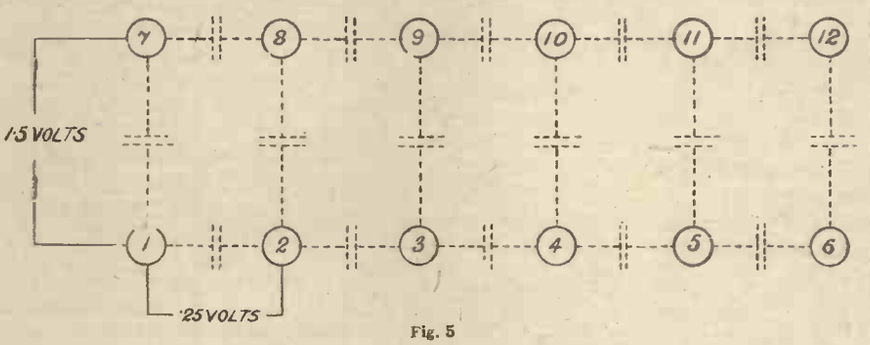


Fig. 5

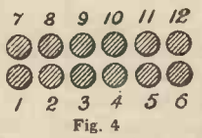


Fig. 4

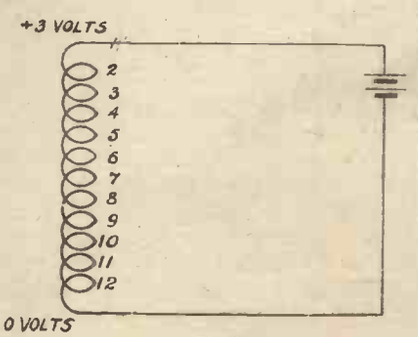


Fig. 3

Fig. 1.—Diagram Explaining Effect of Losses.

Fig. 2.—Hydraulic Analogy.

Fig. 3.—Action of Oscillating Currents in Coil.

Fig. 4.—Capacity in Coil Windings.

Fig. 5.—Diagram Showing Effect of Capacity in Coil Windings.

difference of 1.5 volts between the first turn and the seventh, the second and the eighth and so on.

Tiny Condensers

We may in fact regard the coil as provided with a large number of tiny condensers, as shown in Fig. 5. Each of these forms a leak just like the holes in the water-pipe of which we spoke before. It follows, then, that to obtain efficiency we must reduce the internal capacity, or *self-capacity,* of the coil to a minimum. For long-wave reception the amount of self-capacity present in a coil is not of enormous importance, provided that it is not unreasonably large. But the shorter the wavelength the higher the frequency, and the higher the frequency the more easily does current pass through a condenser of given size. Hence a type of winding which may give quite good results when used for the reception of 5 X X may be utterly useless on the ultra-short waves, behaving to high-frequency currents very much as a pipe made of gauze would to water.

Reducing Self-capacity

Before we can tackle the problem of reducing self-capacity we must understand something about condensers. A condenser consists of two conductors, between which there is a non-conductor known as the dielectric. For a given dielectric the capacity between plates of a certain size will be increased if the distance between them is reduced. We thus see that to produce an efficient coil the turns must be separated. Again, for a given distance between the plates, the capacity varies according to the dielectric constant of the insulating material which separates them. For example, if we cut two plates to a given size and separate them by $\frac{1}{32}$ in. of air the capacity between them will be .00025 microfarad. By plunging the plates into mineral oil we can increase the capacity to about .0005 microfarad, since the dielectric constant of oil is roughly double that of air. Similarly, mica has a dielectric constant which may be as much as eight times that of air; ebonite gives four times the capacity, and so on.

Insulation

If in winding a coil we use covered wire we are providing a dielectric of silk, cotton, rubber or enamel. Each of these has a dielectric constant much higher than that of air, so that its presence makes for increased capacity in the coil. Again, if we dress the wound coil with shellac or with paraffin-wax we increase the dielectric constant of the material separating the windings and so make the capacity of the coil greater. Air has the lowest dielectric constant, and we thus see that to obtain the minimum self-capacity in a coil air spacing should be used.

But there is another side to the question of dielectrics, and that is their efficiency. When a condenser is charged up the electrons in the dielectric are strained in their orbits. In a really good dielectric none of them is torn away from its atom, but in a bad one there is actual leakage of current through the dielectric owing to the detachment of electrons. In other words, the more perfect any substance is as an insulator the more efficient will it be as a dielectric. When we come to examine dielectrics we find that air is by far the most efficient and that silk, cotton, rubber, enamel, shellac and paraffin-wax are all much inferior. Thus in a coil wound with covered wire we have, beside capacity losses, other losses due to the inefficiency of the dielectric matter separating the turns. Once more we see why air spacing is to be preferred to any other kind.

Conclusion

We come, then, to these conclusions as regards the design of a low-loss inductance.

(1) Its turns must be so arranged that there is the greatest possible amount of separation between those at widely different potentials.

(2) Self-capacity can be kept at a minimum only by the use of air spacing.

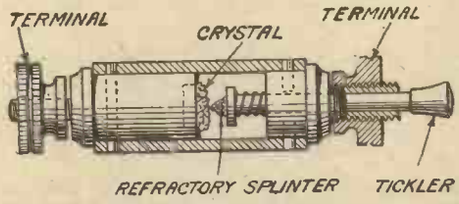
(3) The use of covered wire will lead to losses due to dielectric inefficiency and bare wire is therefore to be preferred.

There is one other very important consideration that must be taken into account. The addition of resistance to any oscillatory circuit flattens its tuning. Therefore the coil must be wound with wire of a gauge sufficient to reduce high-frequency resistance to the smallest possible amount. In coil winding the golden rule to observe, in addition to the three mentioned above, is always to use wire of the heaviest gauge compatible with compactness. J. H. R.

A NEW DETECTOR

FOR some considerable time the essentials of a crystal detector for the reception of broadcasting have been regarded as consisting of a catwhisker and a crystal provided with means so that one can be adjusted lightly to make contact with the other.

A new detector lately placed on the market by Radio Instruments, Ltd., of 12, Hyde Street, New Oxford Street, London, W., however, makes a distinct departure from this practice. A cursory examination of this detector would lead one to suppose that it was a perikon detector and of the cartridge type. Actually it is neither, for the contact is adjustable, and in place of the usual perikon combination there is a crystal and a pointed piece of refractory material.



Cut-away View giving Only an Approximate Idea of the R.I. New Detector.

The sketch gives an idea of the general lines upon which the detector is constructed, though this is not a definitely accurate representation of the interior. As will be seen, it is of the cartridge pattern with terminals at each end. Through one terminal a spring-controlled plunger rod passes, to the inner end of which is secured the piece of refractory material to which reference has already been made. It may be mentioned that the principal virtue of this detector lies in this special material with which the plunger rod is tipped. This material is only available to Radio Instruments, Ltd.

The terminal at the other end of the detector is part of the crystal cup in which the crystal is secured in the ordinary way.

One very noticeable feature is the excellent construction and finish. The barrel portion is polished ebonite and the terminals are highly polished brass and lacquered.

To set the detector all that it is necessary to do is lightly to pull out the plunger rod and release it again. There is no need to fiddle about to get the exact pressure, as this is automatically governed by the spring. During a test at a distance of seven miles from 2 L O excellent results were obtained, and the operation of finding the "spot" was so simple that it could be performed in the dark, neither a fine perception of touch nor of sight being required.

The results of our own tests go to confirm the reports of preliminary tests made by a number of amateurs and research workers throughout the country. While some remarkable claims as to distance have been made (not by the R.I. firm) for this new detector, that is not the particular virtue that the makers have sought. They have done their best to produce a detector in which the crystal setting remains absolutely permanent, and there is no question as to whether they have succeeded. We have had the detector in use for a few weeks only, but in some other tests that have been carried out the crystals have been in use for many months and the original setting remains perfectly good. We can speak most certainly as to the permanency and genuinely good performance of this new device.

The price complete is 6s.

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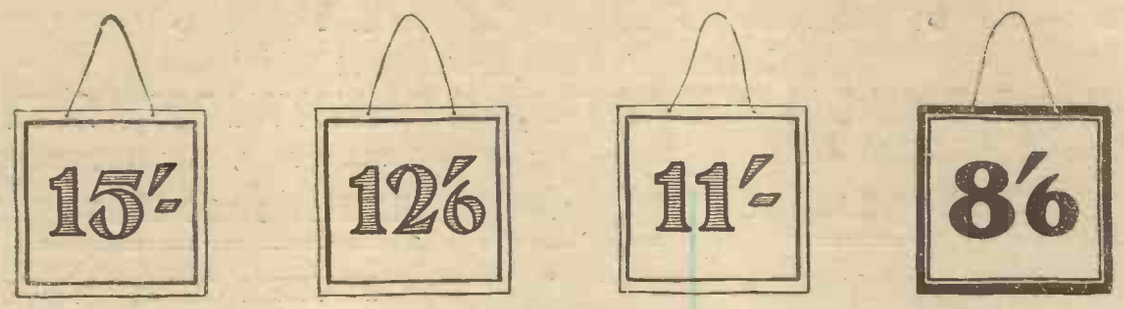
Rubber-covered Lead-in Wire,** brand new, **2/-** per doz. yds.) (**40 New Marble Switchboards,** complete with all fittings, **10/-** each, car. **2/-.**) (**200 Weston Super Sensitive Relays,** cost **£10,** to clear **12/6,** post **1/-.**) (**500 I.M.F. Condensers,** all new, **2/-** each, post **3d.**) (**1,000 New Fuller Block Accumulators,** 2-volt 120 amp., **15/-** each; 4-volt 120-amp., **30/-** each; 6-volt 120-amp., **42/-** each; post **1/6, 2/-,** and **3/-.**) (**2,000 Yds. Heavy Vulcanised Maroon Flex, 2/-** per doz. yds., post **3d.**) (**2,000 Yds. Positive and Negative Coloured Flex, 2/-** per doz. yds., post **3d.**) (**4,000 Yds. Tinned** $\frac{1}{18}$" **Rubber Covered Wire,** as used for wiring wireless sets, **1/6** doz. yds., post **3d.**) (**500 Heavy Morse Practice Keys,** with lamp holder, **2/-** each, post **4d.**) (**700 Choke Coils,** 500-ohm iron wire enclosed core, **2/6** each, post **3d.**) (**200 Step-up Transformers,** 28-volt to 600 volt, **5/-** each, post **1/-.**) (**200 Brand New Intervalve Transformers,** cost **20/-,** to clear, **12/6** each, post **6d.**) (**2,000 Dewar Switches,** D.P.C.O., **2/-** each, post **3d.**) (**500 Chloride Accumulators,** 2-volt 20-amp., **4/6**; 4-volt 20 amp., **9/-**; 6-volt 20-amp., **13/-,** post **6d., 9d.,** and **1/-.**) (**5,000 Telephone Cords,** 6–8 ft. long, various colours, 6 complete cords, **1/-,** post **6d.**) (**400 M.III. Single Valve Transmitting Sets,** 100–1,800 meters, containing meter, tapped coils on ebonite, variometer, condensers, wound leak, key and lamp, brand new, beautiful instruments, cost **£15,** to clear, **35/-** each, car. **2/6.**) (**200 M.III. 2-Valve Transmitters,** containing twice the number of parts as above, brand new, **45/-** each, car. **2/6,** Microphone Transformers for using above sets, for telephony, **5/-** each.) (**50 M.IV. 3-Valve Amplifiers,** containing 4 transformers, tapped studs, condenser, etc., etc., **£3** each, car. **2/-.**) (**200 M.III. R.A.F. Selective Tuners,** complete with variable condensers, fil. rheo., etc., **6/-** each, post **1/-.**) (**100 Pairs 4,000-ohm Headphones,** brand new, **8/6** per pair, post **9d.**) (**3,000 Ebonite Headphone Earcaps, 2/-** per doz., post **6d.**) (**200 Copper Earth Mats,** 20 ft. x 2 ft., **12/6,** post **1/6**; 3 ft. x 2 ft., **4/-,** post **6d.**; these will give a perfect earth.) (**4,000 Loud Speaker Bobbins,** all wound to 2,000 ohms, tested before dispatch, **6d.** each.) (**2,000 7-Piece 4 B.A. Terminals,** retail price **6d.** each, our price to clear, **1/9** per doz., post **4d.**) (**600 Complete Spark Transmitters,** cost **£12** each, to clear, all perfect, **7/-** each, post **1/3.**) (**10 Generating Sets,** 3½ k.w. 110-volt 32-amp., **£45** each.) (**8 Generating Sets,** 110-volt 23-amp., **£40** each.) (**300 H.F. Aerial Ampmeters,** 1·5 amps., **7/6** each, post **6d.**) (**500 Handphones,** complete with microphone and single earpiece, **3/6** each, post **9d.**) (**200 Gross Packets Chater Lea Terminals, 2/-** per gross, post **6d.**) (**2 Tons Useful Wireless Scrap Material,** consisting of odd ebonite panels, damaged instruments, terminals, wire, meters, coils, broken sets, etc., etc.; useful to all experimenters, 9 lb., **6/6,** post **1/3.**) (**100 New High Tension 66-volt Batteries, 7/6** each, post **1/-.**) (**500 Boxes of Assorted Crystals,** 8 different sorts, including genuine Hertzite and Zincite, etc., all tested crystals, retail price, **6/6,** our price to clear, **2/6** per box, post free.)



When bright filament valves cost 12/6 the Silver Clear Louden was put on the market at 10/-.
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New prices are now in force for valves, and once more the Silver Clear Louden maintains its lead. From February 23rd the price of the Louden Valve is reduced to 8/6.

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E.P.S.45.

SOLVING THE CURRENT-SUPPLY PROBLEM

The first of two articles describing how both plate and filament current may be obtained from the mains.

THOSE amateurs whose premises have the public electricity supply are in the enviable position of having a constant source of power supply, which, if used in a proper manner, will prove an economical, clean and easy method of supplying a single- or multi-valve set with both H.T. and filament current. As regards filament lighting, the mains may be used either by a direct method, where the valve filaments are fed directly, or by an indirect method, where accumulators are charged from the supply and then discharged through the filaments.

The method to be described first has the advantage that the H.T. current as well as the filament current is supplied from the mains. Before dealing with the method proper, however, it is thought that a few words as to calculations and precautions would not be out of place. As regards the former, the reader should make a study of Ohm's law and the simple calculations involved. This law shows that the strength of a current due to an electromotive force falls off in proportion as the resistance in the circuit increases, and is represented by the equation $I = \frac{E}{R}$, where I = current in amperes, E = electromotive force in volts and R = resistance in ohms.

From this it is apparent that to find the resistance of a circuit we use the equation $R = \frac{E}{I}$, and to find the voltage we use the equation $E = I \times R$.

A still further calculation which is involved is that relating to the power used. In this case, to find the number of watts consumed we multiply the voltage by the amperes consumed in the circuit. It will be seen that the calculations are simple and need not deter the novice from installing the various circuits according to his requirements.

Now a word as to precautions. Under certain conditions it is exceedingly dangerous to meddle with the mains. In most public supply systems the power is transmitted on the three-wire system, where the two outer wires have a difference of potential of 480 volts between them, and a neutral or earthed wire in conjunction with either of the "outers" has a difference of potential of half this amount—that is, 240 volts. The earthed wire may be either positive or negative, and it becomes apparent that whichever is the case, should a person place his body between the earth and the opposite wire in the supply he will receive a shock of greater or lesser magnitude. When handling the mains, even if the main switch is off, it is as well always to make a point of wearing rubber gloves or to stand upon a dry piece of wood or a stool. Remember that dampness is a conductor of electricity and that touching a damp wall might result in a shock which may easily prove fatal. Handle only one wire at a time, and if possible always with the main switch off. The importance of these precautions cannot be over-emphasised.

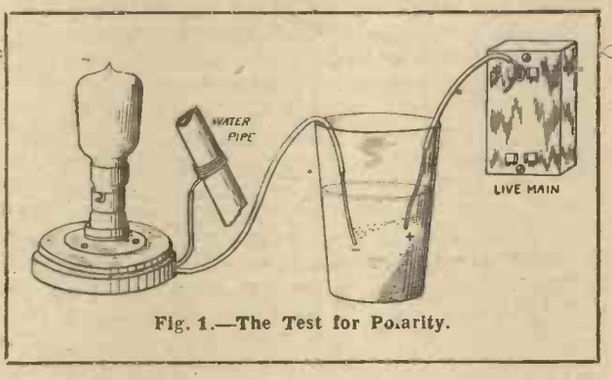


Fig. 1.—The Test for Polarity.

The first thing to be done is to ascertain of which polarity is the earth. This may be done by tightly binding a wire around the water main or attaching it to the "bonding wire," which will be found projecting on the outside of the armoured cable which is the company's property. A glass of water should next be placed on the floor in a good light so that the water can be readily observed, and removing the cover from one of the fuses (a pair of which will be found near the main switch), withdraw the fuse and attach a piece of wire to the live terminal (that is, the terminal nearest the main switch) with a lamp in the circuit as shown in Fig. 1. Next plunge this wire and that on the water-pipe into the glass of water (taking care that they do not touch) and see if any bubbles rise from the wires through the water. If no bubbles rise both wires are of the same polarity, and the wire should be removed from the fuse circuit and the cover replaced. Repeat the operation with the other fuse, and it will be seen that bubbles will rise from one wire if one side of the supply is earthed as suggested above. The wire from which the most bubbles emanate is the negative. The lamp is placed in series with the circuit (as illustrated in the sketch Fig. 1) as a precaution, as it will ensure against the possibility of a "dead short-circuit" and prevent the company's fuse blowing. If you do "blow" the fuse it will be necessary to get the company's representative to replace it. The lamp will glow a dull red if the wires under test are of opposite polarity.

The fuse block may now be marked, according to its polarity, near the fuse. We will assume that it is positive and the earth negative. The remaining fuse may also be marked negative. We have now to consider what amount of current is required for the filaments. As the ques-

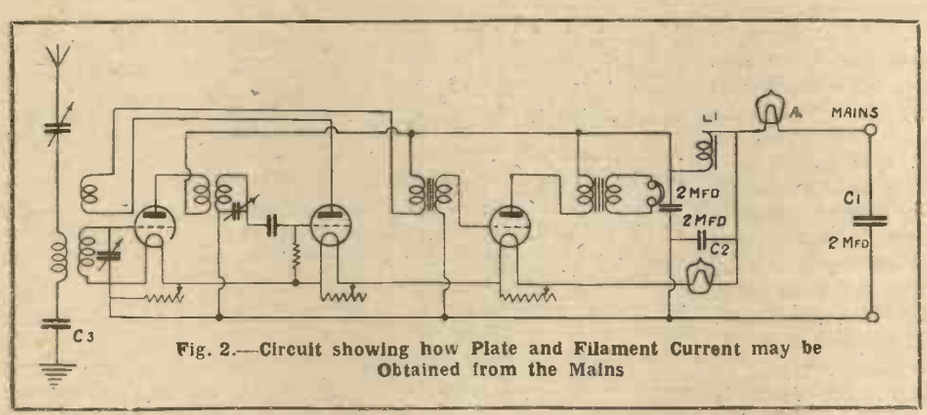


Fig. 2.—Circuit showing how Plate and Filament Current may be Obtained from the Mains

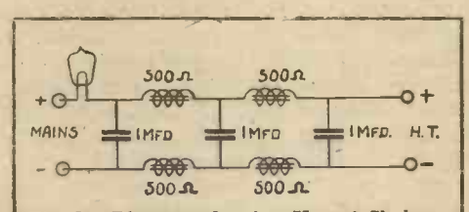


Fig 3.—Diagram showing Use of Chokes.

tion of current supply for a single-valve set is not a very great problem, we will pass over this and consider the requirements of a multi-valve circuit employing bright-emitter valves. The circuit which is most generally used amongst amateurs is a three-valve circuit employing either one H.F. amplifier, a detector and a low-frequency amplifier, or a detector and two low-frequency amplifiers.

