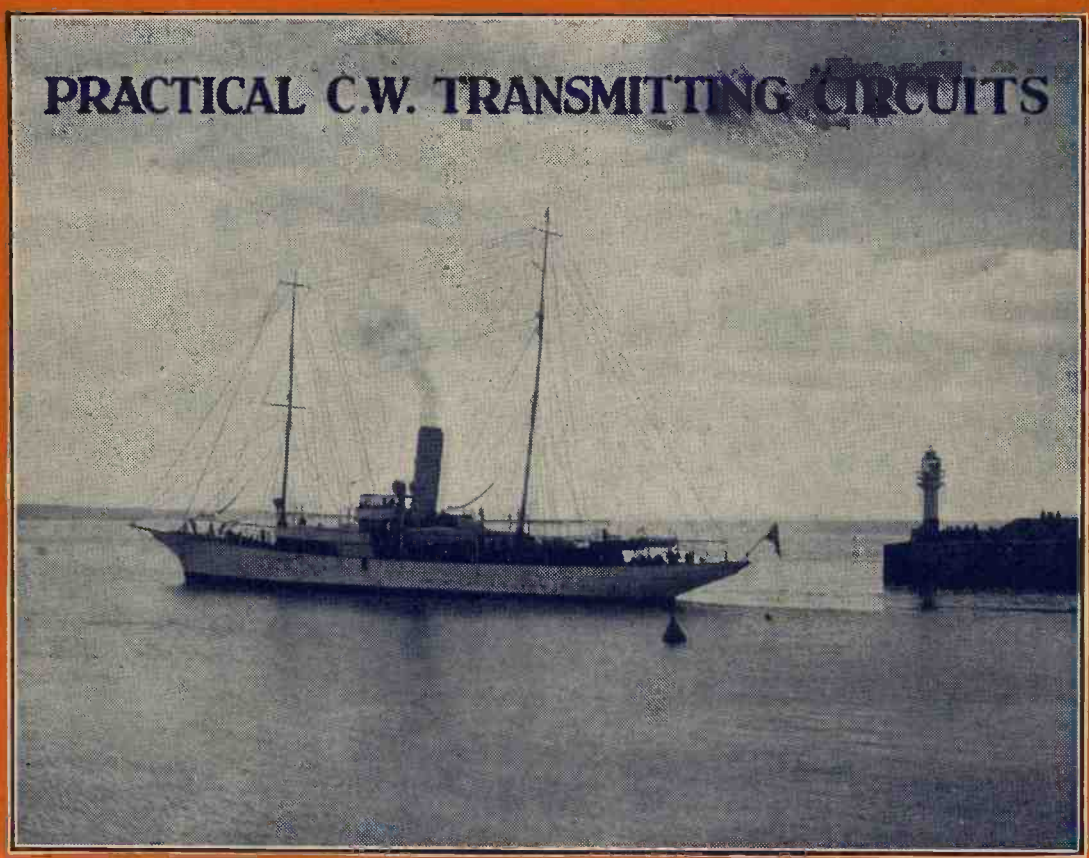
Wireless Weekly, 6d. Net. Wednesday May 6th, 1925

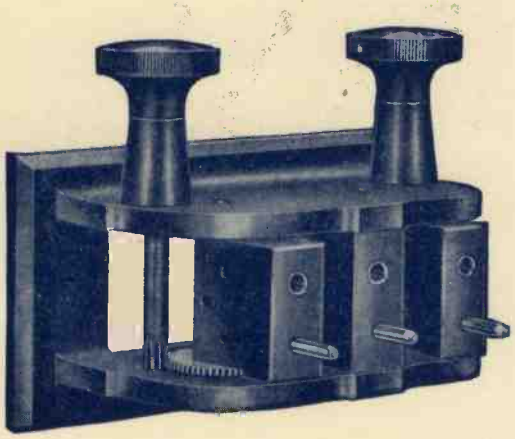
Wireless Weekly

Vol. 6. No. 5.

PRACTICAL C.W. TRANSMITTING CIRCUITS



REDUCED PRICES



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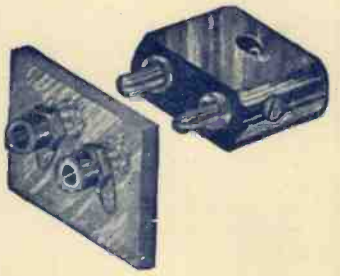

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EDITED BY JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

Some Geneva Problems

A FORTNIGHT ago we referred to the formation of the new Bureau at Geneva and indicated that there were many difficulties to be faced and overcome. The matter of interference between broadcasting stations is one of such importance and urgency that it is well to consider the matter in more detail than we were able to do at the time. As Capt. Eckersley pointed out in a recent technical talk broadcast from 2LO, a pair of low-power broadcasting stations situated at the extremes of the British Isles and working on wavelengths within a metre or so of one another, can set up a " beat-note " which will interfere with the reception of either of these stations, not only throughout the British Isles, but over large areas of the Continent. Whereas in this country the opening of a new broadcasting station only takes place after the question of interference between British wavelengths has been carefully considered, on the Continent new stations spring up with mushroom rapidity, and with very little regard to the mutual interference they may cause.

It might at first appear that all these matters could be simply adjusted by friendly agreement between the various administrations controlling the broadcasting stations. Actually, however, there is a bigger problem than this. We shall understand it better by considering what is happening in the United States. At the present time there are 564 broadcasting stations in operation. To these are allotted all wavelengths between limits, much in the way that in this country wavelengths between 300 and 500 metres are given up to broadcasting. If two stations are operated on wavelengths too close to one another, then interference will be set up which cannot be tuned out on any receiver. There must, therefore, be sufficient separation between any two stations to prevent such interference, and within the band allotted to broadcasting in the United States there are but one hundred different wavelengths possible if this freedom from interference is to be maintained. Of course, if the broadcasting stations are of low power and very widely separated from one another in distance, as is the case, for example, with a station in New York and another at San Francisco then we can increase the number of stations working without ill effect. In Europe, however, the various broadcasting stations are practically all within hearing of one another, and we have a severe limitation of number, which is going to prove the main difficulty of the future.

In America it has already been suggested that the broadcast band shall be extended below the present limit to 150 metres or so. It is possible that such suggestions will be put forward in Europe when, as a result of the conferences between the various administrations, the crowding to which we have referred and the wavelength limitations become more apparent. We earnestly hope that if such proposals are put forward and there is the slightest possibility of their coming into operation, the trade and the public generally will be advised in ample time, in view of the drastic changes which would be necessary in commercial broadcasting apparatus.

Another important aspect of the case relates to how close it is practicable to arrange wavelengths, apart from the question of the interference between two waves due to the beat-note effect referred to. At the present time it is generally considered that a minimum separation of 10 kilocycles is necessary to avoid beat-note interference. To be able to separate stations with only this difference between them, requires a receiver far more selective than the average one in use to-day. Here again a readjustment of wavelengths, even so as to avoid beat-note interference, should only be made after the most careful consideration of the many factors concerned.

CONTENTS.

Practical C.W. Transmitting Circuits for 200 Metres.

By DALLAS G. BOWER.

The Mullard 0/10 valve.

THE amateur designer of a continuous wave transmitting station has at his disposal two fundamental circuital arrangements which he may use, assuming that a valve or valves are to be his radio-frequency generator. Valve oscillators may be classed under two distinct headings:—Self-excited oscillators and "independent drive" oscillators. The first class of oscillator may be connected up in a variety of ways, using various circuital arrangements allowing greater ease of operation, flexibility, etc., but the fundamental principle of all the systems is the same.