Technical Details

The circuit is shown in Fig. 2. The H.T. leads are connected across a 120-volt lamp and another lamp is between the plate lead and the positive of the 240-volt supply, which is the voltage generally in use in town supply systems. The negative side of the H.T. is fed through the filaments in series and thence to the negative of the mains. It will be seen that the filament current flows through the filaments and joins up with the H.T. The two lamps in series on the 240-volt mains should be of a suitable wattage to supply the three valves.

In this case we will assume that the lamps used are 120-volt lamps and that they normally pass .75 ampere. Lamps of larger wattage would, of course, pass more current. Also two lamps in parallel will pass twice the quantity passed by one if they are of the same wattage.

The resistance of the lamps is found by Ohm's law, and in the case under consideration we have 120 ÷ .75, which equals 160 ohms each. Should the valves be 4-volt valves these generally pass .6 ampere per valve, and their resistance is therefore 4 ÷ .6, which equals 6.6 ohms each, or a total resistance of approximately 20 ohms for the three valves. We now have a total resistance in the circuit of 340 ohms (120-volt lamps) plus 20 ohms for the valves. Again Ohm's law shows that 240 ÷ 340 equals .7 ampere, which is the current which will flow around the circuit when the pressure (240 volts) is applied.

The Rheostats

It is obvious that .7 ampere would pass through the filaments (which would, of course, overload them) unless some auxiliary resistance is provided. As valves performing different functions require different values of filament current it will be necessary to provide suitable resistances in the circuit and, moreover, to place them in such a position that they absorb a certain amount of current; in other words, they must be placed in "shunt," for it is obvious that if they are placed in an ordinary position, as with a normal set, the L.F. filament rheostat will be a "master" rheostat, in which capacity it is not wanted. A glance at the circuit will show the resistances, or rheostats as we term them, connected "in shunt."

The designing of the rheostats must now be undertaken. We have seen that .7 ampere is flowing round the circuit and that the valves require only .6 ampere. A little consideration shows that as the current flow is .7 ampere and each valve requires .6 ampere, the rheostat must carry at its maximum .1 ampere, whilst .6 ampere will flow through the filament. The resistance of the rheostat is therefore 6 × 6.6 (filament resistance), which is approximately 40 ohms.

The size of the wire has now to be considered. The required filament variation of a normal 4-volt bright-emitter valve is generally from .4 to .6 ampere, according to the value of the H.T. grid potential, etc., so that the rheostats at the lower amperage will be carrying .3 ampere (the difference between .7 and .4), and the resistances at this position will be .4 ÷ .3 × 6.6, which is 8.8 ohms. A stop may therefore be provided to prevent the resistance from being reduced below that value. The wire must be thick enough to carry slightly more current than this—about .5 ampere. The size of the wire may be decided by reference to the tables compiled by the manufacturers of the particular wire which it is intended to use.

Smoothing Circuit

As regards the smoothing circuit, the value of the two fixed condensers C1 and C2 (Fig. 2) may be from 1 to 2 microfarads, and the iron-core choke L1 may consist of an ordinary speech or intervalve choke as is ordinarily used for coupling L.F. valves. Care must be taken, however, that the choke is in the position indicated. It will heat up very badly if it is situated between the lamp A and the main's terminal and will probably burn out by reason of the comparatively heavy current passing through the windings. Furthermore, *the extra resistance involved will upset the calculations arrived at.*

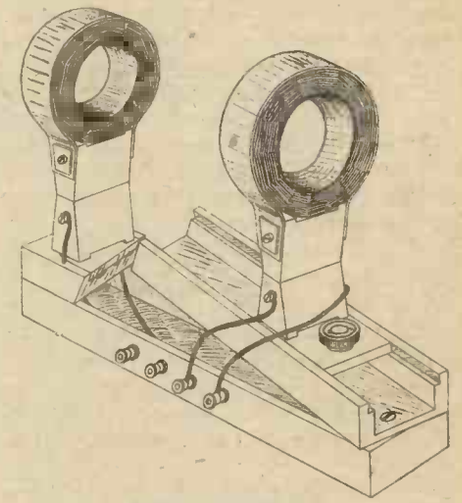
Alternatively a series of chokes of comparatively low resistance (about 500 ohms each) may be used as indicated in Fig. 3. The method described has been used with great success at different times by the author, and it is thought that the amateur will, by the aid of the example given, have no difficulty in working out suitable values for his own supply should it vary from the example shown. The greatest difficulty with this circuit is with regard to the smoothing arrangements. Where bad cases of mains hum are encountered special chokes will have to be designed and constructed to overcome the difficulty. As regards cost the method is economical. Assuming that an average current of .5 ampere is used, we have 240 × .5 = 120 watts. The cost of one Board of Trade unit is approximately 6d., and one unit is equal to 1,000 watt hours, therefore 1,000 ÷ 120 = 8.3 hours for sixpence. It might be remarked in passing that it is important that the high value blocking condenser C3 always be inserted in the earth lead when a set is coupled to the public supply mains. Furthermore, note that low-resistance phones are incorporated in the set so as to isolate the wearer's head from contact with the mains. A. J. C.

(To be concluded.)

A SIMPLE TWO-COIL TUNER

As will be seen from the illustration, an ordinary pencil case is used for the tuner described below.

The round end of the sliding lid is cut off and glued into the round portion of the slide. About two or three inches of the remaining lid is then cut off, and at one end of this is screwed a coil holder of standard pattern, and at the other end a small knob is fixed. On the raised portion of the box is screwed the other coil holder; it is best screwed to the round part of the lid before gluing. The grooves for pencils, in the swivel part of the box,



Simple Two-coil Tuner.

can be levelled with a chisel and glass-paper.

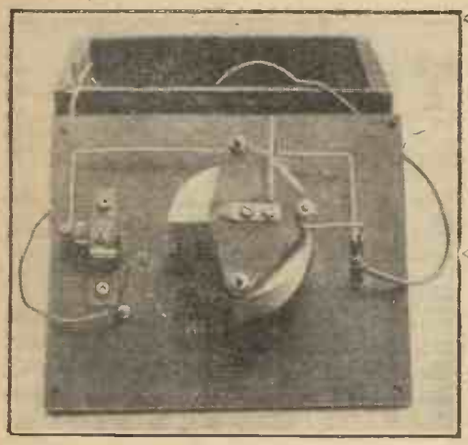
The leads are brought to a terminal block at the side, or, as an alternative, to terminals fixed directly into the side, the holes, of course, being bushed with ebonite. In the sketch the leads are shown outside the box, but they can be taken inside equally well.

It will readily be seen that tuning can be effected by sliding the coil holder backwards and forwards by the knob, and for fine adjustments it can be swivelled round away from the fixed coil.

If the coil stand is mounted on a suitable base, the terminal block can be screwed to the base and the leads be brought under and recessed into the base. This will give quite a smart appearance to the finished coil stand. L. C.

If you attach your aerial to a tree, have the aerial wire 15 ft. from the tree to avoid loss.

Clearer signals are obtained with the detector valve adjusted below maximum signal strength.



Under Side of Panel.

A HOME-MADE WAVEMETER

The second and concluding article on the construction of a useful accessory.

THE adjustment of the buzzer to give a really good, high-pitched note might be found a difficult and exasperating business if tackled without some knowledge of the anatomy of this small component. The parts of the buzzer are shown in Fig. 5. Upon the frame F are mounted the magnet M and the supporting pillar P. The pillar has a short horizontal arm, which carries

Fig. 7.—Knob and Pointer.

the contact screw A. Immediately above the magnet pole is the armature or blade, which consists of a thin piece of springy metal shaped like a shovel. It is fixed to the frame by a screw E. This screw also secures a small V-shaped metal strip D, against which the adjusting screw B bears.

To tune the buzzer easily and quickly proceed as follows. Loosen the screw A until its point is right away from the blade. Then by means of the adjusting screw B bring the blade just clear of the magnet pole. The space between the blade and the magnet should be about $\frac{1}{64}$ in. Now attach the single cell to the small covered wire X (this wire is also seen in Fig. 4) and to the second contact of the buzzer, which may be either a second short piece of fine covered wire or the screw K in the pillar. With a fine screwdriver turn the screw A very gently down until its point just touches the contact on the blade. The buzzer will now begin to sound, though its note may not be anything like that required. By turning the screw A down a little further a good, high-pitched, singing buzz will, as a rule, be produced, though it may be necessary to make further adjustments of the screw B. Sometimes it will be found that when the right sort of note has been obtained, the buzzer will not start when current is switched on. In this case all that is required is a smart tap on the panel of the wavemeter. The higher the note that can be obtained, the easier will it be to take accurate readings with the meter. Once the setting of the screw B has been found, it will seldom require to be touched again, and any slight alteration in the buzzing note can be effected through the hole in the panel by means of the screw A.

We can now mount the panel upon its cabinet, which should be 7 in. square and about 4 in. in depth. The next process is to calibrate, and here we shall find that the use of a square-law condenser makes matters quite straightforward. By employing only four standard plug-in coils we can make the wavemeter tune from about 60 metres to 4,000. Personally I use Igranic coils, the numbers being 25, 50, 150 and 400. With a .0005 low minimum condenser—that seen in the photograph is a Bowyer-Lowe square law—the approximate ranges of the coils are as under. It is as well to strip two turns from the No. 25 coil to make quite sure of getting down to a sufficiently low wavelength with the smallest coil. We can well spare these, since there is a considerable overlap between this coil and the No. 50 coil.

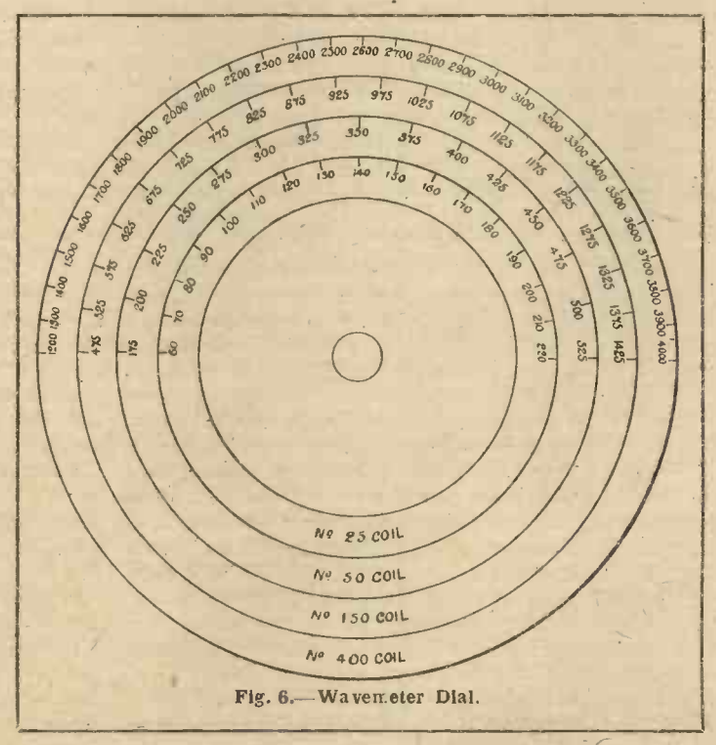


Fig. 6.—Wavemeter Dial.

Coil.	Min. Wave-length	Max. Wave-length
25 (less two turns)	60	220
50	175	525
150	475	1,425
400	1,200	4,000

If you intend to keep the condenser dial and to use charts proceed as follows: Let us suppose that we are going to calibrate the No. 50 coil. Take a piece of graph paper, marking off on the left-hand side

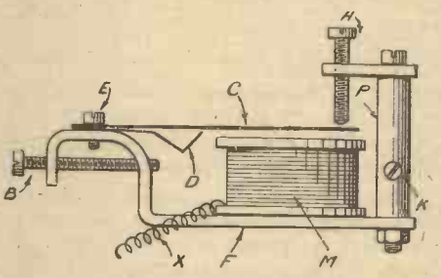


Fig. 5.—Details of Buzzer.

vertical divisions representing the condenser scale degrees. Mark off a horizontal line ruled at right angles to this into divisions, representing 50 metres apiece from 150 metres to 550. Now tune in your nearest broadcast station as sharply as possible, after which set the wavemeter going, and adjust it until you obtain its note at its loudest in the receivers. Note the reading, and make on the chart a dot corresponding to the condenser reading and to the known wavelength of the station.

Now tune in another station whose wavelength is as far as possible above or below the first. Mark in this reading as before. Place a ruler on your squared paper, so that its edge touches the two dots made; draw a straight line, joining them, and produce it in both directions. This straight line will show you just how to set the wavemeter dial in order to obtain any wavelength. You may have a little difficulty in calibrating the No. 25 coil, but here you will find considerable assistance in the calibration waves sent out at intervals from the Eiffel Tower. For the 150 coil you can make use of G N F or

(*Concluded at bottom of next page*)

WHAT OF THE FUTURE?

WHEN we recall the caution of the B.B.C. when they originally embarked upon the enterprise of providing a broadcasting service in Great Britain and the restrictions as to the apparatus to be used by listeners, the obvious dislike of the home constructor and so on which characterised those early days, it is astounding to remember that all this took place a bare two years ago. The most astute brains connected with the beginnings of broadcasting so little foresaw what was to come that they were afraid of commercial failure if they had to rely on the income from licences and could not ensure a profit from the possession of a virtual monopoly of the supply of receiving apparatus.

After Two Years

Well, two short years have put a very different complexion on the whole matter, and now that the last remnants of the "sealed set" monopoly have gone and the design, construction and sale of sets has become wholly unfettered, it may, perhaps, be permissible to turn to the consideration of the future of this great new factor which has been so firmly established in our daily lives. For it is obvious that, come what may, broadcasting will remain such a factor.

The Programme Controversy

I do not propose here to discuss the great "programme" question. Like that of "The Decay of the British Drama," which has been, probably since long before Shakespeare's day, such a staple topic for the playwright, the actor, the playgoer, the dramatic critic and even the ordinary non-technical journalist, this controversy will doubtless go on. What *is* broadcast and what *ought to be* broadcast will never be entirely the same thing in the opinions of any two individuals. But there can be little doubt that, in the long run, the "public" in the mass will get the broadcast matter it wants, just as it gets the plays it wants. That is the B.B.C.'s business, and if at any time those responsible fail to give the public what it wants they will quickly become aware of the fact and supply will be regulated, as always, by demand.

But it may not be devoid of interest to try to speculate, however dangerous such speculation may be, on the probable composition of the future "listening public" and on the type of set they will use.

The Amateur

Until the advent of broadcasting the wireless amateur was a person whose interest was in the technique of wireless communication. Wireless was a scientific hobby, comparable to the dozens of scientific hobbies which have flourished, in a more or less obscure way, for generations. A man "took up" wireless as he might "take up" botany or geology, chemistry or photography. And since a good deal of expense and some hard brain work in mastering technique (including, of course, morse) were entailed, the hobby had a limited, if ardent, following.

The Broadcast Listener

Broadcast telephony has changed all that. Probably nine-tenths of the present-day wireless enthusiasts were first attracted by the prospect of listening to "aerial music." A good few have subsequently acquired "wireless mania" of the technical type. But it is questionable whether the bulk even of present-day listeners care much for the science of radio communication. When we realise that the "mass of listeners" is pretty certain to mean, within the next year or two, the mass of the entire population of the realm, it is not likely that the whole nation will take the trouble to learn even the elementary technique of such a highly specialised science.

Sets of the Future

What kind of sets, then, will these non-technical listeners of the future use? Will the ready-made commercial receiver hold the field? Personally, I do not believe that it will. There will be a great and an increasing sale of such sets. The man with plenty of cash and no inclination to the use of tools will buy his set as he now buys a gramophone. But I believe that there will also be a great and an increasing sale of components wherewith constructors (ignorant, perhaps, of the most rudimentary theory) will build their own sets. For building a wireless set from printed instructions is, of all the jobs an ordinary "handy man" can do, one of the easiest and one which (if the instructions are adequate and properly followed) can be relied upon to turn out at any rate passably well. There is, and will probably continue to be, a real saving in home construction.

The "Salt of the Earth"

The oldest class will, of course, continue to exist and to grow in actual numbers, while it shrinks proportionately to the total. Such a man will go on re-designing and trying out new sets and new circuits, testing every new device he hears of, television apparatus, "liquid valves," oscillating crystals, etc., accumulating masses of data, which often he is unable to digest, but much of which eventually bears fruit when it filters through other brains. He will be, in fact, in the future as now, "the salt of the earth," and the "herald of the irresistible advance of science!" At least *I* think so. But, then, I am a hopeless "wireless maniac" myself, so may hold biased views.

H. W. S.

"A HOME-MADE WAVEMETER" (*continued from preceding page*)

some other station working upon 600 metres, aerodromes on 900 metres, or the Dutch concerts on 1,050 metres. The biggest coil is quite easily dealt with with the help of Chelmsford on 1,600 and the Eiffel Tower on 2,600 metres.

For direct readings the method is a little different. We must first of all scrap the condenser's own dial. Instead of this we fix to the top of the panel a cardboard disc 4 in. in diameter, which we mark off into circles, as shown in Fig. 6, corresponding to the four inductance coils. Next we make a hole with a very fine drill into the brass collar below the condenser knob. Into this we insert a fine darning needle, which after its eye and point have been broken off must be just over 2 in. in length. Push the thickest end of the needle into the hole in the collar, and fix it firmly in position. Fig. 7 shows the knob complete with its pointer.

The circles on the dial should be drawn with indian ink, but the first marks should be done in pencil. Proceed as before to tune in a powerful broadcast station, and adjust the wavemeter to resonance. We will imagine that this station is 2 L O. Now make a mark on the circumference of the No. 50 coil circle, which will show the position which gives 365 metres. Next tune in another station, and adjust the condenser of the wavemeter as before. We will suppose that this station is Newcastle. A second dot is made on the circumference of the 50-coil circle, and with a pair of dividers you can measure the distance between the two dots. On a piece of paper draw a circle of exactly the same size as the outer one of the No. 50 coil. On its circumference mark off two dots the same distance apart as those marked on the wavemeter. This segment represents 35 metres on the wavemeter scale. With the aid of a protractor measure the number of degrees which it contains. You can then without difficulty discover the number of degrees corresponding to 100 metres. Mark off your wavemeter scale into 100-metre divisions, and you will have a roughly-calibrated scale. As Newcastle's wavelength is 400 metres, you can now put in in pencil the approximate position of 250, 300, 350, 400 and 500 metres.

J. H. R.

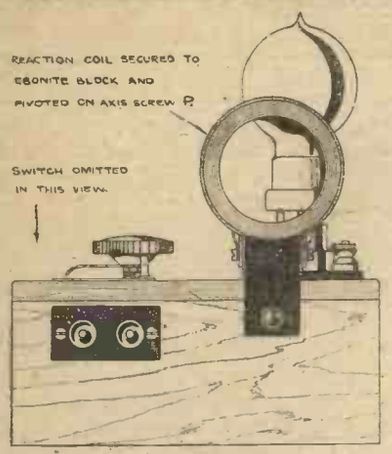


Fig. 2.—Side View of Receiver.

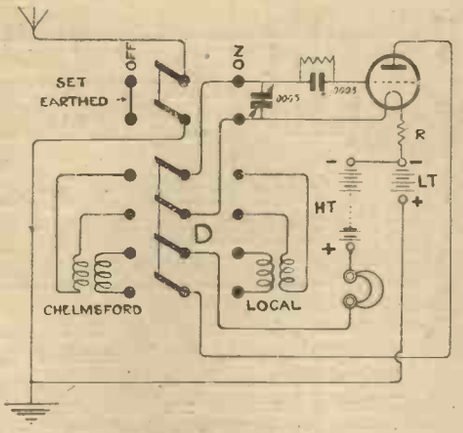


Fig. 1.—Circuit Diagram.

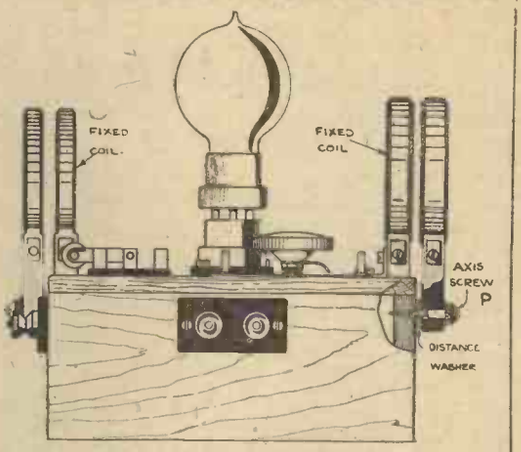


Fig. 3.—Front View of Receiver.

5XX OR THE LOCAL STATION?

Details of a single-valve receiver with reaction for reception of Chelmsford or the local station.

NOW that the high-power station transmits on certain days a programme different from the local station, users of valve sets will, no doubt, desire to change over from one to the other with the least possible trouble. The following receiver was designed with this object in view, and in practice it is certainly very convenient and very simply operated.

In the circuit (see Fig. 1) an aerial and a reaction coil are used for each station, and either one pair or the other is brought into use by the quadruple-pole switch D. It is a feature of this circuit, too, that the reaction coils on each A.T.I. are permanently set for their particular stations, and once set they require no further adjustment.

Another switch (double-pole throw-over) is used to put the set into action by placing the aerial and earth in circuit, and also making the low-tension circuit complete by using the earth arm also as a single-pole switch. When this switch is reversed the set is automatically earthed, and so renders it free from lightning risk; at the same time this operation breaks the filament circuit.

The control of this set resolves itself into switching the set to the "on" or "tune" position, and placing the quadruple-pole switch to the desired station. A slight retuning of the .0005-microfarad condenser is, of course, necessary; but as the two positions for the stations are found by experiment and marked on the dial, no difficulty is found in this operation whatsoever.

In this receiver a dull-emitter valve is used, and when controlled by the usual 4-ohm variable resistance and a fixed resistance of 16 ohms, the position of the variable resistance makes practically no difference to either the apparent brightness of the filament or to the actual reception. This, of course, is the writer's experience when using a plain detector valve and reaction circuit, in which case for tuning purposes the filament current is not critical. It will be noticed in the arrangement drawings (Figs. 2, 3 and 4) no filament resistance is included.

The set is built up on a mahogany cabinet. The terminals are mounted in pairs on pieces of ebonite 2 in. by 1 in. by ⅛ in. thick. The aerial and earth terminals are mounted separately at the back. The drawings show their positions. The cabinet is 6¾ in. by 6¾ in. by 3½ in. deep, and is made from ⅜-in. material.

The tuning coils are built up of separate honeycomb coils, the fixed ones being mounted on a standard ebonite holder, and secured to the top of the cabinet by a small angle bracket. The adjustable ones (these are on the outside) are mounted on a strip of ebonite 2 in. by 1 in. by $\frac{5}{16}$ in. thick, having a hole in the lower end to take an axis screw, about which the coil and its holder rotate. If a spring washer is interposed, sufficient pressure can be applied so that the coil will be held rigidly in any desired position.

Other components, such as the grid condenser and leak, are placed inside the cabinet, as also is the fixed filament resistance, which consists of 12 in. of No. 38 Eureka wire wound round a length of ⅜-in. diameter rod about 2 in. long. This length provides a resistance of 12 ohms.

H.

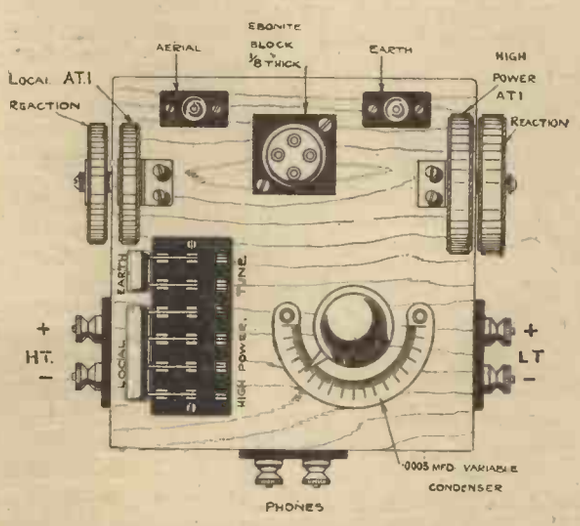


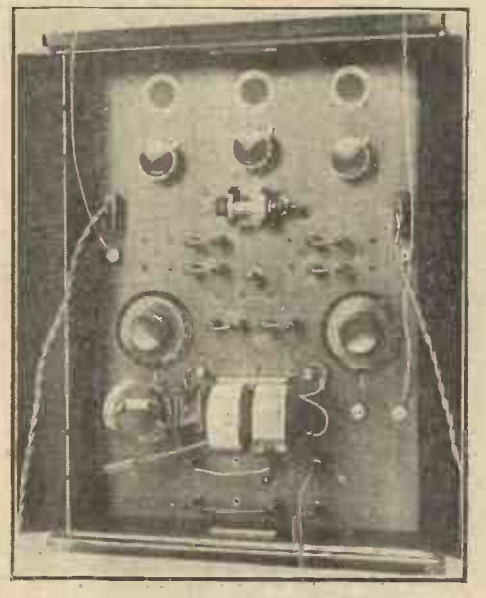
Fig. 4.—Plan View of Receiver.

LOCATING A CONDENSER "SHORT"

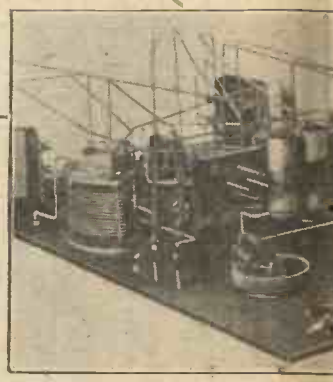
A CONDENSER "short" is usually manifested by a slight scraping sound where the rotary blades touch the stationary ones. Sometimes the contact is so slight as not to give rise to any perceptible noise. Even in this case the rubbing point can sometimes be detected visually by placing a sheet of white notepaper under the condenser in a strong light and looking sideways through the plates as they are slowly rotated. M. A. L.

A THREE-VALVE EXPE

This receiver, by the simple insertion of plugs, permits of



Front View of Experimental Receiver.



View of Back

THE receiver to be described employs three valves, but it allows any number of valves to be used, according to the nature of the circuit. Thirteen different circuits can be obtained by simply inserting suitable shorting plugs in the sockets fixed in the panel. The sockets are widely separated to minimise capacity effects. The use of telephone switches is avoided, as these have an appreciable capacity.

The first valve can be used either as a detector or as an H.F. amplifier, while the second, though usually used as an L.F. amplifier, can also be used as a detector following the first H.F. valve. The third valve always acts as a low-frequency amplifier, and separate input and output terminals have been provided for this.

Components

Cheap components should not be used, particularly L.F. transformers and fixed condensers. The most important is the ebonite panel, which should be of the best-quality ebonite available.

Three inductances are used for tuning purposes, as will be seen from Fig. 1. The aerial coil is a No. 50 Igranic connected in parallel with a variable condenser of .0005-microfarad capacity, while the anode and detector coils are each No. 75 Igranic, the latter being shunted by a variable condenser of .0003-microfarad capacity.

The following is a list of the components required (see Fig. 2):

Variable condensers—C1, .0005 microfarad; C2, .0003 microfarad. Fixed condensers—C3, .0001 microfarad; C4, .0005 microfarad; C5, .0003 microfarad; C6, .001 microfarad; C7, .001 microfarad. Inductances—L1, No. 50 Igranic; L2, No. 75 Igranic; L3, No. 75 Igranic; panel, 17 in. by 12 in. by ¼ in.; ebonite, 9½ in. by 6 in. by ¼ in.; two L.F. transformers; three rheostats (5 ohms); three valve windows; one crystal detector (Mic-Met type); one grid leak (Lissen); one grid battery; forty valve sockets; twenty-four valve legs; sixteen plugs and sockets; six large and four small terminal screws; three coil plugs; two extension handles; connecting wire; quantity of 4 B.A. and 6 B.A. nuts and screws; 2 B.A. threaded rod with nuts.

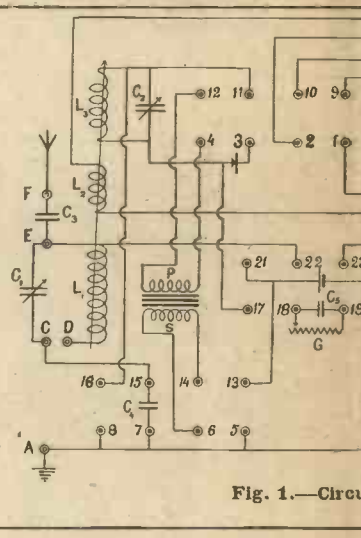


Fig. 1.—Circu

The Panel

The layout of the panel is shown by Fig. 3 (p. 362), from which the positions of the necessary holes can be marked on the ebonite panel. After drilling the holes, the panel should be given a matt finish by rubbing its surface with fine glass-paper.

Fig. 2 shows the plan of the panel, R1, R2, R3 being the rheostats, while C1, C2 are the aerial and detector tuning condensers. The inductances marked L1, L2 and L3 represent the aerial, anode and detector coils respectively.

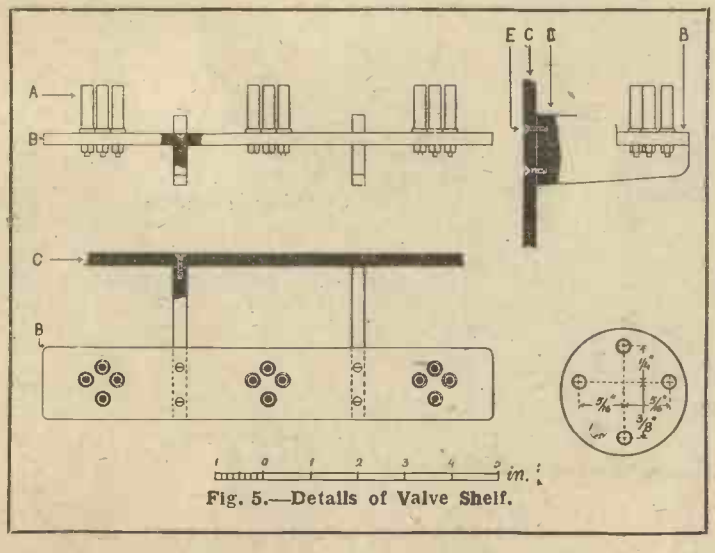


Fig. 5.—Details of Valve Shelf.

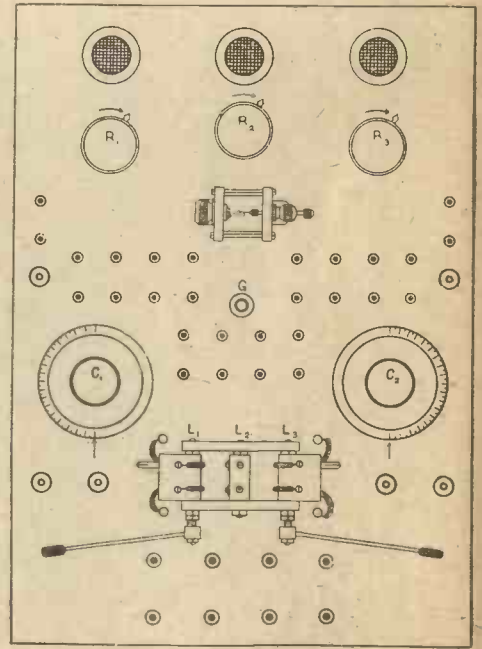
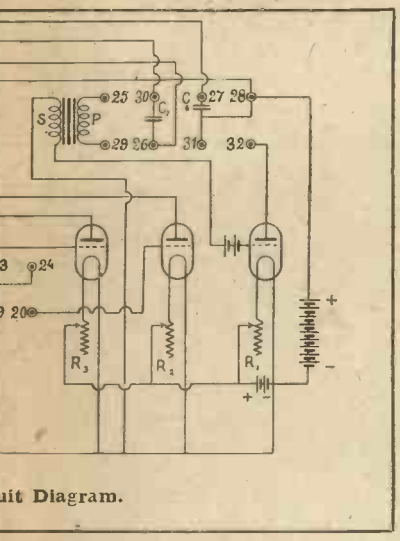


Fig. 2.—Arrangement of Components on Panel.

ÉRIMENTAL RECEIVER

the choice of a number of experimental circuits.

k of Panel.



uit Diagram.

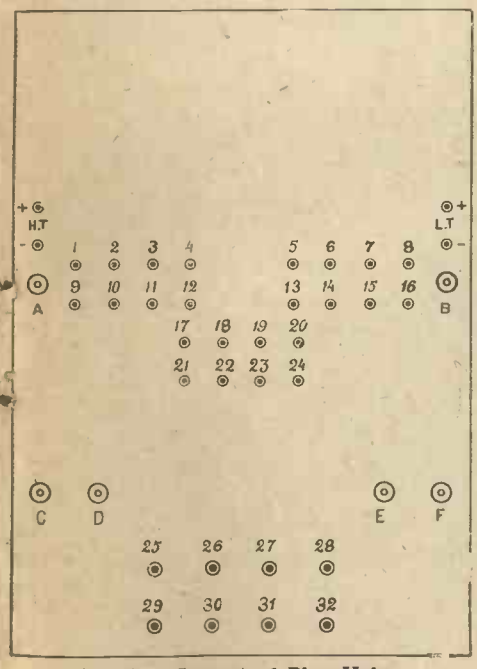


Fig. 3a.—Layout of Plug Holes.

The grid leak G is fixed in the centre, above which is mounted the crystal detector. The valve sockets, mounted flush with the panel, are represented by small circles in the middle of the panel; they are numbered to facilitate the connections. Fig. 3A shows the aerial and the earth terminals, A being the earth terminal, while E is to be connected with the aerial. If constant aerial tuning be employed the aerial should be connected to F. The frame aerial, if used, is connected to the two terminals C and D, which will otherwise be kept short-circuited by a brass strip.

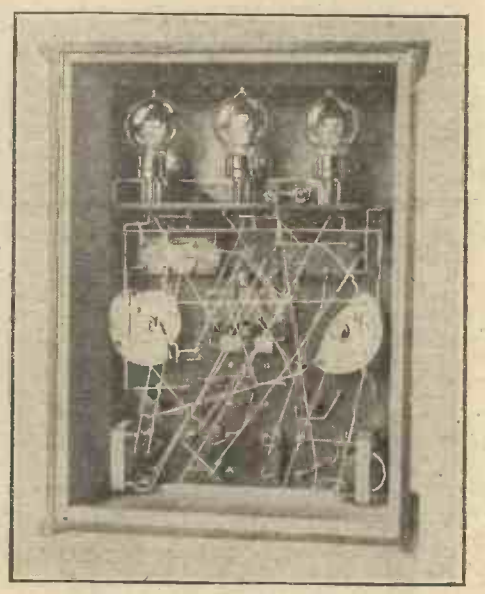
The phones can either be connected to the sockets (26-30) or (27-31), according to the circuit employed, details of which are given later. The sockets (25-29) and (28-32) are the input and output terminals of the third L.F. amplifier valve respectively.

Plugs and sockets are used to connect the H.T. and L.T. batteries with the receiver, and care should be taken to connect the right poles of the batteries to the sockets marked H.T. and L.T.

Components to be Made

Coil Holder.—The details of the coil holder that can cheaply be made to fit the exact space on the panel are shown in Fig. 4. First the coil plugs C should be drilled at the bottom and tapped 2 B.A., in which is screwed a length of 2 B.A. rod, tightened by a lock-nut B. The side pieces A are then cut, each being 3 in. long, ⅞ in. wide and ¼ in. thick, and drilled with three holes to take the rods.

The centre plug is fixed by a nut to one of the side pieces, while extension arms G, provided with ebonite handles K, are attached to the two side plugs. Before screwing the extension handles a spring washer E, followed by two nuts F, is fixed on the panel M by brass screws L, for which holes are drilled in the side pieces A and tapped to suit the screw threads.



Rear View with Back Removed.

The connections to the moving plugs are made by small lengths of flexible wires, which connect the plugs with four small terminal screws fitted on the panel. The centre plug, being a fixed one, requires no flexible wires, and direct connections can be made by soldering the connecting wires with small brass strips screwed on to the plug.

Valve Holders.—Fig. 5 shows the method of mounting the valves. An ebonite piece B, 9½ in. long, 1½ in. wide and ¼ in. thick, is drilled as shown in the diagram.

The next step is to cut two pieces of ebonite of the shape D, whose dimensions can be easily ascertained from the diagram. These pieces are drilled at suitable places and tapped to receive the screws E used for fixing these supports against the panel C and for fixing the piece B.

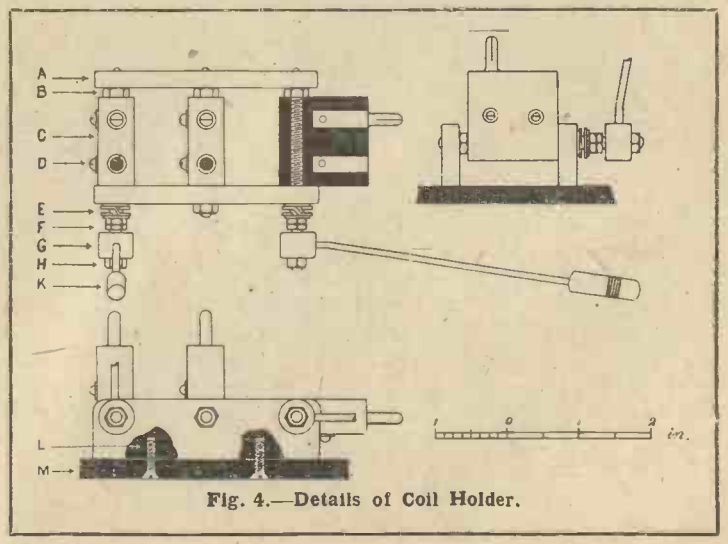
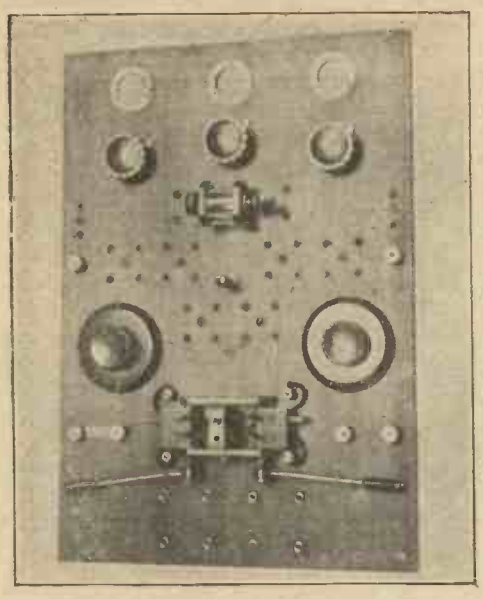


Fig. 4.—Details of Coil Holder.



Views of Panel and of Panel in Case.