Essentials

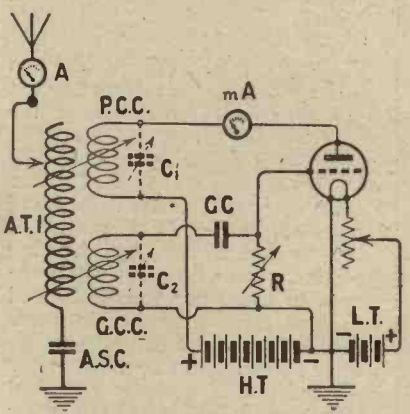
The basic essentials of a self-excited valve oscillator may be considered as a valve with a load in its output circuit with some means of coupling back a small portion of the power in the load circuit to the input circuit. As before mentioned, there are various methods of doing this, and the following information treats each circuit arrangement individually and the merits of each particular circuit are discussed.

Throughout the following information it is assumed that an auto-coupled output to aerial circuit is being used. A loose-coupled system may be used, and in many cases will be found a great asset in so far as ease of operation and steadiness of note are concerned. In order to operate a transmitter with a loose-coupled circuit, the closed or "tank" circuit should be adjusted first for correct wave-length setting and maximum H.F. current reading. The aerial circuit is then brought into operation, and as it is brought closer to resonance the aerial current will increase. When it is in resonance with the closed circuit the aerial current will be at a maximum for the particular degree of coupling employed.

Master Oscillator

It must be borne in mind that a good condenser should be used in the closed circuit, because it has to stand the full power generated by the valve without the load of the aerial while making preliminary adjustments.

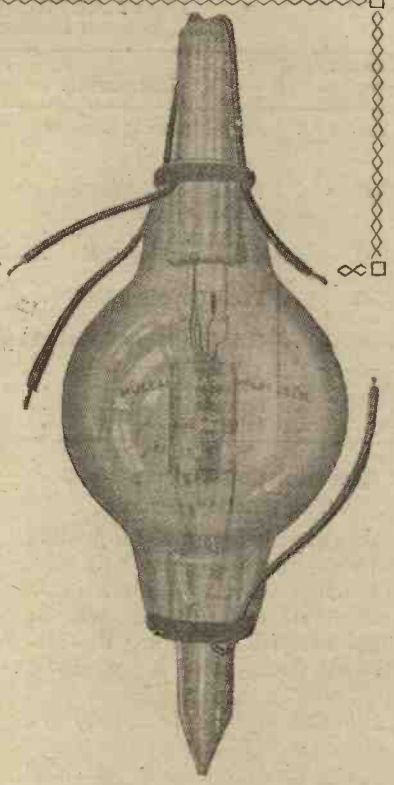
Before passing on to the various self-excited oscillators we must remember the "independent drive" or master-oscillator system. If perfect steadiness of note and ease of operation to the highest degree are required, this, if properly designed, is the ideal circuit. It has, without doubt, one distinct disadvantage from



Circuit No. 1.—The Meissner system.

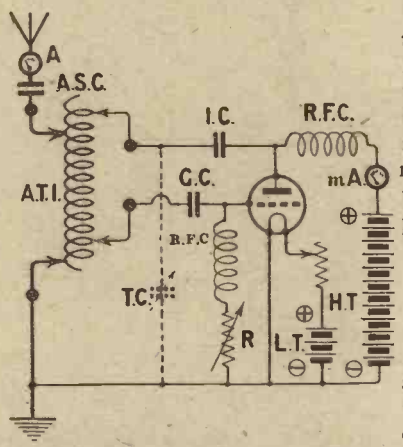
Mr. R. W. H. Bloxam, who, among others, has received signals from IXAM (John L. Reinartz, Connecticut) on a 20-metres wave-length during daylight.

The data given in this article will provide the transmitting amateur with material for a whole series of interesting experiments.



The Mullard 0/150 valve.

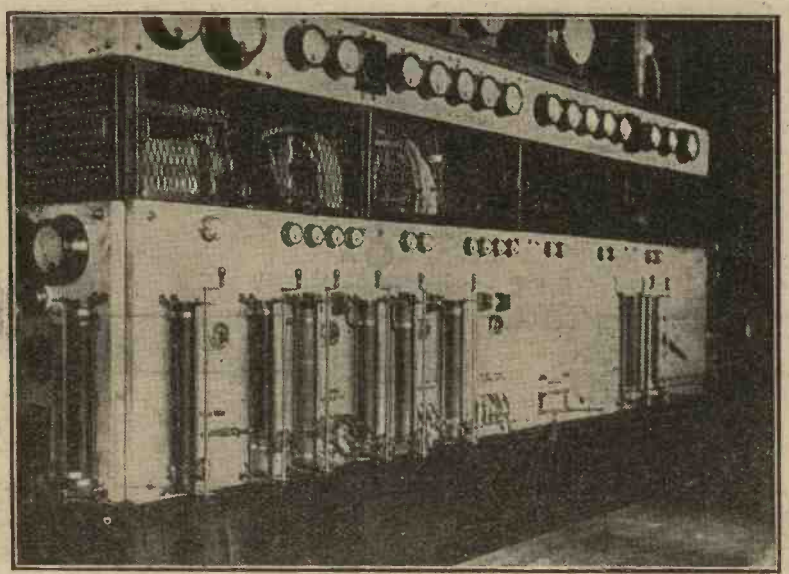
an amateur point of view, in so much as it requires an extra valve. To the wireless engineer this extra valve constitutes no objection, but to the amateur it may mean increased cost in his transmitter. The main power valve only acts as an amplifier and should be switched in after the oscillator has been adjusted to maximum efficiency. The tuning of such a transmitter is almost entirely dependent upon the oscillator circuit, and the aerial circuit adjustment will not appreciably affect the frequency of the transmission. It should simply be adjusted until maximum current is shown by the ammeter in the aerial circuit. As a last minor piece of information before passing on to the various circuits, remember that maximum aerial current does not necessarily mean maximum radiation in watts. This has been explained by Mr. Percy W. Harris in *Wireless Weekly*.



Circuit No. 2.—The Hartley Circuit.

Transmitting Circuit No. 1 Meissner System

This circuit is easy to handle and very flexible. It may be used with either a direct earth connection or a counterpoise. The effect of the aerial series condenser is to counteract the effect of the A.T.I. in raising the wavelength above the fundamental. Providing it is of proper capacity, a counterpoise may be used instead of this condenser. It must be remembered that some portion of the A.T.I. is at a high potential with respect to earth, and there will be a capacity current through the condenser formed by the winding of the aerial tuning inductance and grid and plate coupling coils. The windings of the respective coils, therefore, should not be too close, and every possible precaution taken to reduce dielectric losses.



The switchboard and controls at the Eiffel Tower station.

Condensers

This capacity should be as small as possible. The variable condensers across the grid and plate coils are not essential to operation but are a great help in tuning. It is important to note that the grid and plate coils should be coupled through the aerial coil and not to themselves, otherwise short-wave oscillations may be set up between them.

Disadvantages

The most serious disadvantage of this circuit is that the transmission frequency is entirely determined by the aerial circuit constants, hence any alteration in aerial capacity due to swinging in the wind will cause a very unsteady note to be transmitted.

TRANSMITTING CIRCUIT No. 1.
Meissner System (Series Feed).