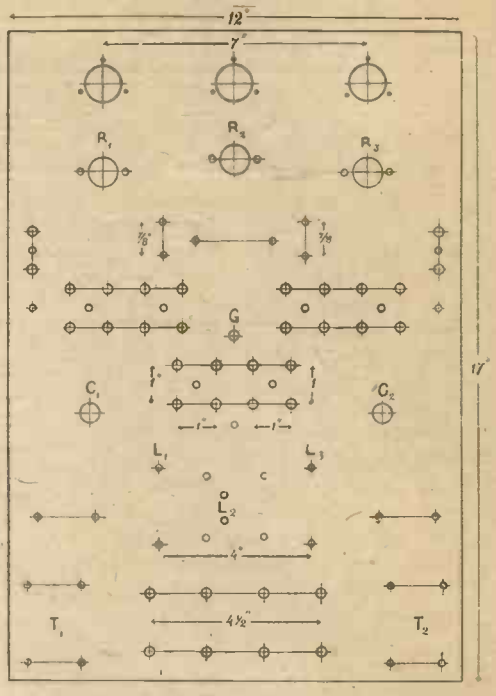


Fig. 3 (above).—Drilling Layout of Panel.

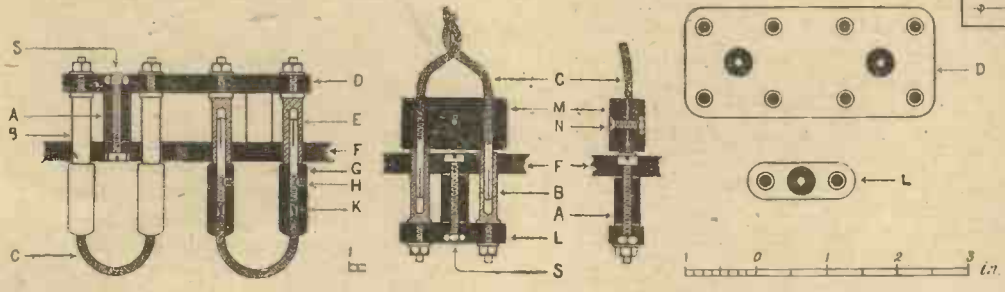


Fig. 6 (left).—Details of Plugs and Sockest.

Valve Sockets.—The valve sockets to connect the various circuits are arranged in three groups. Each group, consisting of eight sockets, is fixed on a single ebonite piece D 3½ in. long, 1½ in. wide and ¼ in. thick (Fig. 6). The sockets B are first fixed on the ebonite piece D, the distance between them being 1 in. The ebonite piece is then clamped to the panel F by long screws and nuts S, with small pieces of ⅜-in. ebonite tube A between the panel and the ebonite piece.

The plugs for connecting the sockets can be made by soldering valve legs at each end of a small piece of flexible wire C (Fig. 6). Short lengths of ebonite tube G are then slipped over the valve legs to cover the soldered joint K, screwed in position by small screws H.

Fig. 6 also shows the arrangement of the valve sockets and plugs fitted as H.T. and L.T. terminals, the sockets being fixed as before with the exception that only two sockets are fitted on the small ebonite piece L. The plugs can be made by clamping together two pieces of ebonite M, 1½ in. long, ¾ in. high and ¼ in. thick, by a screw and a nut N. Two holes $\frac{3}{32}$ in. in diameter and 1 in. apart are drilled along the surface of contact of the two pieces. The pieces are then unclamped and the valve legs (at the ends of which are soldered the ends of the flexible leads C) are inserted in the grooves and the pieces clamped again by the screw N. The ebonite pieces will thus hold the valve legs in position, forming a suitable plug to fit in the sockets. M. J. C.

(To be concluded)

HIGH-VOLTAGE VALVES

THE latest type of receiving valve is one in which the filament is heated from the ordinary supply mains carrying 100 volts and upwards of either alternating or direct current. The "main" filament terminals are mounted on a standard electric-light base, while the "auxiliary" filament, grid and plate connections are made to separate leads coming from the top and side walls of the bulb respectively. The main filament, which is used to heat the true filament indirectly—that is, by radiation—is composed of a high-resistance ribbon fitted inside a quartz tube, which in turn is surrounded by an "alundum" sleeve, which constitutes the electron-emitting filament proper.

Owing to the indirect method employed for heating the active filament the valve is quite free from "hum." M. A. L.

CRYSTAL DETECTORS

PROBABLY the most annoying thing about the average crystal detector is the catwhisker. If made of the usual fine-wire spiral this has an unhappy knack of becoming badly tangled at critical moments. For this reason the writer prefers to use a short length of fairly stiff wire, something like a gramophone needle.

With a little practice such a catwhisker can be adjusted as finely as is usually necessary and does not get easily bent. In this case it is advisable to mount the crystal in a cup that can be moved about without difficulty. The idea is, in fact, to keep the catwhisker rigid and make the crystal movable. U.

A cheap set will work much better with a good pair of telephones.

BIASING THE L.F. VALVE

UNLESS a very fine adjustment is required it is not necessary to use a potentiometer for biasing the grids of low-frequency amplifiers. One flashlamp cell inserted directly in series with the grid of the first L.F. amplifier and two in the second, with a corresponding adjustment of the high-tension in each case, will usually give quite satisfactory results. The cells will certainly last much longer in this way than when shunted by a potentiometer coil. When a special power amplifier is used, three or even four cells should be joined in series with 120 volts or upwards on the plate. J. K.

The best material is the cheapest in the long run.

Until you learn to adjust properly your receiving set, do not condemn it.

AROUND THE SHOWROOMS

Sparta Aerial Wire

PERHAPS the most important part of any wireless receiving station is the aerial, for if this is not absolutely the best that can be obtained really good signals will never be heard without the use of a great deal of juice to light a multitude of valve filaments.

A good aerial cannot be put up with unsuitable wire, and the beginner should make sure that his is of the lowest possible resistance.

Wire that has a low resistance for direct current may have quite a high resistance for the high-frequency currents used in wireless. H.F. currents flow along the surface of the wire, and for that reason aerial wire should have a large surface area.

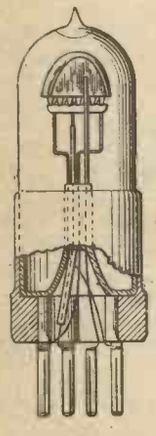
This is usually brought about by using stranded wire. One of the best types that I have come across is that made by Fuller's United Electric Works, Ltd., of Chadwell Heath, Essex.

It consists of sixteen strands of about No. 26 enamelled copper wire woven round a strong hemp core, the latter being specially treated to resist changing atmospheric conditions.

Cossor Valve Bases

IN short-wave work the capacity between the legs of a valve are far from negligible, and the experimenter on low wavelengths uses specially designed valves.

Now, however, he will not have to trouble about this, for Cossors have produced a new valve base (which is being standardised on all Cossor valves) specially designed for low capacity between the legs, as referred to in our last issue. The construction of this new base is



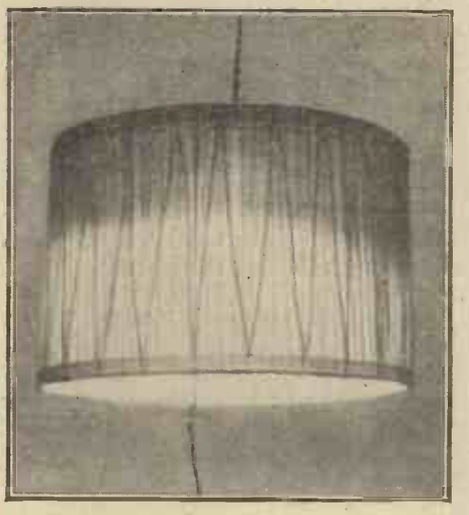
Sectional Diagram of New type Cossor Valve, Base showing Air Gap between legs.

clear from the diagram, which shows a valve in section.

To prevent anybody from taking a Wuncell-type valve for a P type, all the new bases will be coloured black and red respectively—black for dull-emitters and red for bright-emitters.

Perfex Indoor Aerial

THE difficulty of installing an outdoor aerial has led to many ingenious arrangements being devised. The latest and



probably the most artistic device of this nature is the "Perfex" aerial.

This aerial, shown in the photograph, resembles and also does duty as a lamp-shade. Encased in the silk covering is the aerial wire, which consists of air-spaced woven wire laced between the top and bottom ring spreaders. A small eyelet at the bottom of the shade permits the attachment of a lead-down wire, which can be disconnected when the receiver is not being employed. In use this aerial has been found to give gratifying results.

The "Perfex" aerial is, of course, non-directional. The address of the makers is Wireless Apparatus, Ltd., 35, Panton Street, Haymarket, London, S.W.1.

VANGUARD.

We are informed by Siemens Brothers and Co., Ltd., Woolwich, that they are able to make a reduction in the prices of headphones. The price of the phones is now 20s.

PROGRESS AND INVENTION

Loud-speakers

THE quality of sound produced by an ordinary wooden horn loud-speaker is good, provided that the diaphragm and phone part of the speaker is well made. The cost of producing a curved wood horn is high, and manufacturers are on the look-out for a suitable horn which is less costly to produce and yet will give the required purity of speech. A straight wooden horn, suitable for gramophones or loud-speakers, is the subject of Patent No. 227,545/23 (Sir Charles Forbes, Castle Newe, Strathdon, Aberdeenshire). The horn described has a cross section in the shape of an equilateral triangle, the sides of the triangle forming tangents to the circumferences of circles, the areas of which vary in size in the correct progressive proportions. Good-quality plywood, such as birch, should be used for the sides of the horn, which are glued or otherwise secured together.

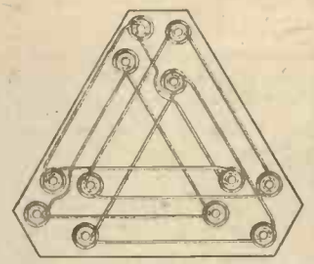
Parallel Valve Holder

FOR power amplification where power valves are not available it is often desirable to use two standard receiving valves in parallel in order to obtain the necessary amplification. This necessitates the use of extra wires straying about the panel unless a suitable holder is available for connecting the valves in parallel.

A holder of this description is described in Patent No. 226,895/23 (G. A. Mitchell, Leicester), and is shown in the diagram.

A base of ebonite or other suitable insulating material has the required number of sockets mounted on it, one of these being connected to the circuit in the usual manner. The other sockets are wired up in parallel, that is, with grid connected to grid and plate to plate; the connections between the valves may be effected by wires connected to the valve contact sockets.

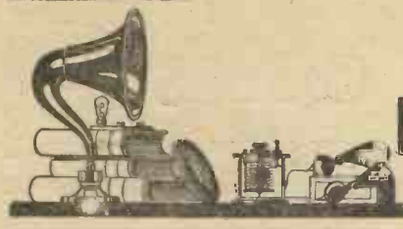
If desired, one of the sockets may be fitted with valve pins on the under side of the base so that the whole mounting



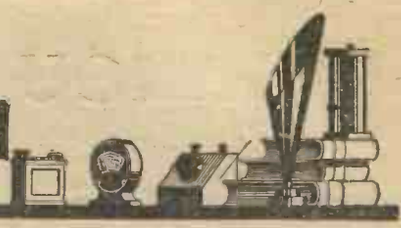
Parallel Valve Holder (226,895/23).

can be plugged when desired, thus eliminating the use of any extra wires.

Such an arrangement should be very useful for use in low-power transmitters or L.F. amplifiers where it is not convenient to use power valves.



OUR INFORMATION BUREAU



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, lay-outs, diagrams, etc., on separate sheets containing your name and address. Always send stamped, addressed envelope and attach Coupon (p. 384).

Bending Sheet Ebonite

Q.—Can thin sheet ebonite be safely bent, or is it liable to split?—A. J. (Leeds).

A.—Thin sheet ebonite will bend quite easily if it is thoroughly warmed, either in boiling water or in steam.—K.

Filling Small Holes

Q.—Can small holes in a panel be filled so as to hide them?—B. F. (Newcastle).

A.—Black sealing-wax is suitable, or Chatterton's compound may be employed. The surface of the panel should afterwards be levelled and polished.—U.

Gas Pipes and Lightning

Q.—When using an indoor aerial, is it safe to connect the earth lead to a gas-pipe?—O. J. (Cannock).

A.—It would in the case of indoor aerials be quite safe, but scarcely advisable to do so. A gas-pipe makes a very poor earth, and in all cases it would be best to connect the lead to a water-pipe.—U.

Loose-coupled Tuners

Q.—Is it to be expected that the signal strength will be louder when a double-circuit tuner is used instead of a single-circuit tuner?—W. N. (W. 12).

A.—The object of a two-circuit tuner is not always to give increased signal strength, although it will slightly increase the signals on occasions. The great advantage is the gain in selectivity which may be obtained, and it is generally worth while from this point of view alone to use a two-circuit tuner.—U.

The Disadvantages of the Telephone Transformer

Q.—What are the disadvantages of the telephone transformer?—D. T. (Beeston).

A.—No transformer is 100 per cent. efficient, and a slight, though hardly noticeable, diminution of signal strength will result if a telephone transformer is used.

There is also the possibility of distortion arising from the use of the iron as the core, while stray coupling effects with other transformers in the set may cause howling.—U.

Doubling the Aerial Wire

Q.—As my garden is very short, would it be better to double the aerial back so that the bend is supported by the pole and the free end is at the house, a few feet away from the lead-in?—T. F. (Bexhill-on-Sea).

A.—Although this would increase the length of wire it would not increase the *electrical* distance from the free end to the lead-in. Owing to the undesirable bend in the middle, this aerial would probably be much less efficient than the short single wire.—U.

Aerials for Long-wave Reception

Q.—Which type of aerial is most efficient for long-wave reception?—C. L. (Newbury).

A.—An aerial having large capacity is of great advantage when tuning to long wavelengths, as less inductance has to be added than would otherwise be the case with low-capacity aerials. However, "static" effects prove troublesome. The weight of a multiple wire aerial demands very strong "fixings," and with the inevitable sagging of the wires the effective height is somewhat reduced. A two-wire aerial will probably be best, provided that a spacing of at least 4 to 6 feet between the wires is possible.—U.

Crackling Noises

Q.—I am unfortunately experiencing considerable trouble from crackling noises in my set, which I am unable to trace. I have tried several high-tension batteries, grid leaks, and even accumulators, but the noise still persists.—F. P. (S. W.).

A.—As you appear to have examined all the most likely sources of this trouble, and as your connections are well soldered, it is very probable that the trouble is due to a defective intervalve transformer or, alternatively, to the insulation of your telephones being defective. In both these cases the remedy is obvious, but we suggest that to determine from which source the noise arises you borrow a pair of telephones which you know to be in perfect condition and test them against your own.—U.

Two-valve Set

Q.—I intend to build a two-valve set, and should like to know suitable dimensions for the aerial tuning coil, the anode inductance, and the reaction coil which is to be coupled with the anode coil. It is proposed to tune from 200 to 450 metres.—V. L. (Harrow).

A.—As you wish to receive only short wavelength signals, the aerial coil may consist of a winding 4 in. in diameter and 5 in. long of No. 22 d.c.c. Ten tappings should be taken. The anode coil should consist of a winding 4 in. in diameter and 4 in long of No. 30 d.c.c. with ten tappings. The reaction coil may be 3 in in diameter and 4 in. long, with No. 34 s.s.c. wire, with four tappings.—U.

H.F. Transformer

Q.—How many turns of wire (a specimen of which is submitted) will be required for a high-frequency transformer?—S. S. (Limpsfield).

A.—Each primary and secondary slot should be wound with 100 turns of the No. 38 s.s.c. wire, sample of which was submitted. The primary of the transformer should be tuned with a condenser having a maximum value of not more than .0003 microfarad.—U.

Fixed Detector Adjustment

Q.—Which is the best method of keeping a crystal detector in adjustment once a good spot has been found?—L. D. (Watford).

A.—In order to keep a crystal detector in perfect adjustment, drop some hot beeswax around the wire.

In practice this has kept the catwhisker in place for months. It eliminates the necessity of seeking for the elusive spot every time the set is used.—U.

Resistance

Q.—What is meant by the resistance of a wire?—E. P. (Romsey).

A.—The property possessed by all substances of offering opposition to the passage of electric currents is known as resistance. The effect of resistance is to produce heat. It is a determining factor in arriving at the amount of electricity that will flow in a given circuit at a given voltage, and where a maximum flow is desired the minimum resistance must be secured.—U.

Plants and Wireless

Q.—Do plants respond to wireless waves?

A.—Professor Bose, who has devoted much study to the subject, is of opinion that they do, but it is probable that the waves would have to be very small ones. It is certainly true that trees have the property of picking up electrical energy from wireless waves, because they can be used as aerials.

"Stand-by" Switches

Q.—How does the term "stand-by" apply to a switch in wireless?—C. A. (N.W.).

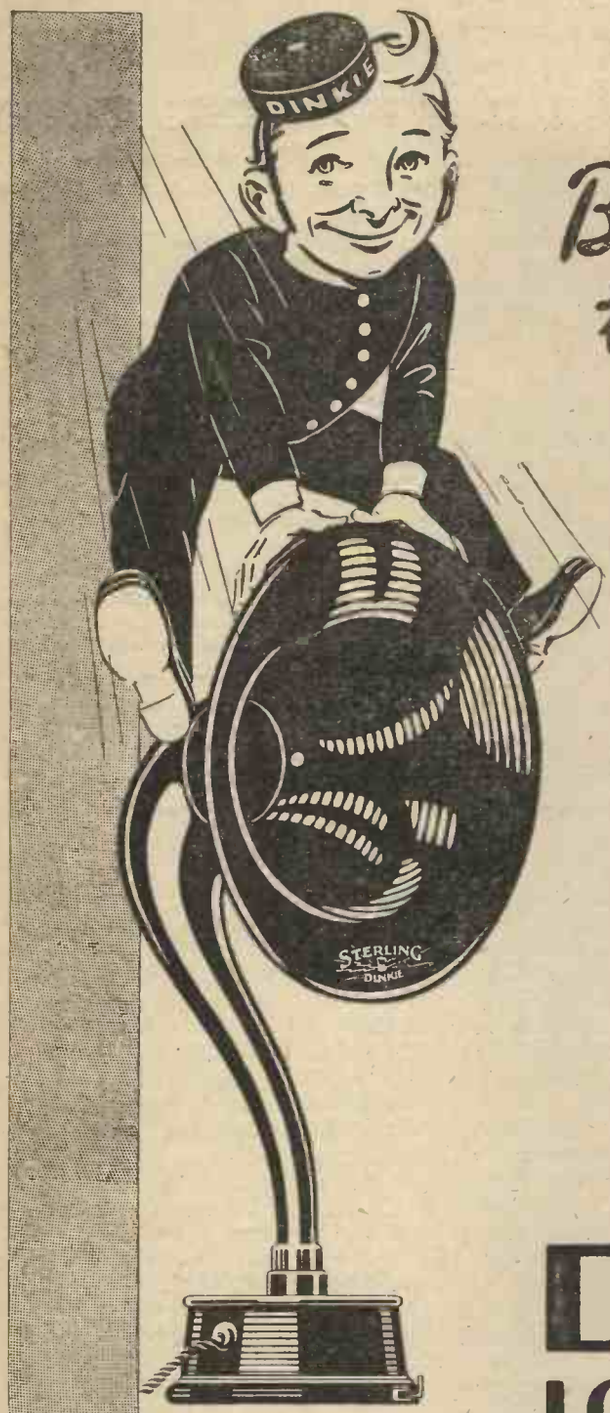
A.—The term first became general in commercial wireless when a station was controlling all messages of a certain area. Other stations would be told to wait for a definite time, and others would be told to "stand-by" to receive messages, or because it was nearly their turn to transmit.

The term was applied to a switch because a different tuning adjustment was necessary in the different circumstances. On the "tune" side (that is, loose-coupled system) the receiver is as selective as possible to the station received.

On the "stand-by" side, single-circuit tuning was employed to enable all stations within range to be heard.—U.

MR. GEORGE GROSSMITH On the Staff of the B.B.C.

In response to an invitation from the British Broadcasting Co. Mr. George Grossmith has accepted the appointment of advisory director of programmes. The photograph shows Mr. George Grossmith listening-in.



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Your radio dealer will willingly demonstrate Dinkie's powers before purchase.

The Sterling "Dinkie" Loud Speaker is supplied in a brown-tinted finish complete with flexible cord. Dimensions: Height overall, 13 in.; diameter of flare, 7 in.; diameter of base, 4 in.

PRICE

30/-

STERLING DINKIE LOUD SPEAKER

30/-

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Manufacturers of Telephones and Radio Apparatus, etc.
210-212, TOTTENHAM COURT RD., LONDON, W.1 Works: DAGENHAM, ESSEX

THAT IDEAL SET!

EVERY experimenter has at one time or another dreamt of a perfect set which would be the embodiment of all his favourite ideas in wireless. Such a set would be a model of neatness and simplicity, combining extreme ease of operation with unheard-of range and power. Simply by turning a knob one would be able to pick up any station desired without the slightest trace of interference from other transmissions.

Putting them in their order of relative importance, purity, selectivity, range and volume are the requirements of the ideal set. Some measure of success has been attained in each of these, but there is still a good way to go before perfection is finally attained.

Distortion

One of the most difficult as well as the most important of wireless problems which has yet to be solved is the question of distortion. There are so many points where this distortion can occur. Take even the first link in the broadcasting chain—the microphone; in spite of every precaution, it is impossible to prevent a certain amount of distortion owing to the tendency of the microphone diaphragm to vibrate at its own frequency. Then come the bank of valves which amplify the current from the microphone; it is difficult to keep the amplification quite even over all frequencies. The receiver is liable to the same troubles; L.F. transformers are a fruitful source of bad reproduction, as well as are reaction effects, the grid leak, rectification and faults in the phones.

Hence the first thing of all to be tackled before wireless reception is perfected is this question of distortion; for this reason it is not unlikely that the conventional method of L.F. amplification (transformer coupling) may be eventually superseded in favour of something better. Already many wireless enthusiasts who prefer purity of tone to excessive volume are installing resistance-capacity amplifiers. It is true that the same measure of "step-up" is not obtainable with this method, but at least the quality is perfect.

Selectivity

Next in importance to the question of purity is that of selectivity, which means, roughly speaking, the power of receiving one transmission without interference from other stations. Enthusiasts who live near a main broadcasting centre often experience great difficulty in hearing other stations through this jamming.

The question of range is also important, since without it we cannot pick up distant stations which are broadcasting attractive items. A sensitive set is therefore a necessity, but it must not be too complicated. Nothing discourages the novice so much as the formidable array of knobs and handles with which he is often confronted. The crystal is the natural rectifier, but unfortunately it is not nearly sensitive enough; if a super-sensitive type could be discovered the valve would soon become obsolete.

H.F. Amplification

The present systems of high-frequency amplification are far from satisfactory owing to the inconvenient number of controls and the irritating lack of stability when more than three H.F. valves are used. Various methods of aperiodic H.F. amplification and also the famous neutrodyne principle have done something to solve the problem, but an ideal radio-frequency amplifier has yet to be discovered.

Lastly, we come to the question of volume, which is really a matter for a number of valves arranged in such a way that no distortion is introduced. Three stages of resistance-capacity L.F. amplification will give sufficient volume for the largest room.

In the opinion of the writer the ideal set of the future will consist of two dull-emitter valves, the first arranged as a super-sensitive detector and the second as a dual amplifier. Both valves will be so designed as to need a very small plate potential, and the invention of a perfect wave-trap will enable the owner to pick up any transmission he desires without interference from his home station.

The year 1925 should be full of surprises in every branch of wireless, and the problem of the ideal set may be nearer solution. G. J. M.

CAPACITY EFFECTS

A VALVE set is most liable to the distressing effects of hand and body capacity when tuned up to its most sensitive condition for the reception of distant signals. As most of us are aware, in the aerial tuning less hand-capacity effects are usually experienced if the condenser, when in series, is connected with the moving plates to aerial and fixed plates to coil, while, with the condenser across the inductance, the fixed plates are better connected to aerial and the moving plates to earth. Extension handles to condensers and moving coils are useful and, indeed, in many cases essential.

Wiring Precautions

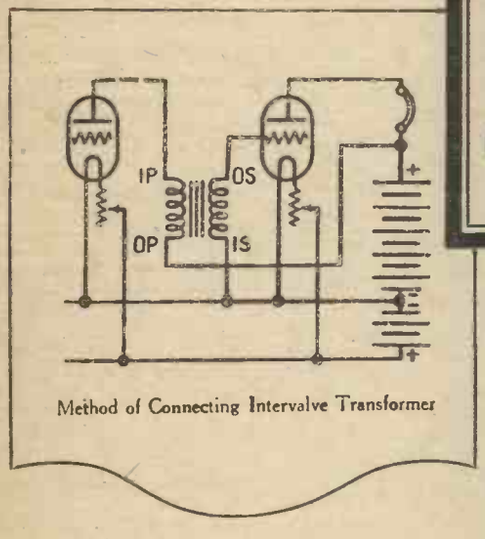
To those who have hitherto been content with these precautions and who have observed the usual methods with regard to widely spaced wiring which does not run parallel and which crosses at a large angle, the following additional hints, if made use of, will be found advantageous. When building the set, keep wiring and connection which will be at high potential away from the upper surface of the panel, so far as this can be made possible. If a grid-leak of the variable type is used in the detector unit, with one end (usually a circular plate of brass) supported on the panel, see that you do not connect this end to the grid—the end farthest from the panel should be so connected, and the end next to the panel to the filament. This will help to avoid trouble when the hand is brought near to it and when adjusting the leak. Similarly, when using a stabilising variable resistance between the grid and filament of the first valve the same rule applies. In using the tuned-anode method of H.F. coupling, or transformer coupling with the primary tuned, connect the positive H.T. to the moving plates of the condenser.

In all cases it is better for the operator to keep away from the aerial lead-in when operating the set in a highly sensitive condition, as the least movement of the body may throw the set into oscillation or render signals, already faint, inaudible. When demonstrating the capabilities of your receiver to friends it is not wise to allow them to be too close, particularly on the aerial side of the set, or they may by their movement carry away bodily the little far-distant signals. A. P.

FREEZING BY WIRELESS

AN apparatus has been invented by a Scandinavian engineer by which it is claimed to be possible to radiate intense cold in much the same way as broadcast programmes are at present conveyed through the ether. Further particulars of the alleged invention are not at present available, but it is apparently intended to enable housewives to connect the domestic meat safe up to the garden aerial and so preserve milk, butter, meat and other perishables for an indefinite period. M. A. L.

IGRANIC
"E" Type
Audio-frequency
Transformer



Method of Connecting Intervalve Transformer

This "E" Type Igranic Transformer

is even better than its predecessors

Further exhaustive and searching experimental work carried out under all conditions has indicated some slight improvements which have resulted in even greater efficiency being obtainable from the Igranic Audio-Frequency Transformer. This latest model we call the E type—and if you would realise to the full the pleasure of distortionless reproduction of speech or music you should build this component into your receiver.

It is made in ratios of 1 to 5 for first stage of amplification—and for second and subsequent stages, 1 to 3. The metal shrouds act as magnetic screens and thus interaction is non-existent even when two or more transformers are mounted closely for multi-stage amplification. The impedance at speech frequency is suitable for most types of valves. **Prices, 1:5, 21/-; 1:3, 19/6**

Write for List Z424.

IGRANIC RADIO DEVICES INCLUDE:

Honeycomb Duolateral Coils, Fixed Condensers, Filament Rheostats, Intervalve Transformers, Variometers, Variocouplers, Bi-plug Coil Holders, Tri-plug Coil Holders, Battery Potentiometers, Vernier Friction Pencils, etc. etc.

All carry a six months' guarantee and are stocked by all reputable dealers.

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These are the foundations of a BETTER set

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"E" Type Transformer

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IGRANIC-FRESHMAN
Fixed Condenser

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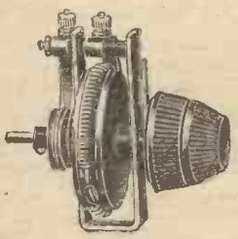
Honeycomb Duolateral Coil



IGRANIC
Rheostat (Vernier type)

NEW WIRELESS LEGISLATION

An Explanatory Note on the Bill now before Parliament

THE provisions of the new Wireless Act sponsored by Sir W. Mitchell-Thomson, the Postmaster-General, have aroused widespread interest and no little criticism in wireless circles generally.

The existing Act, which dates from 1904, is admittedly out of date and unsuited to deal with the situation created by the introduction of broadcasting and the enormous development that has since taken place in wireless. The new measure repeals the older Act and consolidates all existing regulations governing the use, not only of wireless receiving and transmitting apparatus, but also all apparatus used for visual or sound signalling.

Broadcasting Apparatus

So far as the use of ordinary broadcasting receiving apparatus is concerned, the new penalties laid down for refusing to take out the necessary licence are:

"On summary conviction, imprisonment with or without hard labour for a term not exceeding three months, or to a fine not exceeding £50, and for a continued offence, a further £5 for each day during which the offence continues."

This appears unnecessarily severe having regard to the nature of the "crime," but it must be remembered that under the old Act the penalty was:

"On summary conviction a fine of £10, or, on conviction under indictment a fine not exceeding £100, or imprisonment with or without hard labour for a term not exceeding twelve months."

Present Powers

There appears little to choose between the two so far as severity is concerned, but the general concensus of opinion is that both are far too drastic under existing conditions. It is admitted that up to the present the authorities have never attempted to press their legal powers to the full extent. Public opinion would certainly not tolerate such punishments except under abnormal circumstances such as exist in war-time, and it seems an unnecessary and dangerous weapon to place in the hands of the Post Office officials.

Right to Search

Another clause that has excited much comment is the one giving the right to enter and search any premises in which the presence of unlicensed wireless apparatus is suspected. Here too it must be stated that nothing is added to the legal powers already in existence. Under the 1904 Act any magistrate could, on reasonable grounds, issue a search warrant authorising a competent officer to enter a suspected house and seize any wireless apparatus found therein.

Certain of the new clauses appear at first sight to prejudice the rights and privileges of the bona-fide experimenter. These are bound to meet with strong opposition in the passage of the Bill through the House of Commons. Criticism is therefore deferred until it is known what their final form will be.

It is interesting to note that a clause has been inserted in the new Act declaring that all references to wireless transmission shall be deemed always to have included apparatus for reception. This definitely clears up a point which has for some time been a bone of contention in the daily press, although readers will remember that "A.W." has always maintained the opinion now legally expressed.

BARRISTER-AT-LAW.

WIRELESS TELEGRAPHY AND SIGNALLING BILL

GENERAL POST OFFICE.

IN view of statements which have appeared in some organs of the Press to the effect that new and inquisitorial powers of search are sought to be conferred by Clause 1, Subsection 4, of the new Wireless Telegraphy and Signalling Bill, the Postmaster-General desires it to be known that the subsection referred to is almost purely a consolidation of the existing provisions and merely re-enacts, with minor amendments, Section 1, Subsection 4, of the Wireless Telegraphy Act, 1904. Procedure by repeal and re-enactment with amendments was adopted in order to avoid the inconvenience of legislation by reference to the existing Act. The powers of search conferred thereby have existed for twenty years, exist to-day and continue to exist, whether the new Bill becomes law or not.

February 16, 1925.

"**An Electric Latch-lock,**" that was designed as an emergency lock to be used only when everyone was away from home, is illustrated and described in the current issue of "The Amateur Mechanic and Work" (3d.). The following articles and features appear in the same number: "A Long-range Two-valve Set," "Making Money by Inventing," "An Easily-made Mirror," "Our Small Car Page," "Fixing Wireless Tackle," "Notes by the Way," "Repairing Cast-iron Domestic Articles," "Preventing Rain Driving Under Doors," "A Basket-shaped Plate-drainer," "Cleaning Small Brass Articles," "Motor-cycle Practicalities," "Care of Acetylene Lamps."

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Guaranteed within 5 per cent of stated capacity, this accuracy has never before been obtainable by the public. The only one-hole fixing condenser on the market. Buy one. Test one. It will prove our statements and thoroughly satisfy you.

FEATURES: Reliability of Capacity. Finest grade Mica Dielectric Highest possible quality Copper Foil. Adapted for Terminal or soldered connections.

CAPACITIES: .0001 to .002, price 2/- each. .003 to .006, price 2/6 each.

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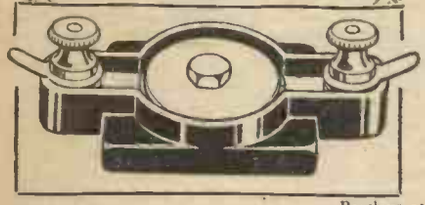

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Equal in performance to any '06 or '07 obtainable. Send for the concert-tested PLIOTRON S. S. post free with makers' instructions for use.

24 Hours' Approval upon receipt of cash order.

Max. con. '07, fil. volts 2·3, anode 40-80.

English "R" Valves, fil. volts 4·5, anode 45-100, 8/6.

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The distortionless all British **"Renown"** L.F. Transformer which we have designed and manufactured is unequalled for distortionless powerful amplification and its immunity from breakdown is a special feature. **Price 8/4 Post free**

GUARANTEE: Try this transformer against any in existence and if it is not equally as efficient in every respect, return it to us within 14 days and we will refund cash without quibble. *Should* this transformer *ever* breakdown we will rewind it making it equal to new for **2/9**

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The Living Artiste

LOTS of people think that good suits cost too much—that a good car costs too much—that fine furniture costs too much. Yet there are people who buy all these things and who know that they get very good value for their money.

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Into the manufacture of Eureka Transformers goes much care and forethought. In fact, it would not be too much to say that each Transformer receives the individual attention that is usually accorded to expensive scientific instruments. An incessant demand—not only from all parts of this country, but also from the Continent and from the Colonies—has certainly necessitated their manufacture on a mass production basis, but no test is too stringent and no safeguard too great to ensure the original Eureka quality being fully maintained.

As a direct result we have yet to hear of a dissatisfied Eureka user—while the wonderful flow of correspondence from wireless enthusiasts is a spontaneous tribute to Eureka excellence, and its ability to "re-create the living Artiste."

Portable Utilities Co., Ltd.,
Fisher Street, London, W.C.1.

Concert Grand 30/-

Supreme EUREKA for Tone

Eureka No. 2. 22/6 (*For Second Stage*)

Gilbert Ad. 2235.

WHILE wireless is said to have introduced many new words into the English language, a reader points out that an expression to adequately describe the feelings of those who suffer from the effect of other people's oscillations is still wanted.

The Forfarshire Education Authority has decided to take no steps in regard to the question of introducing wireless into schools. Another minor Scottish setback was given by the Edinburgh Town Council, which, without discussion, declined to entertain a proposal to have its proceedings broadcast.

The B.B.C. now produces 35,000 hours a year of ever-changing programmes.

Scottish amateurs are wondering what the B.B.C.'s intention is with regard to the Edinburgh station. At very short notice the wavelength of this relay centre was changed from 323 to 465 metres, but, after only three evenings with the new arrangement, the wave was suddenly brought back to the original.

Very successful results have been obtained in a series of tests which have been carried out by Air Ministry experts in the wireless control of aeroplanes.

Listeners-in have been asked by the Liverpool broadcasting station director to take part in a discussion on the question of whether the local programmes are to continue to be relayed from London or whether, in order to obtain better results, they would prefer the Manchester programme.

The *Leviathan*, which left New York on February 28, until her arrival on March 6 will broadcast every night after the British stations have closed down performances by the ship's bands, songs by gifted passengers, and talks by eminent people crossing the Atlantic. Transmission will probably be on a wavelength of 317 metres, although it will vary at times from 200 to 345 metres.

An "All British" concert will be broadcast on February 26.

At 7.30 p.m. on February 28 will be given another of the popular "query" programmes.

Passengers on the fast train from Chicago to California, which is completely equipped with wireless receivers, clearly hear the programmes from the Fortworth (Texas) broadcasting station.

An indication of the tremendous growth of the wireless industry was given in the annual statement of the Radio Corporation of America, showing that its income has doubled in two years.

A broadcasting company has been established at Oslo, Norway, and will begin working in a few days.

A Melbourne experimenter succeeded recently in relaying an American broadcasting station to the Melbourne station for retransmission. Music, mainly orchestral, came through clearly, the reception being frequently equal to local transmission.

An 88-miles journey in the driving-cab of an L.M.S. engine, to memorise the sounds of an express train for a wireless drama, has been the experience of Mr. A. Whitman, of the dramatic department of the B.B.C.

Canadian and South African beam stations will be erected near Bodmin (Cornwall) and Bridgwater (Somerset).

Wireless receiving licences collected by the Post Office in 1923-24 amounted to £250,055.

On the express train to Ventimiglia, on the Italian frontier, a wireless installation succeeded in picking up two American amateur stations and one Australian. The only aerial used was one of the electric-light wires.

Had it not been for strikes and other delays the Government's wireless station at Rugby would have been in working order this month.

The popular programme to be broadcast on March 2 contains orchestral items, and songs by Lea Felissa.

A "nautical" programme will be given on March 3.

A programme devoted to the works of Sullivan will be broadcast on March 4.

A Victorian amateur has succeeded in sending a direct wireless telephone message to England.

The first Irish Wireless Exhibition, which was to have been held from February 23 to February 28, has been cancelled as a direct outcome of the discouraging attitude of the Free State Minister for Posts and Telegraphs.

It has been felt desirable that a complete wireless installation, with loud-speakers, should be presented to the Cardiff Royal Infirmary, and an effort has been set on foot by the Cardiff Press Bowling Club to achieve this worthy object.

In place of the scale on the piano, the British Broadcasting Company have reverted to the high-pitched whistle for tuning-in purposes.

Telegrams may now be sent by wireless from Germany to the Dutch East Indies between the hours of mid-day and midnight.

According to Mr. Arthur Burrows, director of programmes of the British Broadcasting Company, "it will be necessary to have an open studio to which the public will be admitted in the ordinary way as to a place of public entertainment, if ideal broadcasting is to be obtained."

A wireless message broadcast from Mosul, Mesopotamia, was picked up by an amateur wireless enthusiast at Cowes recently.

The intention to petition against what they believed was too much simultaneous broadcasting has been abandoned by Levenshulme listeners.

Mr. Ramsay MacDonald states that one of the things that struck him when in the West Indies was the inadequacy of the Imperial wireless news service.

The Cardiff City Council have rejected a suggestion by the British Broadcasting Co. that their meetings should be broadcast.

With a single-wire aerial 15 ft. long M. Léon Deloy, a French amateur, has established bilateral communication with the American station 3 C H G, situated some thirty miles south-west of Philadelphia.

New York's police department, following the lead of London and Paris, is experimenting with wireless for quick communication between headquarters and the district stations.

The newly-formed Spanish Radio-Union is building at Madrid a new high-power broadcasting station.

In Spain, the last of the older nations to take up wireless, more than 100,000 licences for receiving sets have been issued.

Major-General George A. Squier, U.S. Army Chief Liaison Officer during the war, has invented a new telegraphic alphabet to replace morse. He asserts it is one hundred and fifty-six times more rapid than the code, and that the adoption of his system would save many thousands of pounds a year.

Swiss wireless clubs are regarding with interest and some nervousness the proposal to forbid amateurs to use more than 50 watts power.

The B.B.C. has started an amateur dramatic club of its own, and hopes to give a play in one of the suburban theatres some time in April.