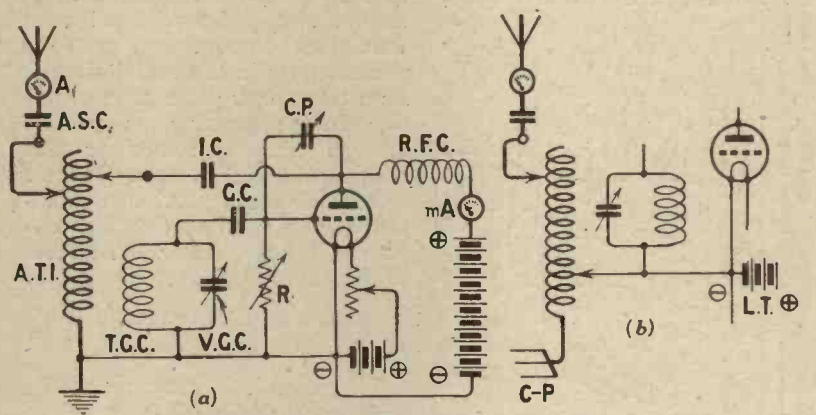
Circuit Symbol.	Instrument.	Description.
A.T.I. ..	Aerial Tuning Inductance ..	60 μH, 30 turns 6 in. dia. former. Copper strip or No. 16 s.w.g.
A.S.C. ..	Aerial Series Condenser ..	0.0003 μF to 0.003 μF.
A.	Aerial Ammeter	0–2 amperes. Hot-wire or thermo-couple.
G.C.C. ..	Grid Coupling Coil	4 in. dia., No. 22 d.c.c., 20 to 25 turns.
P.C.C. ..	Plate Coupling Coil	4 in. dia., No. 22 d.c.c., 20 to 25 turns.
C_2 and C_1 ..	Grid Tuning and Plate Tuning Condensers	Maximum capacity 0.0005 μF.
G.C. ..	Grid Condenser	0.002 μF.
R. ..	Grid Resistance	5,000 to 10,000 ohms.
mA. ..	Milliammeter	0–100 ma.

Transmitting Circuit No. 2
The Hartley Circuit

This circuit is not at all flexible and does not appear to suit high impedance valves. Unless extra precautions are taken it will be found that when heating the filament off A.C., using a step-down transformer, serious losses will occur due to the fact that the large capacity between the transformer windings is in parallel with the counterpoise (if one is used). The variable condenser across the plate tap and earth is not essential, but is a great asset in tuning the circuit and renders it more flexible. It greatly reduces the number of turns between the plate tap and earth, which may be quite considerable. The correct inductance between the plate tap and earth should be about 60 microhenries. The isolating condenser and radio-frequency chokes serve their usual purpose.

TRANSMITTING CIRCUIT No. 2.
The Hartley Circuit.

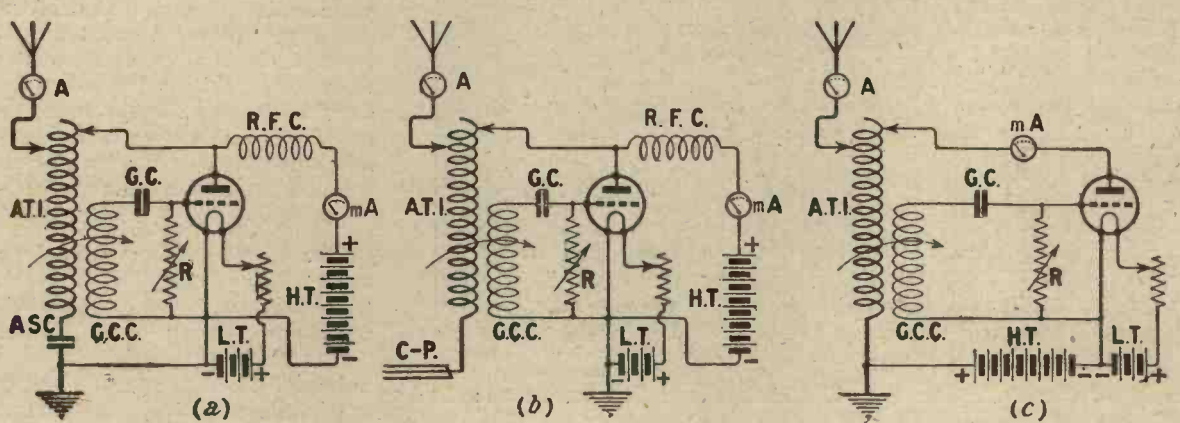
Circuit Symbol.	Instrument.	Description.
A.T.I. ..	Aerial Tuning Inductance ..	60 μH, 30 turns, 6 in. dia. former, 16 s.w.g.
A.S.C. ..	Aerial Series Condenser ..	0.0003 μF to 0.003 μF.
A. ..	Aerial Ammeter	Hot-wire or thermo-couple, 0–2 amperes.
T.C. ..	Tuning Condenser	Maximum capacity 0.0005 μF.
R. ..	Grid Resistance	5,000 to 10,000 ohms. Variable.
G.C. ..	Grid Condenser	0.002 μF.
I.C.	Isolating Condenser	0.001 μF.
R.F.C. ..	Radio-Frequency Chokes ..	2 in. dia., 8⅜ in. long, 500 turns, 26 to 28 d.s.c.
mA. ..	Milliammeter	0–100 ma.



Circuit No. 4.—The tuned grid system.

Transmitting Circuit No. 3
Magnetic Reaction

This is one of the best-known systems, and is used very extensively on account of its great flexibility. Three arrangements are shown—(*a*) when the valve is in shunt with the H.T. supply; (*b*) the arrangement suitable for use with a counterpoise; (*c*) when the valve is in series with the H.T. supply. In arrangement (b) the counterpoise capacity takes the place of the aerial series condenser in (*a*), the negative pole of the filament supply being earthed to complete the circuit for the anode alternating current. The aerial series condenser in circuit (*a*) also serves as an isolating



Circuit No. 3.—The magnetic reaction system.

condenser which the shunt oscillator must possess to prevent short-circuiting the H.T. supply. In (*a*) and (*b*) circuits the A.T.I. and aerial are at the D.C. potential of the H.T. supply, and care must be exercised in not touching any part of these circuits when the H.T. is on. Notice that in arrangement (*a*) the radio-frequency choke is in parallel with the aerial series condenser. With the values given in the data table, this circuit will resonate on wavelengths between 2,000-3,000 metres, the inductance value of the choke being about 3 millihenries. No troublesome resonant effects will be noticed unless in arrangement (*b*) the counterpoise is of unusually low capacity.

Series Feed

In the series feed circuit (*c*) the A.T.I. and aerial are at earth potential, but the filament circuit is at the D.C. potential of the H.T. supply, hence precautions must be taken not to touch this part of the circuit.

Transmitting Circuit No. 4
Tuned Grid System

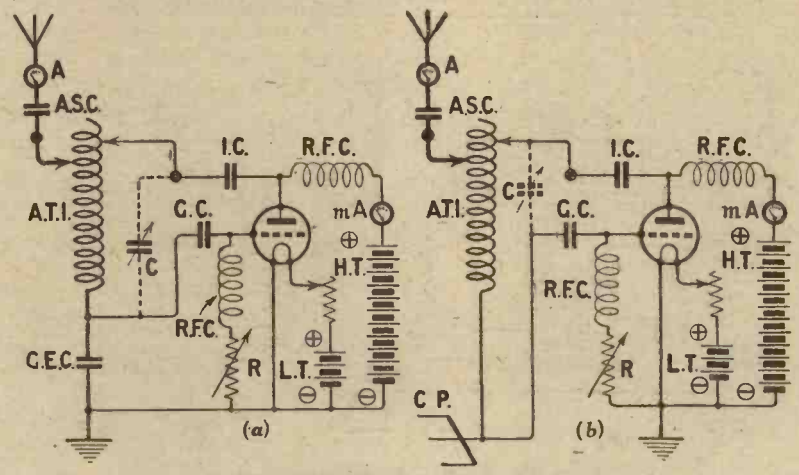
This arrangement uses a tuned input circuit to the valve. The coupling between the aerial and the tuned grid circuits is provided by the capacity between the plate and grid of the valve augmented by the small variable condenser. It will probably be found that this condenser will be unnecessary when using the circuit with a high-powered valve possessing a high amplification constant. In (*b*) a counterpoise is used. The earth tap should be variable in order to let it rest on the voltage node. The frequency of the oscillations is determined mainly by the constants of the tuned grid circuit, hence a fairly steady note is given.

Transmitting Circuit No. 5
The Colpitts Circuit

This circuit is different from all other types of self-excited valve transmitters. The output is capacitively coupled to the input and the grid obtains its excitation voltage from the condenser G.E.C. As the input power is increased and the size of the valve this condenser may decrease in value as indicated in the table. If a counterpoise is used, as in (*b*), this will act as the condenser G.E.C. in (*a*), providing the negative pole of the L.T. supply is earthed. The capacity of the average counterpoise will be lower than the values given, and the grid may be over-excited.