In order to give the engineers a clear evening for line tests once a week, the B.B.C. have arranged to close down all stations on Friday evenings from 10.30 onwards.

NOTE.—*In the following list of transmissions these abbreviations are observed: con. for concert; lec. for lecture; orch. for orchestral concert; irr. for irregular; m. for metres; and sig. for signal.*

GREAT BRITAIN

The times given are according to Greenwich Mean Time.

London (2LO), 365 m. 1-2 p.m., con.; 3.15-3.45 p.m., lec.; 4-5 p.m., con.; 5.30-6.15 p.m., children; 6.40 p.m. talk; 7-7.30 p.m., time sig., news, talk; 7.30-9.30 p.m., music; 9.30-10.0 p.m., time sig., news, talk; 10.0-10.30 p.m., music. Mon. and Wed. the Savoy Bands are relayed until 11.0 p.m., and on Sat. until midnight. Sat. only, 4-5.30 p.m., con.

Aberdeen (2BD), 495 m. **Belfast** (2BE), 435 m. **Birmingham** (5IT), 475 m. **Bournemouth** (6BM), 385 m. **Cardiff** (5WA), 351 m. **Glasgow** (5SC), 420 m. **Manchester** (2ZY), 375 m. **Newcastle** (5NO), 400 m. Much the same as London times.

Bradford (2LS), 310 m. **Dundee** (2DE), 331 m. **Edinburgh** (2EH), 465 m. **Hull** (6KH), 335 m. **Leeds** (2LS), 346 m. **Liverpool** (6LV), 315 m. **Nottingham** (5NG), 322 m. **Plymouth** (5PY), 335 m. **Sheffield** (6FL), 301 m. **Stoke-on-Trent** (6ST), 306 m. **Swansea** (5SX), 481 m.

CONTINENT

The times are according to the Continental system; for example, 16.30 *is* 4.30 *p.m., and* 08.00 *is* 8 *a.m.* (*G.M.T.*).

AUSTRIA.

Vienna (Radio Wien), 530 m. (1 kw.). Daily: 08.00, markets (exc. Sun.); 10.00, con.; 12.05, time sig.; 12.20, weather; 14.30, Stock Ex. (exc. Sun.); 15.00, news, con.; 15.10, children (Wed.); 17.00, lec. (Tues., Wed., Thurs., Sat.), children (Mon., Fri.); 17.20, women (Tues.); 18.00, news, weather; 19.00, time sig., con., news; 21.00, dance (Wed., Sat.).

Graz (relay), 675 m. Testing.

Innsbrück (relay station). Under construction.

BELGIUM.

Brussels (SBR), 265 m. (1½ kw.). 17.00, orch., children (Wed. and Thurs.); dance (Tues. and Sat.); 18.00, news; 20.15, lec., con., news (opera, Mon. and Wed.).

Haeren (BAV), 1,100 m. 13.00, 14.00, 16.50, 18.50, weather.

CZECHO-SLOVAKIA.

Kbely (OKP), 1,160 m. (1 kw.). Weekdays: 09.00, 10.30, 12.30, 16.00 and 17.00, con. (Wed. and Sat.); 18.30, lec., news, weather, con. (time sig., 19.00), daily; 10.00, con. (Sun.).

Komarov (OKB), 1,180 m. (1 kw.). Weekdays: 13.00, Stock Ex., weather, news; 17.30, con. (Thurs.); 09.00, con. (Sun.).

Strasnice (430 m.). Testing.

DENMARK.

Copenhagen (Kjobenhavns Radiofoni station), 475 m. (1 kw.). 18.35, notices, lec., con.* (Tues., Thurs., Sat.). * This con. is also relayed by the Aalborghus ship station on 510 m.

Lyngby (OXE), 2,400 m. and 2,700 m. Weekdays: 18.20, news, Stock Ex. (2,700 m.); 20.00 and 21.00, news, weather, time sig. (2,400 m.). Sundays: 15.00 and 20.00, news (2,400 m.).

Ryvang, 1,190 m. Concert, 14.00 (Wed.), 15.00 (Sun.), 19.00 (Fri.), 19.30 (Tues.).

FRANCE.

Eiffel Tower, 2,600 m. (6 kw.). 06.40, weather (exc. Sun.); 11.00, markets (exc. Sun. and Mon.); 11.15, time sig., weather; 14.45, 15.35, 16.30,* Stock Ex. (exc. Sun and Mon.); 18.00, con. (not daily); 18.45, Paris fashions (in English)—temp—(Wed. and Sat.); 19.00, weather; 20.30, con. relayed from PTT (Fri.); 22.10, weather (exc. Sun.). Frequent tests on 1,500 m.

* On 1st and 15th of each month at 16.45.

Radio-Paris (SFR), 1,780 m. (2 kw.). Sundays: 12.45, orch.; 13.45, news; 16.45, con.; 20.30, news, &c.; 21.00, dance music. Weekdays: 12.30, orch., Stock Ex., news; 16.30, markets, Stock Ex., con.; 17.45, Stock Ex., news, women; 20.30, lec., news, con.; 21.00, dance (Thurs.). Frequent relays of 5 X X after 22.00. *Le Matin*, Paris, provides a special con. every 2nd and 4th Saturday in the month at 21.00 or 22.00 G.M.T. Tests probable on 1,125 m.

L'Ecole Sup. des Postes et Télégraphes (PTT), Paris, 450 m. (400 w.). 14.00, lec. relayed from Sorbonne University (Thurs.); 15.00, outside relay (Sat., irr.); 15.45 and 17.00, lec. relayed from Sorbonne (Wed.); 16.00, outside relay (irr.); 20.00, Eng. talk (Tues.); 20.30, lec. or con., almost daily, con. relayed by F. L. (Fri.); 20.45, lec. (Sun.), organ recital 3rd Sun. each month; 21.30, con. (Sun.). Power will be shortly increased.

"Le Petit Parisien," 345 m. (500 w.). 21.30, con. (Sun., Tues., Thurs.), dance (Sat.).

Lyons-la-Doua, 550 m., 10.30, gramophone con.; news, etc. (irr.).

Radio-Lyon, 287 m. (2 kw.). 12.00, 17.00, 20.00, news; con. (irr.).

Toulouse Aerodrome (MKD), 1,525 m. 09.42, 19.42, weather.

GERMANY.

Berlin (2), 505 m. (1½ kw.). 08.00, sacred con. (Sun.); 09.00, markets, news, weather; 10.00, factory con. and tests; 10.30, educat. hour (Sun.); 11.15, Stock Ex.; 12.00, time sig., news, weather; 13.15, Stock Ex.; 14.00, lec. (Sun.), markets; 14.30, children (Sun., Wed.); 15.00, Esperanto (Sat.); 15.30, orch., French (Tues.); 17.30, lec., women; 18.00, French (Mon.), lec. (Tues.); 18.30, lec., Engl. (Thurs.), theatre news (Tues.); 19.30,* con., weather, news, time sig.; 21.30, chess (Mon.), dance until 23.00 (Thurs., Sat., Sun.). * If opera relayed, at 18.30.

Berlin (Telefunken Co.), 290 m. Tests about 22.30 daily.

Königswusterhausen (LP), 2,450 m. (5 kw.). Wolff's Buro. Press Service: 06.00, 20.00. 2,800 m. (5 kw.): 10.30, con. (Sun.), Esperanto lec. 3,150 m.: Telegraphen Union, 06.45-18.45, news, con. (Fri., irr.). 4,000 m. (10 kw.): Express News Service, 06.00-20.00 (daily); lec. (Tues. and Fri., time irr.).

Bremen, 330 m. (1 kw.). Relay from Hamburg.

Breslau, 418 m. (1½ kw.). 10.15, Stock Ex., weather; 11.00, factory con. (weekdays), sacred con. (Sun.); 11.55 (Sun.), time sig., weather, Stock Ex.; 14.00, news (weekdays); 15.00, children (Sun.); 16.00, orch., children (Fri.); 16.45, con. (Sat.); 17.00, shorthand (Sat.), Mah Jongg (Wed.); 18.00, Esperanto (Mon.), Engl. (Thurs.), lec. (other days); 19.00, con., weather, time sig., news; 20.30, dance (Sun.); 21.15 (Mon.).

Cassel, 288 m. (1½ kw.). Relay from Frankfort.

Dresden, 280 m. (1½ kw.). Relay from Leipzig.

Frankfort-on-Main, 470 m. (1½ kw.). 07.30, sacred con. (Sun.); 10.10, Stock Ex.; 10.55, time sig., news; 15.00, children (Sun.), Stock Ex. (weekdays); 15.30, con., women; 16.00, con. (Sun.); 17.00, markets, lec., children (Wed.); 18.00, lec. (daily), shorthand (Wed.), Esperanto (Fri.); 18.30, educat. hour; 19.00, lec., Engl. (Mon.); 19.30, con. (daily), jazz band (Fri.); 20.30, time sig., weather, news; 21.00, dance or late con. (not daily).

Gleiwitz (relay station). Under construction.

Hamburg, 395 m. (1½ kw.). Sunday: 07.55, time sig., weather, news, lec., women; 10.00, sacred con., chess; 12.00, con., lec.; 16.00, children; 17.00, con.; 18.00, Engl. conv.; 19.00, sport, weather, news, con. or opera; 21.00 onwards, as weekdays. Weekdays: 06.25, time sig., news; 07.30, theatre news; 11.55, time sig.; 12.20, Engl. (Wed.); 14.00, political news, markets; 15.00, women; 15.30, lec., Esperanto; 16.05, orch., 17.00, con., lec.; 18.25, lec., Engl. conv. (Tues. and Fri.), Spanish (Mon. and Thur.); 19.00, weather, con. or opera; 21.00, weather, markets, news; 21.50, news (in English), dance (not daily). Will shortly be increased to 5 kw.

Hanover, 296 m. (1½ kw.). Relay from Hamburg. Also own con., 16.00.

Königsberg, 463 m. (1½ kw.). 08.00, sacred con. (Sun.); 10.15, markets; 11.55, time sig., weather; 13.15 and 15.00, markets; 15.30, children (Tues., Wed., Sat.), orch.; 18.30, lec., Esperanto (Thurs., Sat.); 19.00, con. or opera; 20.00, orch., lec., weather, news, dance (Thurs., Sun.).

Leipzig, 454 m. (1¼ kw.). 07.30, sacred con. (Sun.); 10.00, educat. hour (Sun.); 11.00, markets, orch., time sig.; 15.00, markets; 15.30, orch., children (Wed.); 16.30, lec. (Tues.); 17.30, lec. (Tues.), experimenters (Wed. and Sat.); 18.00, lec.; 19.00, lec. (irr.); 19.15, con. or opera, weather, news; 21.00, con. (not daily). Will shortly be increased to 5 kw.

Münich, 485 m. (1½ kw.). 10.30, lec., con.; 13.00, news, weather, time sig., snow forecast; 14.00, con., lec. (Sun.); 15.30, orch. (16.00 Sun.), children (Wed.); 17.00, agric. talk (Mon.), con.; 18.00, lec., Engl. (Mon. and Fri.), Italian (Tues.), Russian (Sat.), Esperanto (Thurs.); 19.30, con.; 20.30, news, weather, time sig.; 21.00, late con. (Sun.), lec. (Tues.), dance (Sat.).

Munster, 410 m. (1½ kw.). 11.00, sacred con., news (Sun.); 11.30, news (other days); 11.55, time sig.; 14.30, markets; 15.30, children (Sun.), lec. (weekdays); 18.40, weather, lec., time sig.; 19.20, women, con. or opera, news, dance (Sat.); 21.00, English, Spanish or Esperanto, news, dance (Sat.).

Nuremberg, 340 m. (800 w.). Relay from Munich.

Stuttgart, 443 m. (1½ kw.). 06.30, time sig., weather (weekdays); 10.30, con. (Sun.); 15.00, time sig., con., news (Sun), children (Sat.); 16.45, children (Wed.); 18.30, lec. (weekdays); 19.00, con. (daily); 20.15, time sig.; 22.00, weather, news, dance (Sun.).

FINLAND.

Haelsinkki, 400 m. (temporary w.l.). Testing daily.

HOLLAND.

Amsterdam (PCFF), 2,000 m. (1 kw.). Daily: 07.55-16.10 (exc. Mon. and Sat., when 10.10-11.10), news, Stock Ex., time sig., 09.55 and 16.10. (PX9) (400 w.), 1,050 m.: con., 20.40, con. or organ recital (Mon.).

Hilversum (HDO), 1,060 m. (2½ kw.). 17.40, children (Mon.); 19.40, lec. (Fri.); 19.40, con. (Sun.), relay of Mendelberg orch. (Thurs.); con. (Sun.); 19.55, Radio talk (Wed.); 21.40, lec. (Sun.).

Vossegat (Bé), 1,050 m. 12.10 and 19.40, weather.

Soesterberg, 1,050 m. 19.26, weather.

Bloemendaal, about 200 m. 09.40 and 16.40, sacred service (Sun.).

HUNGARY.

Buda-Pesth. New broadcasting station will be opened in March.

ITALY.

Rome (1RO), 425 m. (2½ kw.). Week-days: 16.00, orch., Stock Ex.; 19.30, time sig., news, con.; 20.15, news, Stock Ex., con.; 21.10, dance; 21.20, news, weather. Sundays: 09.30, sacred con.; 15.45, children, Stock Ex.; 16.15, orch. (relayed from Hôtel di Russia); 16.45, jazz band; 19.35, con.; 21.30, dance.

Milan, 650 m. (temp. W.L.). Testing shortly.

JUGO-SLAVIA.

Belgrade, 1,650 m. (2 kw.). 17.30, con.,

(*Concluded on page* 374)

"BROADCAST TELEPHONY" (*cont. from page 372*)

news, weather (Tues., Thurs., Sat.), weather, news only (Mon., Wed., Fri.).

NORWAY.

Christiania, 340 m. (500 w.). Testing, daily, about 19.30.

PORTUGAL.

Lisbon (Aero-Lisboa), 375-410 m. 21.30, tests, music, speech (Wed. and Fri., irr.).

Montesanto (CTV), 2,450 m. (15 kw.). Tests, music (irr.); 13.00 and 23.00, weather.

RUSSIA.

Central Wireless Station, 1,450 m. Sundays: 12.45, lec.; 15.30, news; 16.15, con. Weekdays: 13.00, markets; 15.30, news or con.

Sokolniki Station, 1,010 m. Sundays: 09.00, lec.; 10.00, radio talk; 13.30, lec.; 14.30, con.; 17.00, lec. and con. (Tues., Thurs., Fri.).

Trades Union Council Station, 450 m. 17.00, con. (Mon., Wed.).

SPAIN.

Madrid (Radio-Iberica) (3 kw.), 392 m. 22.00, weather, Stock Ex., time sig., con., news; *La Libertad* con. (Tues. and Fri.). Sunday: 16.30, con. (irr.).

Barcelona (EAJ1), 325 m. 18.00, lec., Stock Ex. markets, con. or relay of opera; 20.30, news and con.

Seville (EAJ5), 350 m. 18.30, lec., con., news.

Bilbao (Radio-Vizcaya), 375/450 m. (W.L. not fixed yet). Testing shortly.

SWEDEN.

Stockholm (SASA), 430 m. (500 w.). Sundays: 09.55, sacred service; 16.00, children; 17.00, sacred service; 19.00, con.; 20.30, news, weather. Weekdays: 11.30, weather, Stock Ex., time sig. (11.55); 18.00, lec. (irr.); 19.00, con., lec., news, weather.

Gothenburg (SASB), 290 m. (500 w.), also 700 m. 10.00, fishery reports (700 m.); 11.55, time sig.; 19.00,* programme s.b. from Stockholm.

Malmoe (SASC), 270 m. 11.00, weather; 19.00,* programme s.b. from Stockholm.

Boden (SASE), 2,500 m. 18.00, con. (Tues., Fri., Sun.)—temp

* Local programmes are also broadcast at times.

Sundsvall (SASD), 680 m. (500 w.). To open about March.

Falun (SMZK). Tests. Occasional relay of 5XX.

SWITZERLAND.

Geneva (HB1), 1,100 m. (500 w.). 13.15, lec. No Sun. transmissions.

Lausanne (HB2), 850 m. (500 w.). 07.05, weather; 12.30, weather, markets, time sig., news; 16.00, children (Wed.); 17.55, weather, news; 20.15, con. (exc. Wed.), dance (Thurs. and Sat.).

Zurich (Höngg), 515 m. (W.L. not definitely fixed) (500 w.). 11.00, weather; 11.55, time sig., weather, news, Stock Ex.; 15.00, con.; 17.15, children (Mon., Wed., Fri.); 18.00, weather, news; 19.15, lec., con., dance (Fri.); 21.00, news. Sundays: 15.00 and 19.15, con., news, weather.

———

A rumour that in the near future the Glasgow station will depend almost entirely upon 2 L O for its programmes is officially denied. The tendency, on the contrary, for some time has been towards making Scotland more self-supporting in a broadcasting sense.

Seven people responded to an appeal broadcast recently for volunteers to undergo a blood transfusion operation required for a patient suffering from blood poisoning.

"Connecting Your Transformers"

SIR,—Your contributor, Mr. Gerald Whitley, in No. 138 does not enunciate any theory to support his statement that IS should be connected to the grid of the valve. I believe most experimenters advise interchanging IS and OS to find which operates the better.

Mr. Whitley appears to assume a flow of negative electrons from + to − and incidentally reversing the induced secondary current.

We have ample authority to be sure that there is an emission of negative electrons from the filament to the plate, and that the source of these electrons is the negative pole of the accumulator. We are told that this is equivalent to a current from + to −. In any case we are not much concerned with the direction in potential which sets up a corresponding variation of potential in the secondary of the transformer, thereby producing an alternating current. IS and OS are therefore rapidly alternating in potential and are alternately positive and negative.—E. B. (Leigh-on-Sea).

U.S.A. Without Aerial

SIR,—*Re* the reception of W G H, Tuckerton, U.S.A., without an aerial, reported by 2 A Y F in your issue of February 7, I would like to state that, if the reception referred to was in morse on about 110 metres, I can get this station any evening on a single valve without aerial or earth. Also I have logged as many as eleven U.S. amateurs in an evening using the same set.—2 A C K (Wales).

"What Your Condensers Do"

SIR,—In connection with the question "What Your Condensers Do," there is considerable evidence in favour of A. F. W.'s statement that oscillating currents do not pass through a condenser.

Siemens showed that the glass of a Leyden jar is sensibly warmed after being charged and discharged several times rapidly. If we picture to ourselves what most probably happens when, as A. F. W. says, the current stops short at the condenser plate the functioning of a condenser presents no difficulty.

The current—that is, the flow of electrons stops, obviously because it cannot get through the dielectric, but in doing so it delivers a shock, there is an impact, and as the result of which a portion of the energy or E.M.F. of the electron stream is delivered up to the dielectric, and, further, there is a change in momentum of the current. Now the molecules, of which the dielectric is composed, are perfectly elastic, and so it does not strain our imagination unduly when we consider the whole molecular mass to be pushed on one side an infinitesimally small degree; immediately there is the recoil, and could we observe the dielectric closely enough, it would, I think, be seen to vibrate, its period of vibration being of the same order as the frequency of the current. While this is happening on one side of the dielectric something must be happening on the other. What we observe is an oscillating flow of current exactly similar to the inflowing current. With the impact a portion of the energy is given up to the dielectric, and this must make itself manifest in some way; it does so by increasing the velocity of the molecules of the dielectric, and so we observe a heat effect.—C. G. P. (Weston-super-Mare).

"Seeing Music"

SIR,—I am glad to see that someone has pointed out the fallacy of "Thermion's" remark about his milliammeter needle.

If his milliammeter needle dips on loud signals he wants more negative grid bias or less H.T., and if it rises he is using too much negative grid bias or too little H.T.—F. G. S. (Theydon Bois).

SIR,—With reference to the letter from C. E. W. (Parkstone) in No. 141 of "A.W.," may I say that in the note which I wrote about seeing music by means of the milliammeter I omitted to mention that the result was produced by cutting out temporarily the grid-bias battery? The milliammeter is, as a matter of fact, most useful for assisting one to obtain the correct amount of negative bias on the grids of the note magnifiers, for when the proper potential is applied its needle remains stationary.—THERMION.

African Broadcasting Stations

SIR,—Please allow me to draw your attention to an error in the Supplement issued with No. 132. African stations are as follows:

Station	*Wavelength*	*Call Sign*
Cape Town	375 metres	Cape Town Calling
Durban	400 ,,	Durban Calling
Johannesburg	400 ,,	J.B.
Grahamstown	Being Erected	

Durban (V N D), 600 metres, and Walfish Bay (V N V), 600 metres, are not broadcasting stations.

On January 27 at 9 p.m. the Swedish cruiser *Fylgia,* which had left here on Monday, transmitted some music played by their band; this was sent out on a wavelength of 1,000 metres (ordinary carbon microphone being used). This was picked up by the broadcasting station here and relayed. The items were very clear, although spoilt a bit by atmospherics. The *Fylgia* was 230 miles out at sea.—D. C. (Cape Town).

5 X X and Radio-Paris

SIR,—After reading the letter from Capt. Eckersley which you published I was surprised. I cannot understand anyone in this district having difficulty in separating

(*Continued on page 378*)

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The WOODHALL No. 1 Variometer.

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The coupling between Rotor and internally wound Stator is closer than in any other Variometer. The spindle has a *metal* bearing. All connections internal; two terminals; one-hole fixing.
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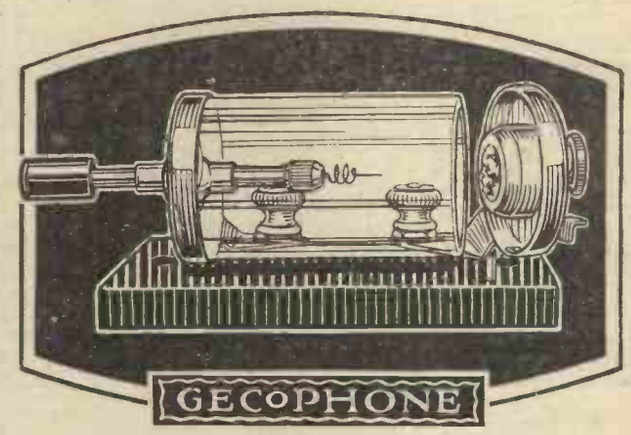

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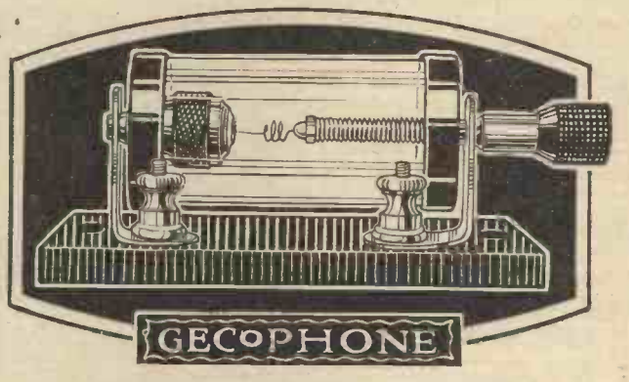

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THE MIC-MET SUPER CRYSTAL DETECTOR **6/-**

MANSBRIDGE Fixed Condensers

Octopus Tested at 350 volts D.C.		TCC Green	
.01	2/3	2 mfd.	4/8
.25	3/-	1 mfd.	3/11
1 mfd.....	3/3	.25 ...	3/6
2 mfd.....	4/3	Post free.	

N and K Latest model Stamped N and K

4,000 ohms 17/6
(Price U.S.A. £2)
Limited number old model Stamped N & K, post 6d. 12/11

BRETWOOD

Valve Holder..... 1/9
100 p.c. Efficiency Eliminates poor reception. No soldering stop over or under panel.

"UTILITY" SWITCHES

2 Pole c/o Knob 4/-
2 Pole c/o Lever 5/-
4 Pole c/o Knob 6/-
4 Pole c/o Lever 7/6
Post 3d. each.

DETECTORS (Enclosed)

Micrometer 2/6
Nickel, Large 2/6
Brass ,, ... 2/-
Burndept 4/6
Mic. Met. 6/-

HEADPHONES

BROWN'S FEATHERWEIGHT

4,000 ohms 20/-

ERICSSON E. V. CONTINENTAL.

Your Favourite 'phones. Entirely NEW MODEL. Most beautifully finished, exquisite tone. Ridiculous Price, per pair (4000 ohms) **13/11**

BRUNET

New Model "TYPE D." Hygienic Horn Headbands. Nickel-plated Stirrup. Black and White Cord. Each receiver stamped with trade mark. 4000 ohms. per pair 16/6

TELEFUNKEN TYPE

So near to Originals. You can scarcely tell the difference except not adjustable. 4000 ohms. Pair 10/9

GENUINE "BRUNET" L.F. TRANSFORMERS

Shrouded type
Ratio 5-1 5,000 Primary
25,000 Secondary
13/6 Post Free
3 to 1 Ratio can be obtained.

THORPE K 4 5 PIN VALVE

For Unidyne Circuit
Post free.....17/6
5 Pin holder 1/3

SUPER L.F. (5-1) TRANSFORMER

Windings have insulated layers of 6 sections each, wonderful for amplification. Made in France, by the World's foremost firm.
SPECIAL PRICE 10/-

PERFECT RHEOSTATS

Shipton New Type Strip Rheostat, 7 ohms (with fuse) 3/-
Shipton New Type Strip Rheostat, 30 ohms..... 3/-
Shipton New Type Strip Rheostat, 60 ohms 3/-
Shipton Potentiometer, 600 ohms 4/6

D.C.C. DUPLEX Reactone Coils

Set of 5 ..... 3/-
Chelmsford 1/9
Ledion Coils, set of 5 ... 2/3
Chelmsford 1/6

H.T.C. VALVE HOLDERS

Under panel 1/6
Over panel 1/9
Now Stocked

£50 REWARD!
given if the
DR. NESPER
PHONES SOLD HERE ARE NOT GENUINE! BEWARE OF FRAUDULENT IMITATIONS!!
(Injunctions obtained)
Adjustable diaphragm, detachable receivers, double leather-covered head-springs long flexible cords, nickel plated parts. Very comfortable fitting to the head. Per Pair, 12/11, Post 3d. pair

Brandes Matched Tone, 4,000 ohms 20/-
B.T.H. 4,000 ohms 20/-
Siemens 4,000 ohms 20/-
Sterling 4,000 ohms ...25/-
G.R.C. 4,000 ohms 20/-

TELEFUNKEN (GENUINE). Adjustable. 4000 ohms. Price 17/11

RAYMOND

Light as a feather 4,000 ohm phones, post free 8/11

STERLING Square Law and Vernier VARIABLE CONDENSERS

.001 .....30/6
.0005 .....25/6
.00025 .....23/6

"FINSTON" FIXED CONDENSERS

Wonderful line.
.001 to .0005 ..... 1/3
.002 to .006..... 2/1

"FINSTON" Filament Rheostat with dial 2/-

QUALITY (GOSWELL) RADIO COILS

Far more efficient than honeycomb or any other type of coil. Exceedingly strong and rigid, mounted on standard ebonite plugs. Brown finish, no wax or shellac used. MOUNTED

25	...	1/6
35	...	1/9
50	...	2/0
75	...	2/3
100	...	2/9
150	...	3/0
175	...	3/6
200	...	3/9

Post 3d. Coil

MANSBRIDGE CONDENSERS

Octopus, Tested at 350v D.C.

		T.C.C.	
.01	2/3		
.25	3/-	2 mfd.	4/8
1 mfd.	3/3	1 mfd.	3/11
2 mfd.	4/3	.25	3/6

Post 2d. each.

"WONDER" Aerial Wire

49 Strands Special Alloy Phosphor Bronze.
For Frame, Indoor, or Outdoor Aerial.
100 feet. 3/6 Post 2d.

ACCUMULATORS FOR CALLERS ONLY at present.

Rheostat, with Dial, extra value, 2/-

Bretwood Valve-holder 1/9

Manchester "Powquip" 15/6

Ormond 14/6

Shrouded "Powquip," 18/-

Standard "Powquip," 14/6

"R.I." NEW MODEL IN SEALED BOX

Don't Buy Otherwise, Post **25/-** Free

FERRANTI L.F. BETTER THAN THE BEST 17/6

IMPORTANT NOTICE

TRADE COUNTER OPEN
will oblige you with any lines in stock, less 20% on Proprietary articles.
NO POST ORDERS TRADE.

EBONITE PANELS

3-16 in.			
3×6 ...	1/8	10× 8 ...	2/6
7×5 ...	1/8	12× 9 ...	5/-
9×6 ...	2/6	12×12 ...	5/9
9×6 ...	2/9	14×10 ...	5/9

CRITERION CONCERT COILS.

Low Self Capacity. Every turn and layer airspaced. Perfect for Reaction. Mounted on Plug.

25 ...	2/-	75 ...	2/9
35 ...	2/3	100 ...	3/-
50 ...	2/6		

SET OF 5 (25, 35, 50, 75, 100) 10/- Post 3d.

RIGHT OPPOSITE
DALY'S
GALLERY DOOR

K. RAYMOND
WIRELESS DEPOT
27, LISLE STREET, W.C.2
'PHONE: GERRARD 4637

No responsibility accepted on post orders unless cheques and postal orders are crossed and made payable to the firm. Moneys sent must be registered

HOURS OF BUSINESS:
DAILY - - 1 to 7.45
SUNDAYS - 10 to 1

HULLO EVERYBODY!!

RAYMOND VARIABLE CONDENSERS

SQUARE LAW

One-hole fixing. Ebonite Bushes. Aluminium ends. Highly recommended.

PRICES include KNOB and DIAL.

Post Cd. Set

WITH VERNIER

.001	8/9
.0005	7/9
.0003	7/-

Ebonite ends 1/- extra.

WITHOUT VERNIER

.001	7/7
.0005	5/9
.0003	5/3

Ebonite ends 1/- extra.

DE LUXE ORDINARY

Complete with Knob and Dial.

.001	alum. ends	6/11
.0005	,, ,,	5/6
.0003	,, ,,	4/11
.0002	,, ,,	4/6

Post, 3d. set.

TWIN CONDENSERS

Equal Parts of .0005, .0003 and .00025.

With Knob and Dial.

.0005	Ebonite Ends	18/11
.0003	,, ,,	12/6
.00025	,, ,,	12/6

LONDON'S LARGEST Stockist of JACKSON BROS.'

"J.B." VARIABLE CONDENSERS

Complete with Knob and Dial.

SQUARE LAW		STANDARD	
.001 ...	9/6	.001 ...	8/6
.0005 ...	8/-	.0005 ...	7/-
.0003 ...	6/9	.0003 ...	5/9
.0002 ...	5/6	.0002 ...	5/-

Other sizes as advertised by "J.B." Post, 4d.

CALLERS! THESE 4 COLUMNS FOR YOU NO POST ORDERS FROM SAME

Warning! Note name RAYMOND on windows. You will not be able to buy these goods otherwise. Nearest Tube Leicester Square. This address is at the back of Daly's Theatre. Open Weekdays 9 to 8, Saturdays 9 to 8.45, Sundays 10 to 1.

ACCUMULATORS

2 v. 40 amps.	9/6
4 v. 40 amps.	16/6
4 v. 60 amps.	18/6
4 v. 80 amps.	23/6
6 v. 60 amps.	27/6
6 v. 80 amps.	33/-
6 v. 105 amps.	38/6

Hart's Stocked. All High Quality.

EBONITE, 3/16 in.

Stock Sizes.

Cut to size ½d. sq. in.	
6 × 6	1/4
7 × 5	1/4
8 × 6	1/10
9 × 6	2/-
10 × 8	3/-
12 ... 6	3/-
12 × 9	4/3
12 × 12	5/6
14 × 10	5/6

¼ in. also Stocked.

Switch Arm, 12 Studs, 12 Nuts, 12 Washers. Lot 10½d.

HART'S ACCUMULATORS

special purchase

4 v. 40 amps. 17/11

100 only

WEDGE COIL PLUGS

Fitted Fibre	7d.
Various	7d., 8d., 9d.
Edison Bell	11d.
Plaincoil Plugs	4½d.
Also 5d., 6d., 7d. each.	
Fibre Strip	2d.

(36 in. by 1 in.).

Emoire Tape, doz. yds. 6d.

RAYMOND FIXED CONDENSERS

.001, .0001 to .0005 ... 10d.
.002, .003, .004 ... 1/-
.006, 1/3; .01, 1/9; .02, 1-9
Ebonite Base Terminals.

DETECTORS

(Enclosed).

Micrometer	1/6
Half Opal	1/-
Small Brass	8d.
Large Brass	1-/, 1/3
Nickel	10d. to 1/6
Burndept	4/-

CRYSTALS STOCKED

Blue Tungstalite, Permanite, Shaw's Genuine Hertzite ... 10d.
Uralium ... 1/-
All known makes.
4 Whiskers (1 gold) ... 2d.
Gold and Silver do. 2d.
7 Waxed Coils ... 1/8
5 Waxless Coils ... 1/3
For B.B.C.

SPECIAL!

Vernier 2-way Coil Stands ... 3/6
Geared do. ... 5/3

BOXES from 1/11

7 × 5 9 × 6 12 × 9 14 × 10
8 × 6 10 × 8 12 × 10 etc.

H.T. BATTERIES

60 v. H.T. ... 5/11

Very Special Value

B.B.C. H.T. 60 v. ... 8/11
B.B.C. H.T. 36 v. ... 5/6
B.B.C. Grid bias 9 v. 2/3
Ever Ready, Siemens, 36 v., 66 v., 108 v.
Also Flag, etc., 1.5

D.C.C. WIRE ¼ lb.

18 swg.	9d.
20 ,,	9d.
22 ,,	10d.
24 ,,	11d.
26 ,,	1/-
28 ,,	1/2
16 D.C.C. ... per lb.	2/6

CHELMSFORD COILS, 11d.

Also at 1/-, 1/3, 1/6
Duplex set of 5
Extra air space
25, 35, 50, 75, 100 per set 1/9

LEGLESS VALVE HOLDERS

Solid Rod Holders ...	1/-
Murray Holders ...	1/3
H.T.C. ...	1/6 and 1/9
Valve Templates ...	1½d.

SHAW'S HERTZITE

only genuine if in sealed box with signature ... 10d.

COLVERN VERNIER 2/6

Do. Neutrodyne ...	3/6
Ormond Neutrodyne	2/-

CRYSTAL SETS

Fine Value

Re-echo set ...	13/11
Brownie sets ...	7/6
"Rodeo" sets ...	7/11

ORDERS TAKEN FOR BOXES

To your own sizes few days delivery

MANSBRIDGE 2 MFD. 4/3

Ditto 1 mfd. ...	3/6
Ditto .25 ...	2/9

Also cheaper make

500 FIXED CONDENSERS

Clearing at 4d.
Various capacities.

VARIOMETERS

Inside winding ...	6/11
Edison Bell ...	10/-
Igranic ...	10/-
Very good value ...	1/6

Many others

HEADPHONES

N & K Model 4000 ...	8/11
Telefunken Type ...	8/11
Lightweight ...	7/11
Dr. Nesper ...	11/9
Ericsson EV ...	11/9

SPECIAL!

Leatherette Boxes with Lid ... 2/3 and 2/11
Re-echo Crystal Sets 13/11

CALLERS SNIP

Square Law Variable Condensers

.0005 ... 5/-

.0003 ... 4/11

Complete with Knob and Dial

WARNING

Customers entering premises adjoining without seeing the name

RAYMOND

on windows, do so at their own risk.

VALVES

Dutch Detectors ...	4/9
"R" type ...	4/9
.06 Dutch ...	11/-
Phillips "R" ...	6/6
French "R" ...	5/11

RADIO MICRO .06 THE WONDER VALVE

H.T., L.T., or D.

3 volts ... 11/-

METAL .06

Be sure "METAL" is Stamped on Valve and avoid imitations.

One to each Customer at **10/-**

ALL VALVES REDUCED

Marconi, Ediswan, Mullard, Cossor, Myers, etc.

VARIOMETERS

Very Special 290/650 metres. All ebonite. Double silk wound, callers only 4/-

TERMINALS (Complete)

W.O., Piller, 'Phone, brass, 1d. each; nickel, 2d. each; stop and valve Pins, ½d.; nuts, various, 6 a 1d.

Valve Sockets	1d., 1½d
Flush Panel do.	1d.
Spade Tags ...	6 a 1d.
Do. Terminals	2 for 1½d
Do. Pins	2 for 1½d.
Screws and nuts	2 a 1d.
Switch arms ...	7d.
Nickel arms ...	10½d.
Studs, complete	2 a 1d.
'Phone connectors	1d.
2 B.A. Rod ft. ...	2d.
4 B.A. Rod ft. ...	2d.
Valve windows ...	4d.
Washers ...	12 a 1d.
Shorting plug and socket ...	3½d
Shellac ...	5d.

H.F. TRANSFORMERS

For Chelmsford ... 2/9
For B.B.C. range ... 2/6
Energo, McMichael, Bowyer-Lowe stocked.

MANSBRIDGE FIXED T.T.C. GREEN

.25 ...	2/9
1 mfd. ...	3/6
2 mfd. ...	4/6

Var. gd. Leaks ...	1/-
Fixed 2 meg. ...	9d.
Battery Links	3 for 2d.
Ins. Hooks	2 for 1½d.
Egg Insulators ...	1d.
Reel ,,	2 for 1½d.
Ins. Staples ...	5 a 1d.
6 ft. 'phone cords	1/-1/3
Sleeving	3 yards 9d.
Tinned Copper 18 g.	5d.
⅛ Bus bar, bank	6d.
Knobs, 2 B.A. ...	2d
Wander Plugs ...	1½d.
Strip Aerial, 100 ft.	2/-
7/22 Heavy, 100 ft.	1/10

COIL STANDS

Ebonite 2-way ...	1/9
With ex. handles ...	2/3
Nickel ,, ...	2/8
3-way ...	from 3/11
Basket Holders ...	8½d.
Best quality ...	1/-
Basket Spikes ...	7d., 9d.
Anti cap. handles ...	9d.
Lead-in Tubes ...	6d.
Sorbo Ear Caps	pr. 1/3

2-col. Flex, 36 ft. ...	1/6
Lighting ,, ,, ...	1/6
Twin silk doz. yards	1/-
Lead-in, thick,	yd. 3d.
Do., good, 10 yds.	1/-

Rheostats, C. & S. ...	1/-
Ormond ...	1/9
Ebonite Former ...	1/6
With dial ...	1/11

Shipton, Igranic, Burndept, McMichael, etc.

SPECIAL!

Customers purchasing 20/- worth of our own goods (at full prices only) are allowed to buy a first-class pair of phones for 5/-, 4,000 ohms, as an advertisement. One pair to each customer. This offer must be taken advantage of at time of purchase.

VALVES for UNIDYNE CIRCUIT, 11/-

SPECIAL LINE IN L.F. TRANSFORMERS FRENCH 7/11

RIGHT OPPOSITE **DALY'S** GALLERY DOOR

K. RAYMOND

WIRELESS DEPOT

27, LISLE STREET, W.C.2

'PHONE: GERRARD 4637

No responsibility accepted on post orders unless cheques and postal orders are crossed and made payable to the firm. Moneys sent must be registered

HOURS OF BUSINESS:

DAILY - - 9 to 7.45

SUNDAYS - 10 to 1

CORRESPONDENCE (continued from page 374)

5 X X and Radio-Paris. Perhaps in the south conditions differ considerably.

Here I can easily tune out 5 X X when receiving Paris, although Chelmsford is considerably louder.