The Grid Tap

This may be overcome by tapping the grid on to a portion of the aerial tuning inductance nearer the plate tap. As the grid tap is moved towards the plate tap the voltage excitation to the grid is decreased. In the Colpitts circuit it is only possible to work *above* the fundamental frequency unless a series condenser (A.S.C.) is used. When the circuit contains the aerial series condenser it is possible to operate *at* the fundamental with great advantage. The condenser between



Circuit No. 5.—The Colpitts circuit.

TRANSMITTING CIRCUIT No. 3.
Magnetic Reaction System.
Data.

Circuit Symbol.	Instrument.	Description.
A.T.I. ..	Aerial Tuning Inductance ..	60 μH, 30 turns 6 in. dia. former, 16 s.w.g.
A.S.C. ..	Aerial Series Condenser ..	0.003 microfarads.
A. ..	Aerial Ammeter ..	Hot-wire or thermo-couple, 0–2 amperes.
G.C.C. ..	Grid Coupling Coil	4 in. dia. former No. 22 d.c.c., about 15 turns.
G.C. ..	Grid Condenser	0.002 microfarads.
R. ..	Grid Resistance	5,000 to 10,000 ohms. Variable.
R.F.C. ..	Radio-Frequency Choke ..	2 in. dia., 8¾ in. long, 500 turns, No. 26 to 28 d.s.c.
m.A. ..	Milliammeter	0–100 ma.

TRANSMITTING CIRCUIT No. 4.
Tuned Grid System.

Circuit Symbol.	Instrument.	Description.
A.T.I. ..	Aerial Tuning Inductance ..	60 μH, 30 turns, 6 in. dia. former. Copper strip.
A.S.C. ..	Aerial Series Condenser ..	0.0003 μF to 0.003 μF.
A. ..	Aerial Ammeter	Hot wire or thermo-couple, 0–2 amperes.
T.G.C. ..	Tuned Grid Coil	4 in. dia. former, No. 18 d.c.c. copper, 30 turns.
V.G.C. ..	Variable Grid Tuning Condenser	Maximum capacity 0.0005 μF.
G.C. ..	Grid Condenser	0.002 μF.
R. ..	Grid Resistance	5,000 to 10,000 ohms. Variable.
I.C. ..	Isolating Condenser	0.002 μF.
CP. ..	Plate Condenser	Maximum capacity .0001 μF.
R.F.C. ..	Radio-Frequency Choke ..	2 in. dia., 8¾ in. long, 500 turns, No. 26 to 28 d.s.c.
mA.	Milliammeter	0–100 ma.

TRANSMITTING CIRCUIT No. 5.
The Colpitts Circuit.

Circuit Symbol.	Instrument.	Description.
A.T.I. ..	Aerial Tuning Inductance ..	60 μH, 30 turns, 6 in. dia. former. Copper strip.
A.S.C. ..	Aerial Series Condenser ..	0.001 μF.
A.	Aerial Ammeter	Hot-wire or thermo-couple, 0–2 amperes.
G.E.C. ..	Grid Excitation Condenser ..	0.003 μF to 0.001 μF (see text).
C.	Tuning Condenser	0.0005 μF.
G.C. ..	Grid Condenser	0.002 μF.
R.	Grid Resistance	5,000 to 10,000 ohms. Variable.
R.F.C. ..	Radio-Frequency Choke ..	2 in. dia., 8⅛ in. long, 500 turns, No. 26 to 28 d.s.c.
mA. ..	Milliammeter	0–100 ma.

much as 20 watts can be lost without the choke. When the choke is used the loss is reduced to approximately 0.5 watts. As a comparison of the tuned grid system with the tuned plate, the latter will work better with low capacity counterpoises.

(In our next issue will be given some details concerning the "master oscillator," together with constructional data similar to that included this week.)

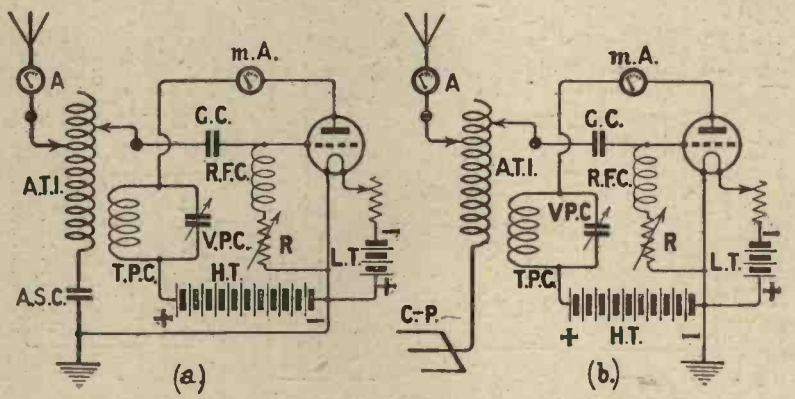
plate tap and grid tap is not a necessity, but simplifies tuning and reduces the number of turns between the two taps.

Transmitting Circuit No. 6
Tuned Plate System

This circuit differs only slightly from the tuned grid system, the output circuit of the valve being tuned instead of the input. A counterpoise may be substituted as in (*b*), the positive of the filament supply being earthed.

The R.F. Choke

The object of the radio-frequency choke is to keep the radio-frequency current from leaking through the grid resistance. In the case of a 5,000 ohm resistance used with a 250-watt valve, as



Circuit No. 6.—The tuned plate system.

TRANSMITTING CIRCUIT No. 6.
Tuned Plate System.

Circuit Symbol.	Instrument.	Description.
A.T.I. ..	Aerial Tuning Inductance ..	60 μH, 30 turns, 6 in. dia. former. Copper strip.
A.S.C. ..	Aerial Series Condenser ..	0.0003 μF to 0.003 μF.
A. ..	Aerial Ammeter	Hot-wire or thermo-couple 0–2 amperes.
T.P.C. ..	Tuned Plate Coil	4 in. dia., No. 22 d.c.c., 30 turns.
V.P.C. ..	Variable Plate Condenser ..	Maximum capacity 0.0005 μF.
R. ..	Grid Resistance	5,000 to 10,000 ohms. Variable.
G.C. ..	Grid Condenser	0.002 μF.
R.F.C. ..	Radio-Frequency Choke ..	2 in. dia., 8⅛ in. long, 500 turns, No. 26 to 28 d.s.c.
mA. ..	Milliammeter	0–100 ma.

Sir Arthur Steel-Maitland, Minister of Labour, broadcasting from the London Station upon the subject of Juvenile Unemployment.

Reception Conditions Week by Week

By W. K. ALFORD.

Review of reception for week ended April 26.

THE general conditions affecting reception continue to become more and more erratic, and will finally settle down to the more or less clearly defined summer conditions.

During the present week it has been noticed that there have been quite sharply defined periods exceptionally favourable for long range reception when the intensity of "atmospherics" was very greatly diminished only to reappear after about five minutes at general intensity existing at the time. It was particularly interesting to note that the phenomenon of fading, which was not very marked at the time, did not seem to bear any relation to these favourable periods which leads one to suppose that atmospheric conditions cannot always be associated with discontinuity or irregularity of the Heaviside layer.

Map showing approximate area of uniform reception from 2LO's old station. Blind spots are not shown.

A good deal of discussion is still going on regarding the effectiveness of the new London station, though the general inference is that of considerable improvement throughout the country as regards strength, compared with the old station, but there is no doubt that the quality of the transmission has not yet reached the very high standard of the old station.

A view of the assembly department of the wireless section of the C.A.V. works, showing loud speakers ready for packing.

The Old 2LO

Some considerable time ago I made an attempt to plot out on a map what might be termed curves of "iso-audibility," in other words, determine the places where London was received at good strength using a single regenerative valve.

Of course, very much greater ranges than the curves show are obtained by many people using a similar receiver, and one had to decide whether abnormally favourable conditions existed.

However rough and inaccurate the diagram is, it is quite certain that the old London station radiated very much more in a north-south direction than in an east-west direction, which seems to be exactly reversed in the case of the new station, although the effect is very much less noticeable in this case.

It is not possible in a map of this sort to delineate clearly all the so-called "blind spots," but only indicate in a general way the more effective areas for good reception.

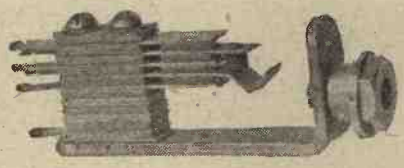
The broadcasting band of wavelengths seems to be rapidly extending, whether officially or not one cannot say, but one hears two Continental stations frequently, one on about 170 metres, and the other right down in the region of 70 metres, near KDKA's wave, and both much too strong to allow of them being harmonics from a higher wavelength, and who never give call signs. There is much speculation as to the effectiveness of the new high-power station of the B.B.C. at Daventry. The advocates of a single high-power station supplying the whole country are particularly interested, and in the light of present experience there is much to commend it.

A New P.O. Station

One is given to understand that the Post Office are erecting a receiving station in the vicinity of Daventry for the Leafield traffic, and what with the new B.B.C. station and the Post Office "aether shaker" at Rugby, one imagines that it would have an extremely hectic career. However, the ways of the Post Office are mysterious in the extreme, and they cannot very well fall out with the B.B.C. for some time to come.

A New Use for Filament Control Jacks

A useful tip for those who wish to incorporate switching in circuits employing resistance-coupled low-frequency valves.



A "double-filament" jack.

The plug within its shield.

MANY constructors, though favouring the use of plugs and jacks, do not care to use double filament control jacks on account of the extra complications introduced in the wiring, or else they feel that the sudden make-and-break action of the contacts is not good for the filaments of the valves, and they therefore prefer to use variable resistances for turning the valves off as well as controlling them.

A Further Use

There is, however, another use to which these extra contacts can be put in the case of a resistance-coupled amplifier. The chief disadvantage attending the use of jacks in a resistance-coupled low-frequency amplifier is due to the fact that when the 'phones are placed in circuit instead of the anode resistance the effective voltage applied to the plate of the valve in the circuit of which the 'phones are placed is immediately raised. In the case of a detector-valve this may cause the set to burst into violent self-oscillation, or if the case is that of an amplifier the grid-bias

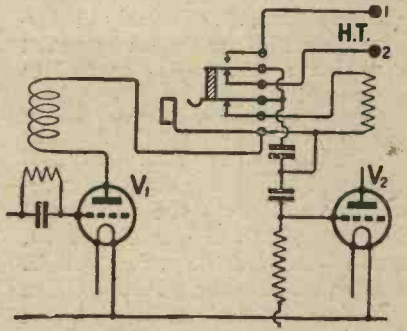


Fig. 1.—With this arrangement for switching in or out the resistance-coupled L.F. valve V2, a constant H.T. voltage may be maintained on the plate of V1.

being applied to the grid of the valve will now be insufficient to give pure reproduction or economy in plate current. A glance at Figs. 1 and 2 will help to make this clear.

Switching

A simple way of doing this automatically is to use the filament control contacts on the jack as a two-way switch by means of which a different plate voltage is applied according as to whether the 'phones or resistance are in circuit. Fig. 1 shows the circuit diagram, and it should be noted that H.T.1 will be the lower voltage required and H.T.2 the higher. If this arrangement

The plug removed from its shield showing how connection is made.

is used with a detector valve the best way to adjust your H.T. is first to use your stage of resistance-coupled L.F. with H.T.2 plugged into the value you intend using, adjusting the reaction of your receiver till your set is just off the oscillating point. Now plug H.T.1 into a much lower value and plug the 'phones in.

H.T. Adjustments

If the set goes into oscillation reduce the plate voltage going to H.T.1 until the set is again just off the oscillating point. Then when you are trying for distant stations it is possible to switch the L.F. stage in or out without upsetting the reaction setting of your receiver. In the same way this use of the filament contacts can be applied to the L.F. stages, so that when the 'phones are inserted after any one valve the plate voltage is reduced so as to bring it down to the correct value for pure reproduction without any alteration of grid-bias being necessary.

An Alternative Use

A further method which is suitable only for use with resistance-coupled L.F. amplifying valves is to use the filament contacts to vary the grid-bias being applied, so that when the 'phones are inserted in any plate circuit a larger negative potential is applied to the grid of that valve. The method is shown in the theoretical circuit diagram in Fig. 2, but, of course, is not suited for use with a detector valve.

Convenience

Either of these schemes will therefore remove what has always been, in the writer's opinion, the sole disadvantage of jacks, namely, their unsuitability for L.F. switching when resistance-coupled L.F. amplification is employed. Let the constructor give jacks a trial, he will find them a great convenience. Not only do they simplify the wiring of the receiver, eliminating many leads going back and forth from switch to component, but they also simplify the layout, enabling a logical scheme to be employed

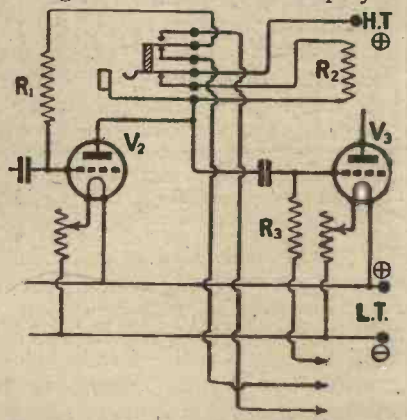


Fig. 2.—Using a jack to change grid-bias with H.T. voltage.

that is sure to result in increased efficiency.

C. P. A.

A SHORT-WAVE COIL MOUNTING.

By R. W. HALLOWS, M.A., Staff Editor.

FOR some time now experimenters have been giving a great deal of attention to the question of increased efficiency in tuning inductances. Some very successful coils for use on the broadcast waveband and upon shorter wavelengths have been turned out, but there is one point to which sufficient attention has not been paid; this is the design of the plug-and-socket coil-mounting which has now become the standard. In the early days of

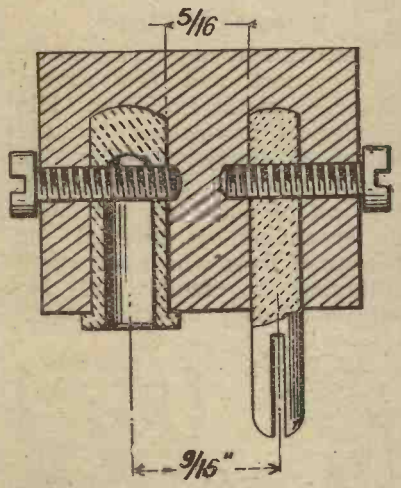


Fig. 1.—A section of a coil socket showing the construction.

wireless few people thought very much about the question of inductance efficiency. The plug-and-socket mounting was designed then, and it is most unfortunate that its use should have become practically universal, since now that the majority of sets are fitted with coil stands suitable for this mounting it is unlikely that a change will be made, for some time at any rate. It seems as though wireless might be saddled with the coil mounting referred to, and its progress hampered by it just as our railways are saddled with the 4 ft. 8½ in. gauge (laid down originally to accommodate the wheels of horse-drawn carts) and the small tunnels made in early days, which gave ample clearance for the locomotives and rolling stock then in use, but now prevent desirable increases in size from being made.

The Coil Holder

In Fig. 1 is seen a section of the standard coil holder which will serve to show the undesirable capacities that it introduces. The plug and socket are spaced $\frac{9}{16}$ in. apart from centre to centre. As they are usually $\frac{1}{4}$ in. in diameter this means that the portions of them embedded in the ebonite are only $\frac{5}{16}$ in. apart Further, since the fixing screws frequently go right through both plug and socket there may be a point within the holder at which portions of metal in electrical contact with the high or low potential ends of the coils are separated by only $\frac{1}{4}$ in. of ebonite.