My set is a plain "straight four" (one H.F., detector, two L.F.), home-made and somewhat crude, and the aerial is of the crow's-nest type. I may say that this type of aerial appears to be quite as efficient as the ordinary P.M.G. pattern, and I think if many people realised this there would be many more in use. I have received several American stations on mine on three valves only.—G. M. H. (Saltburn).

Other Correspondence Summarised

C. W. K. (Hants) has received K D K A, W G Y, Radio-Paris, L'Ecole Supérieure, Radio-Iberica and all B.B.C. stations on his one-valve set.

C. P. (Norfolk) has received a French station and K D K A on his two-valve receiver made from instructions given in No. 127.

W. S. W. (Shepherd's Bush) can receive K D K A any evening on his two-valve Reinartz receiver made from instructions given in No. 127.

R. A. B. (Derbyshire), referring to the recent discussion on the merits of H.F. amplification, states that he received W B Z on his two-valve receiver (detector and L.F.) with an extra L.F. when required.

DEATH OF Mr. OLIVER HEAVISIDE, F.R.S.

THE originator of that elusive conception known as the "Heaviside layer" died recently in Torquay at the age of seventy-four. Although a Fellow of the Royal Society, a Faraday medallist of the Institute of Electrical Engineers, and the holder of various honorary degrees and other distinctions, Mr. Heaviside for many years lived in absolute seclusion, wholly indifferent to the outside world and to the astounding progress of the science in which his name will long be honoured as a pioneer.

At the early age of twenty-four he abandoned a commercial career in order to devote himself to mathematical research, being especially attracted by the brilliant work of Clerk Maxwell on the fundamental phenomena of electromagnetic induction. In collaboration with Laurenz he succeeded in throwing the Clerk Maxwell equations into a more easily-handled form by employing an ingenious substitution, now known as the Heaviside-Laurenz unit.

At a time when eminent authorities denied the possibility of long-range wireless transmission, affirming that the ether waves would spread outwards in all directions and be lost in interstellar space, Heaviside insisted strongly to the contrary. He maintained that the semi-conductive surface of land and sea would "bind" the ether waves in much the same way as a metallic conductor binds and guides a high-frequency current.

In particular he suggested the probable existence of an upper conductive layer, formed of ionised air and located some thirty or forty miles high—at the extreme verge of the atmosphere. This he maintained would form an upper conductor or boundary supplementary to the lower conductor formed by the earth's surface. The ether waves would be confined to the zone between the two, and would thus be restrained from straying outwards into the farthermost spaces.

Subsequent research has fully corroborated these intelligent anticipations, and has shown that the existence of the Heaviside layer provides an essential clue to much that would otherwise be inexplicable in the "mechanism" (and irregularities) of wireless transmission and reception.

Mr. Heaviside's career presents a typical example of unrewarded genius. After long and arduous labours in the difficult field of abstruse mathematics, he presented the fruits of his genius to the world at large, leaving the financial harvest to be reaped by others. B. A. R.

So extensive have been the thefts of apparatus, cable, etc., of late by wireless enthusiasts from Post Office manholes that the attention of the police has been drawn specially to the matter.

REDUCED PRICE

25/-

Carriage Paid, ready for mounting.

Clearer Speech and Music

with the

M-L TWIN-COIL L.F. INTER VALVE TRANSFORMER

ONE amateur enthusiast writes: "Your transformers are definitely superior in quality of production of speech and music." Another says: "The greatly improved reception since fitting these transformers is indeed amazing."

These opinions, arriving daily, confirm our own tests. With the M-L transformer you get both speech and music clearer. There is a complete absence of distortion, greater amplification and a longer range.

Stoutly built and well finished, it is dust and damp proof. The coils are completely enclosed. Insulation has received special attention, and there is no danger of burning out. Primary to secondary ratio, 1—4.

To get the best from your set use an M-L transformer.

The M-L ANODE CONVERTER

A PERMANENT substitute for the high-tension battery. Ideal for power amplifier work. Worked from the ordinary 6-volt accumulator, the consumption is low — 1.15 amperes. Perfectly smooth reception. Continuous adjustment of H.T. voltage and not by steps.

Supplied in the following standard voltage ranges:

Type B 6–120 volts **£11 5 0** } For two stage power amplification

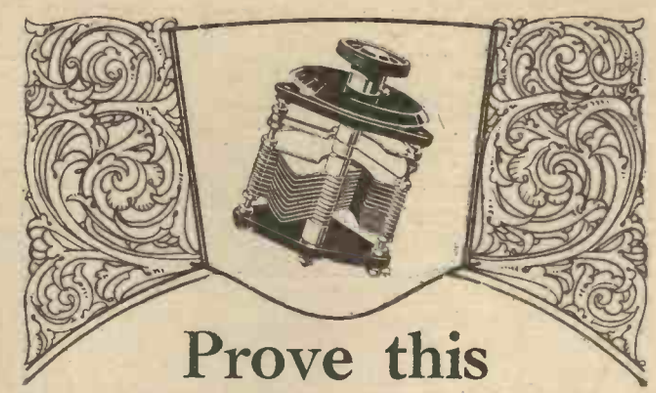
Type C 12-300 volts **£13 10 0** } For two stage power amplification

Type D 12-500 volts **£18 0 0** } For low power transmission work.

We invite applications from traders for terms. Write for details.

The M-L Magneto Synd., Ltd., Wireless Dept., Victoria Works, Coventry.

M-L



Prove this by your own knowledge

The reasoning behind the Bowyer-Lowe Square-Law Condenser is so conclusive that it convinces every experimenter who follows it.

Your own experience tells you that the wavelength range of a Condenser depends on its capacity ratio; that is the ratio between its maximum and minimum capacity. Reduce the minimum capacity and up goes the ratio.

Now, the fixed plates of the Bowyer-Lowe Square-Law Condenser present so little edge to the moving plates in the minimum position that the capacity ratio is equal to 150 to 1, the highest in wireless. You know, too, that low losses make for richness and purity of reception. See how losses are reduced to a minimum in the Bowyer-Lowe Square-Law Condenser through the use of grade "A" Ebonite, careful designs and scrupulous manufacturing methods. These things MUST result in better reception.

You understand how the square law effect makes a set selective and easy to calibrate. The Bowyer-Lowe Square-Law Condenser is NO larger than ordinary condensers. You can fit it in your sets without altering them in any way. Therefore by installing this condenser you must be able to increase the efficiency of any set.

The Bowyer-Lowe Square-Law is the ONLY Condenser which obtains the square law effect with INCREASED selectivity and REDUCED losses. Insist on having it in every receiver you make.

All good dealers sell them at prices from 11/6.

Bowyer-Lowe Tested SQUARE-LAW CONDENSERS

For best results use Bowyer-Lowe Condensers in conjunction with Bowyer-Lowe MATCHED H.F. Transformers. Every one is guaranteed to match perfectly every other in the same range. All ranges and Neutrodyne model at uniform price of 7/-.

Write for our FREE Catalogue

containing 36 pp. of information about all the Bowyer-Lowe Tested Components with blanks for your notes. Send 1½d. stamp to cover postage.

Bowyer-Lowe Tested Radio Components

BOWYER-LOWE Co., LTD., LETCHWORTH.

WIRELESS IN PARLIAMENT

From Our Own Correspondent.

MR. GROVES and Lt.-Col. Dalrymple White suggested, in the House of Commons last week, that the Postmaster-General might well consider the introduction of a regulation that corks, or other devices, as used on army aerials, be used on wireless aerials to warn or deter birds from contact.

Sir Wm. Mitchell-Thomson, however, said that he had at present no evidence of the extent to which injury was caused to pigeons through collision with wireless aerials, but he had asked the National Homing Union to furnish him with information on the subject. When he received it he would consider whether he could with advantage take any action on the matter.

In reply to a further question on the same subject by Brig.-Genl. Meakins, Sir Wm. Mitchell-Thomson said that ten representations with respect to the destruction of racing pigeons by broadcasting wires had been received by the Post Office and one by the British Broadcasting Co. There were about 1,200,000 wireless licences in existence, and the number of outdoor aerials was estimated to be more than a million.

Mr. T. Henderson asked the Postmaster-General whether he was aware that on July 1, 1924, the cost of wireless licences was reduced from 15s. to 10s., and that great dissatisfaction existed owing to the refusal of his department to grant a rebate to licence-holders who had been charged the higher rate; and would he give this matter further consideration?

Sir Wm. Mitchell-Thomson said that under the wireless licensing system in force before July 1 last two types of licence were issued, one at 15s. and the other at 10s., the latter containing certain restrictions on the apparatus that might be used. A uniform type of licence at 10s. was introduced on July 1 by agreement with the British Broadcasting Co. Refundment as proposed would not be practicable under the financial provisions of the agreement between the Post Office and the British Broadcasting Co.

We regret that owing to pressure on our space the instalments of the "Extensible Unit Set" and "Experimental Transmission" have had to be held over.

TRADE NOTES AND CATALOGUES

FROM Craik and Smith, Allen Street, E.C.1, we have received an interesting catalogue of wireless goods.

An interesting catalogue of wireless generators has been sent us by Evershed and Vignoles, Ltd., Acton Lane Works, Chiswick, W.4.

This well-illustrated booklet contains full details of hand- and motor-driven generators for supplying the H.T. necessary for transmission, and, in addition, a number of practical circuit diagrams a number of practical circuit diagrams are given showing the use of these generators.

Generators of the type described in the catalogue have been supplied to the Air Force for emergency signalling work on aeroplanes.

CHIEF EVENTS OF THE WEEK

SUNDAY, March 1

London and 5 X X	3.0	St. David's Day Programme.
London and 5 X X	9.0	De Groot and the Piccadilly Orchestra.
Birmingham	3.0	Light Classical Programme.
Bournemouth	9.0	J. H. Squire Celeste Octet.
Cardiff	8.15	Welsh Service, Conducted by the Arch Druid.
Manchester	3.0	Welsh Programme.
Newcastle	7.30	Philharmonic Concert.

MONDAY

Birmingham	7.35	Music and Plays.
Bournemouth	7.35	"England, Ireland, Scotland and Wales."
Manchester	7.35	Symphony Concert.
Aberdeen	8.0	An Hour of Poetry and Fairy Music.
Glasgow	7.35	*The Heart of Midlothian.*
Belfast	7.35	Songs and Folk Music.

TUESDAY

5 X X	7.30	Excerpts from Shakespeare.
ALL STATIONS except 5 X X	7.30	"The Sea."
ALL STATIONS except 5 X X	10.0	"The Country."

WEDNESDAY

London and 5 X X	7.30	Sullivan Programme.
Birmingham	7.30	A Jubilee Celebration and Ballads.
Bournemouth	7.30	Winter Gardens Evening.
Cardiff	7.30	Symphony Concert Relayed from Bristol.
Newcastle	7.30	Selections from Opera.
Belfast	7.30	Symphony Concert.

THURSDAY

London	7.35	Chamber Music Evening.
Manchester and 5 X X	7.35	The Halle Orchestra.
Newcastle	7.35	"A Night in Hawaii."
Glasgow	7.35	Border Scenes.
Belfast	7.35	Musical Comedy Night.

FRIDAY

London and 5 X X	7.30	Italian Night.
Bournemouth	7.30	British and French Music.
Cardiff	7.30	"Voices from the Void."
Manchester	7.30	Concert relayed from Houldsworth Hall.
Glasgow	7.30	Birthday Programme.

SATURDAY

London and 5 X X	7.30	Popular Operatic Evening.
Birmingham	7.30	The Opera, *Faust.*
Cardiff	7.30	"Dancing Round the World."
Manchester	7.30	"A Night in Hawaii."
Glasgow and 5 X X	7.30	Ballad Concert.

Dublin Wireless Club

A MEETING was held on January 22, when Mr. H. J. McCann, B.L., presided, and a loud-speaker demonstration was given.

Coventry and District Co-operative Radio Society

Hon. Sec.—MR. A. CURTIS, 35, Berkeley Road, Earlsdon, Coventry.

ON January 21 a very successful "junk" sale was held, when a large assortment of useful components found ready buyers. Mr. Burt, the society's librarian, acted as auctioneer.

Kensington Radio Society

Hon. Sec.—MR. H. JOHNSON, 36, Cromwell Grove, W.6.

THE fourth annual meeting took place on January 15, when the president, Mr. Reeves, was in the chair. The treasurer's and secretary's reports were read and approved, and various suggestions were put forward to make the monthly and informal meetings more attractive than at present.

Beckenham and District Radio Society

Hon. Sec.—MR. H. WEST, 3; Manor View, Beckenham.

A WELL-ATTENDED lecture was given on January 22, when Mr. Partridge spoke on "Short-wave Transmission and Reception." The society propose to hold an exhibition and competition at an early date.

Preston and District Radio Research Society

Hon. Sec.—MR. R. CHARNLEY, 120, Lune Street, Preston.

ON January 22 a lecture was given by Mr. S. J. Holt, who dealt with many points in wireless reception. The lecture was preceded by a lesson in morse by Mr. F. Murray.

North Middlesex Wireless Club

Hon. Sec.—MR. H. A. GREEN, 100, Pellatt Grove, Wood Green, N.22.

THE club held its 157th meeting on January 21 at Shaftesbury Hall, Bowes Park, N, when Mr. A. S. Manders delivered a lecture on "A Low-loss Tuner."

Hackney and District Radio Society

Hon. Sec.—MR. G. E. SANDY, 114, Parnell Road, E.3.

ON January 19th a most successful dinner took place at the Elephant Hotel, Dalston, followed by a musical programme. On January 26 Mr. G. A. V. Sowter, B.Sc., talked on the technical aspects of crystal reception.

North Middlesex Wireless Club

Hon. Sec.—MR. H. A. GREEN, 100, Pellatt Grove, Wood Green, N. 22.

ON February 4 Mr. J. H. Forbes gave a lecture on "Supersonic Heterodyne Circuits," which was mainly devoted to an account of his own experience in operating such circuits.

ANNOUNCEMENTS

"Amateur Wireless and Electrics." Edited by Bernard E. Jones. Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. It will be sent post free to any part of the world—3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to the Proprietors, Cassell & Co., Ltd.

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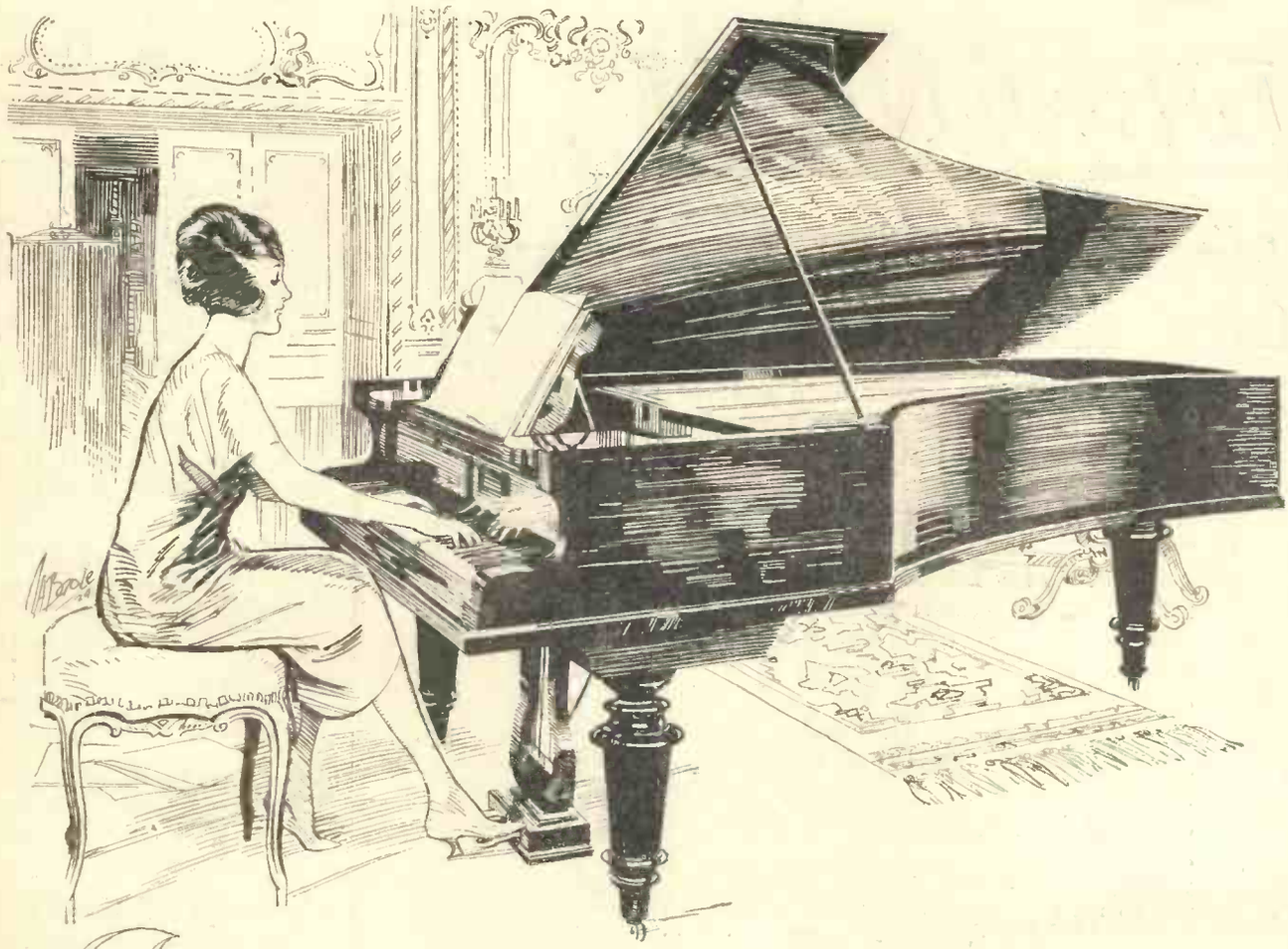

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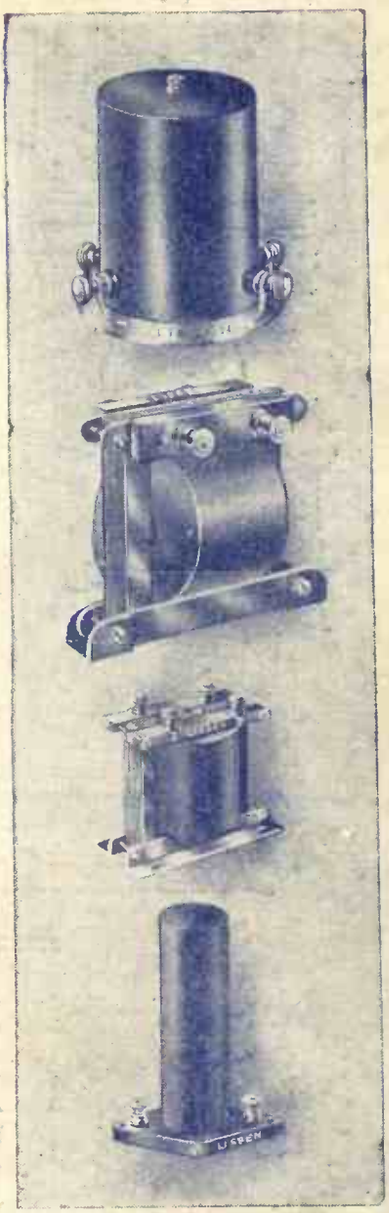

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