Capacities

It must be remembered that the capacities referred to are doubled in the case of each coil since they exist between the plug and socket of the coil mounting as well as between those of the stand into which it is fitted. It is obviously of little use to take great pains in the construction of a low-loss coil for short-wave work and then to mount it upon a holder which, to a considerable extent, neutralises the good effects of one's labours. The standard coil holder can be slightly improved by drilling two or three $\frac{3}{16}$ in. holes through the ebonite between

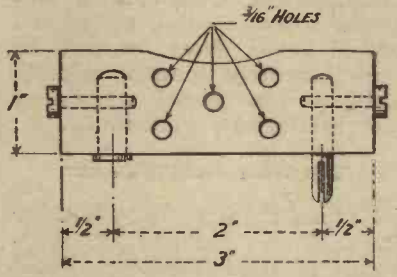


Fig. 2.—The dimensions of a coil-holder which is used by the author.

the plug and the socket, but we want something better even than this for short-wave work.

A Suggestion

In Fig. 2 is seen a mounting which the writer has found a great improvement over the standard one. It is quite simple to make in the home workshop, and those who go in for reception on 150 metres and below will find that it is well worth attention. The parts needed are a piece of $\frac{1}{2}$ in. ebonite 3 in. in length and 1 in. wide, an ordinary plug and socket, and a couple of 4B.A. screws. In what is to be the lower edge of the mounting drill two $\frac{1}{4}$-in. holes spaced 2 in. apart from centre to centre. They should be deep enough to take the plain portion of the plug and socket. From the edges drill and tap two 4B.A. holes running into the plug and socket and insert 4B.A. screws long enough to make good contact with the brass when wire and a washer are placed under their heads. With a round file hollow out slightly the upper edge of the former, as shown in the drawing. It is as well to drill through between the plug and socket a number of $\frac{3}{16}$ in. holes in order to reduce capacity.

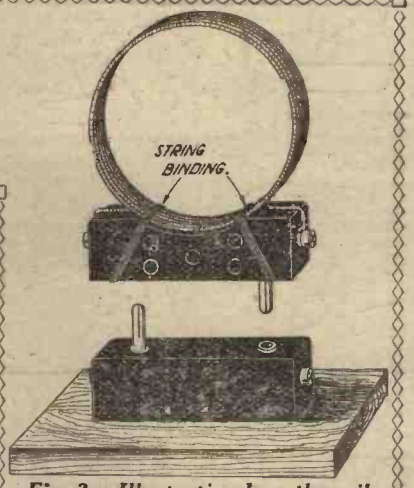


Fig. 3.—Illustrating how the coil may be mounted.

Fixing the Coil

Fig. 3 shows one method of fixing a coil to a mounting so made. Others will suggest themselves to the constructor.

Existing coil stands may be adapted to fit these mountings, but the writer has found it preferable to make up special little stands of a very simple kind. One of these is seen in Fig. 3. It consists simply of a small block of hard wood provided with a coil mounting made on the lines described. With a pair of coupled coils mounted in this way extremely fine variations in the coupling are possible, the stands being moved about on the table with the help of a stick or ruler.

Jottings by the way

Wonders Upon Wonders

WHENEVER I read in my paper an account of an interview with Professor A. M. Blow I am filled forthwith with conflicting emotions. In the first place, I thrill all over in sheer admiration for such wondrous projects as that of broadcasting coolness from the North Pole to help the fur trade in the summer time, or that other one of bringing sand in aeroplanes from the Sahara to those of our seaside resorts that have temporarily lost their beaches. You and I, you know, would simply never think of things like that. That is the

. . . During recruit days . . .

first emotion. The second is a feeling of sadness which steals over me when I reflect that there is another fertile brain whose activities, owing to its owner's shrinking modesty, are but little known to the public at large. I am speaking of my friend Professor Goop. What do you know of his inventions beyond what I have told you from time to time in these notes? Nothing.

The Taste of Stamps

Yet though you wot not of it, Professor Goop's brains are helping you at almost every moment of your life. When, for example, you stick a postage stamp upon a letter, do you not enjoy its subtle flavour? It was Professor Goop who, after years of research work, performed the impossible by discovering a flavour that would please *all* palates. Again, have you ever laid a pair of braces before you and pondered over their perfection? If you have, it will doubtless have occurred to you that the whole secret lies in the fact that the two things which come over your shoulders are stuck together at the back. Professor Goop did that for you. Why is it again that bootlaces are always of precisely the right length? If it were not for the Goop Bootlace Gauge, now used in the best factories throughout the world, they might easily be a fraction of an inch too short or possibly a multiple of a yard too long.

A Few More

If you served in the Great War did you never find yourself during recruit days filled with wonder at the strength of the voice that directed your movements? It is not, I think, too much to say that the War was won by the Goop Pocket Voice Amplifier for weak-chested sergeant-majors. But for it you would never have learned to spring smartly to attention or to cultivate the correct waggle of the right hand when saluting.

The Goop Baby Silencer

Has not the Goop Baby Silencer brought rest and sleep to thousands of tired fathers? Would life be worth living if the holes for the fixing screws in low-frequency transformers were always spaced in the same way? Would not wireless lose half its zest if every maker drilled and tapped components for the prosaic 4B.A. screw? Can you imagine anything duller than high-frequency transformers with their connections made in one monotonous standard way? All of these things are due to the secret propaganda conducted in the early days of wireless by Professor Goop, who has incessantly preached the doctrine that variety is the spice of life.

Ducks on Wet Days

Yes, we may say that we owe our comfort and contentment ultimately to the Professor. His mechanical spot-dabber for the horses of merry-go-rounds, his patent goloshes for protecting the feet of ducks on wet days, his expanding hat designed for the use of those who contemplate springing to fame, and his system of daily exercises which

. . . One eye peering through . . .

has enabled many a would-be alderman to bring up his once puny girth to the proportions necessary for success in civic life—all these have done not a little to increase the amenities of life. Even the Oxford trouser was introduced ten years ago by the Professor, who designed a pair with legs forty-eight inches in circumference. He used to stick both feet down one of them, leaving the other trailing behind him like a train.

Sheer Luck

It is curious to reflect at times upon the part that chance has played in some of the greatest inventions. The fellow who discovered gunpowder was, I believe, really engaged in endeavouring to make a new boot

blacking, or a love philtre, or something of that kind. To this end he mixed together sulphur and saltpetre and charcoal, and, finding the mixture unsuccessful, flung it, just as we fling our receiving sets at times, into the fireplace. Later on his one remaining useful eye, peering through a swathing of sticking plaster and bandages, lighted upon the shattered hearth, and he realised that his compound, even if it did not fulfil its original purpose, would provide the world with a new and noble means of promoting the brotherhood of man. Why go in for the messy and exhausting business of hacking your enemy to pieces with a billhook or a halberd when you could blow him neatly and expeditiously into smithereens with a pint or two of this handy compound?

A Tuning Device

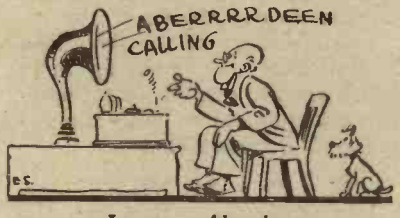
Chance again had a great deal to do with the conception and the development of Professor Goop's new all-stations tuner. He first got the idea in this way. For a long time, even with his most powerful receiving set, he had been unable to pick up Aberdeen. The desire to hear transmissions from the rugged north became a perfect passion with him. Set after set, circuit after circuit, he designed to capture them, but all failed. Then one day he asked to stay with him a friend who had recently been visiting the granite city. To this friend he opened his heart, telling him of his difficulty. The man smiled and got to work. With the help of the wavemeter he tuned to 495 metres. Except for an occasional wail, due probably to Poddleby, the loud-speaker was dumb. From his pocket the friend produced a shilling, which he rang loudly upon the panel of the receiving set. In came Aberdeen.

Inner History

This was the real beginning of the all-station tuner. The subsequent inner history of this wonderful invention reads like a romance. Some people might misunderstand that last remark, but I am quite sure that you, reader, will not. For days the Professor went on ringing his shilling and getting Aberdeen whenever he wanted him. Then quite by accident he chanced upon a discovery of the kind that can be described only as epoch-making. His set was tuned to London, which was coming through at remarkable strength. In taking his handkerchief from his pocket the Professor accidentally pulled out a shilling that bounced upon the panel. Instantly Aberdeen came through at almost equal strength. This set the Professor thinking. He

. . . Frankfort responded readily . . .

added another shilling. 2BD now rose to R6, whilst 2LO became C3. Professor Goop continued his experiment, and when the entire contents of his pockets, consisting of 5s. 9d. in silver and 4¾d. in copper, had been brought into service London was so faintly audible as to cause but little interference with the northern signal. By adding his watch and chain he was enabled to eliminate London altogether and to revel for the rest of the evening in a wonderful programme of dance music relayed by the northern station from the Savoy Hotel. As he told me next day, it did him a power of good to hear a real Scottish programme.



. . . In came Aberdeen. . . .

Further experiments were put in hand at once, and before many days the tuner was practically perfect. It takes the form of an ebonite panel shaped like a tea-tray, and mounted upon insulators of the largest size. This is placed between the A.T.I. and the loud-speaker. Wishing to hear something of the Swiss stations the Professor drilled a number of holes in a piece of cheddar cheese and placed it upon the tuner. This merely showed how extraordinarily selective the tuner is, for though Switzerland refused to respond to the artificial Gruyère, many American stations were heard simultaneously. The German stations are particularly easy on the all-station tuner, Frankfort responding readily to the correct sausage, Munich to a few drops of beer, and Stuttgart to a grand piano.

Warning

A little care is required in using the tuner in order to obtain the best results. One must always bear in mind how exceedingly delicate it is. The other day, for example, when the Professor had picked up Rome with the aid of a plateful of macaroni Mrs. Goop entered the room and reproached him for burning a hole with his soldering-iron in her new sofa. The ensuing exchange of winged words sounded so exactly like a meeting of the League of Nations that Rome was promptly swamped by Lausanne. By careful attention to detail, interference of all kinds can be eliminated with ease. The other night, for example, Moscow, enticed into the loud-speaker by means of a red rag, was rather badly jammed by another station which was eventually identified as Madrid. The reason, of course, was that red rags are an integral part of the national pastime of Spain. Here is a problem which would seem at first a little difficult to solve. Rising to the occasion the Professor seized the "Do It Now" card which hung over his desk and placed it upon the tuner. This finished Madrid at once, for in Spain, as you know, Mañana holds sway.

WIRELESS WAYFARER.

An informal meeting of the R.S.G.B. will be held at the Institution of Electrical Engineers, Savoy Place, W.C.2, at 6 p.m. on Wednesday, the 13th May, when Mr. R. H. Kidd, B.A., will open a discussion entitled "An Attempt at Quantitative Experiments on Modulation." These meetings are open to members of Affiliated Societies, who are heartily invited to attend. A certain number of tickets are also available to the general public. These may be obtained from the Secretary, The Radio Society of Great Britain, 53, Victoria Street, S.W.1.

RADIO NOTES AND NEWS

AT a meeting held recently in the laboratories of the Zenith Radio Corporation, Chicago, where radio scientists met with Commander Donald B. MacMillan, the Arctic explorer, to finally determine on the type of new short-wave radio transmitting and receiving apparatus with which the expedition is to be equipped this year, the scientists present were startled by the statements made by Mr. John L. Reinartz, of South Manchester, Connecticut, when he described the phenomena encountered by him in reaching down to extremely low wavelengths. Normal American broadcasting wavelengths are between 200 and 600 metres, yet phenomenal day-time code work has been accomplished on wavelengths as low as 10 metres. Mr. Reinartz made some remarkable observations on the conditions obtaining when working on very high frequencies, corresponding to wavelengths below one metre.

* * *

It was definitely decided between Commander MacMillan and the engineers present at the meeting that the expedition will be equipped with transmitters capable of four wavelength ranges, the lowest being approximately 20 metres, then 40, then 80, and then 180. The section of the world in which the expedition will be this year is one of the most difficult from the standpoint of radio transmission and reception, namely, that between 50 deg. and 75 deg. north latitude, in Davis Straits. The 20 metres wave band will be used during the period just preceding and succeeding noon. The 40 metres wavelength will, in all probability, be used during the hours around midnight, which will still be daylight in the Arctic, but dark in the lower degrees of latitude. The 80 metres wavelength is provided as an emergency compromise wavelength to cope with unanticipated conditions. The 180 metres wavelength transmitter is provided only for the purpose of ascertaining whether the 180 metres wave will be satisfactory over this great distance under the conditions existing.

The transmitting panels at Rome, a description of which station was given in our last issue.

On the last MacMillan Arctic Expedition a wavelength of 180 metres was used with good results after the Arctic night set in, and no appreciable interference from the Aurora Borealis was noticed. What the interference of the aurora will be on the low wavelengths no one knows.

The members of the American Radio Relay League will again be called upon to establish and maintain communication with the expedition, if possible.

* * *

We understand that on the afternoon of Saturday, April 25, at 5 p.m., Greenwich time, Mr. R. W. H. Bloxam was successful in intercepting at his experimental station, 5LS, at Blackheath, S.E., signals transmitted by Mr. John L. Reinartz on a wavelength of 20 metres, from his station 1XAM, at South Manchester, Connecticut, U.S.A.

The time at South Manchester would then be midday, so that these very short wave signals traversed the entire distance in broad daylight.

The Royal Geographical Society state the distance to be 3,334 miles, and the reception probably constitutes a daylight record for the low power used. 1XAM's power input is 1 kw.

* * *

On Saturday, May 9, a programme of "Old Masters," which is composed chiefly of works by Schubert and Schumann, is being broadcast from Manchester and relayed to 5XX. The artists taking part are Mr. Edward Isaacs, the distinguished Manchester pianist, and Mr. Harry Hopewell, a popular local baritone, and the 2ZY Augmented Orchestra.

* * *

Striking evidence of the popularity of the plays broadcast from the Manchester Station was given on the occasion of the 2ZY Dramatic Company's presentation of "The Chinese Puzzle." It was decided beforehand to issue a synopsis of the play to listeners in order that they might experience no difficulty in following the course of the play. Nearly three thousand requests for copies came in from districts as far apart as Staffordshire and North Wales.

A New Receiver for Modern Conditions

By D. J. S. HARTT, B.Sc.

Some further hints and a Test Report.

The orchestra at KDKA, which many readers will have heard during the winter months.

IN the article in the previous issue of *Wireless Weekly* the construction of special air-spaced coils for the short-wave plug-in unit was described, but for an alternative coil unit the same type of skeleton former may be used and the coils wound with No. 16 d.c.c.

An Alternative Coil

Although the air-spaced coils demand no special skill in construction, this alternative coil unit is, if anything, more easily made.

With 5½ turns of No. 16 d.c.c. wound on one end of the skeleton former for the aerial coil and 15½ turns on the other end for the secondary coil (the half turns being to enable the ends of the coils to be taken from opposite sides of the former), the minimum wavelength will be about 50 metres when the unit is used in conjunction with the receiver as described. The coils may be mounted in the manner previously indicated, and the unit made identical as far as the remainder is concerned.

With regard to the coil values for the reception of 5XX and Radio-Paris, a No. 150 or its equivalent will in most cases be suitable when using direct coupling, and a No. 100 or its equivalent for reaction. In some cases, where the aerial/earth system is of high resistance, a larger size reaction coil may be found necessary. For the Eiffel Tower wavelength a No. 200 or 250, with a No. 150 or 200 for reaction, should be tried.

If " semi-aperiodic " coupling is used for 5XX and Radio-Paris, suggested coil values are Nos. 150, 200, and 100, and for Eiffel Tower, Nos. 200, 300 and 150, for aerial, secondary, and reaction respectively.

Test Report

The receiver has been tested recently on the short wavelengths, and the Pittsburg station KDKA has been received on this lower wavelength without any difficulty at good strength in the 'phones. Only on one transmission out of five was the fading and the peculiar distortion which is sometimes apparent on these short-wave telephony transmissions sufficient to mar the reception. Although on the last night on which tests were made KDKA came in at unusual strength for the present conditions, the tendency seems, on the whole, to be for signals from this station to become weaker as general reception conditions approach those we are accustomed to in the summer months. A French station working telephony on 60 metres was also heard at excellent strength one night, while many amateurs' transmissions have been received on the short waves.

When the set was tried out on the broadcast and higher wavelengths, Brussels on 265 metres was received at fair strength on the loud-speaker, while several German stations, Birmingham, Bournemouth, Newcastle, Ecole Superieure, and Madrid were all heard at good strength in the 'phones, Bournemouth and Birmingham being particularly good. London (8 miles) and Chelmsford (about 35 miles) both come in excellently on the loud-speaker. Using the " semi-aperiodic " coupling, it was possible, by critical adjustment, to receive intelligible speech and music from a foreign station which was working on a wavelength between those of London and Bournemouth, while both the latter stations were working, but London could not be entirely eliminated on this wavelength. On the longer wavelengths the Eiffel Tower and Radio Paris were both received very well. Eiffel Tower, in particular, was very loud in the 'phones and quite enjoyable on the loud-speaker in a small room.

Random Technicalities

By PERCY W. HARRIS, M.I.R.E.
Assistant Editor.

IT is high time something was done about the naming of valves in a sensible way. If the nomenclature is puzzling to the expert, what must it be to the beginner?

Let us take a few examples. There is on the British market a type of valve consuming .25 of an ampere of filament current and working with about 40 to 100 volts on the anode. It is generally called a " small power valve," and richly deserves the popularity it has attained. It is made by all the valve manufacturers, and (with apologies to all of them) there seems very little difference between the different makes. Are they similarly named? Not a bit of it! The British Thomson-Houston Co. call theirs the B.4. The Marconi-Osram people call theirs the D.E.5, while Mullards call theirs the D.F.A.3. As all of them are modelled upon the American U.V.201a, there might at least be an agreement between makers (seeing that they are bonded together as the Valve Manufacturers' Association) as to the title.

* * *

The confusion is not due merely to differences in letters, which, as the valves are made by different manufacturers, is, perhaps, pardonable. The real trouble comes from the numerals attached to the letters. There is, as I have mentioned, the B.4 and the D.E.5. These are similar valves. Then we have the B.5 and the D.E.4; these are not similar valves. The B.5 and the D.E.5 are as different as chalk from cheese, for one is a dull emitter of the .06 ampere type and the other takes .25 of an ampere—to indicate but one difference between them. What is Mr. Mullards' D.F.A.4? Is it like the B.4 or the D.E.4? Certainly not! The D.F.A.4 closely resembles the D.E.5B.

Can we get a clue to the mystery by examining the voltage? No hope in this direction! The D.E.4 is a 3.8 valve, the B.5 is a 3-volt valve. The D.E.5 is a 5.6-volt valve. Just to help matters the B.4 which requires a 6-volt accumulator can be thought of in conjunction with the B.6, which requires a 4-volt accumulator.

* * *

Ediswans also have a good line of valves, but their names are just as confusing. The P.V.2 is a 6-volt valve and the P.V.6 is a 1.8- to 2-volt valve.

About the only matter on which the valve makers agree (other than price) is in a colour scheme. Red, apparently, means high frequency and green low frequency. For high frequency Cossors have a red top, Mullards have a red ring, and Ediswans a red stripe. In addition to these decorations they are hereby awarded a medal for their naming!

* * *

By the way, I have found recently that a number of com-

Dr. James Harris Rogers, the inventor of a printing telegraph system, whose efforts to cross the American continent with an underground transmitting aerial have been successful. Dr. Rogers is here seen pointing to the aerial.

ponents on the market are made to fit ¼-in. panels, and cannot be used on anything thinner. The manufacturers of such components are apparently under the impression that, as most people use ¼-in. ebonite panels, there is no need to trouble about anything smaller. As a matter of fact, we do not use 3/16-in. ebonite so much as we might well do, for on sets with small panels (up to, say, 8 in. x 6 in.) 3/16 in. ebonite is quite thick enough. The advantages of using it are that it is cheaper (seeing that ebonite is generally sold, or at any rate charged up, on the pound basis), and if two components are mounted, say, 1 in. from another on a 3/16-in. panel. the insulation between them is just as great as if they were mounted upon a 1-in. thick panel. Indeed, for very short wave work the thin panel is preferable. In such work great care is taken by some manufacturers to remove as much solid dielectric as possible from the field of variable condensers, and it seems rather absurd for us to screw the top plate of such a condenser close up against a thick ebonite panel.

* * *

On broadcast wavelengths I think it will be impossible to detect the difference in efficiency between a set using a ¼-in. panel and one using a 3/16 in., but when we come down to the 40- and 20-metre ranges such matters are of greater importance. In any case, experimenters might well consider whether they have not fallen into the habit of using a ¼-in. panel for everything where in many cases they would save money by using the thinner material. At the same time, manufacturers who make components which only fit ¼-in. panels may find themselves left behind should the popularity of the thinner material increase. Fortunately there are already plenty of excellent components which fit 3/16-in. panels.

GERMAN RADIO

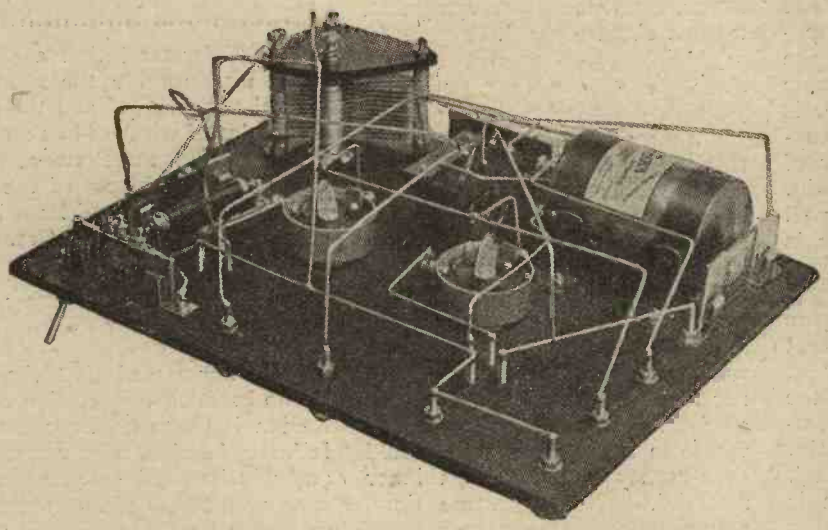
We understand that a special radio institute for the study of both the theoretical and the practical sides of wireless has recently been founded at Bremen, Germany. The objects of the new institute are to spread knowledge of radio throughout Germany, and to encourage work for the advancement of the science.

* * *

It is announced that the new Berlin broadcasting station of the National German Broadcasting Industry has just been completed, and will be put into operation as soon as a series of test transmissions can be accomplished. It is situated on the Kaiserdamm Strasse in the Charlottenburg district of the city.

This new station is able to supply an aerial power of 2 kw., ten times more than the station now in use.

In this photograph we see Dr. Rogers working his apparatus. The call letters of his station are 3XR.



The layout of the receiver permits easy access to the components for wiring up.

The receiver presents a very con be seen in the

A General P Valve R

By JOHN U

Special switching is inco that separate H.T. value valves, without disturbin detector when the secon ci

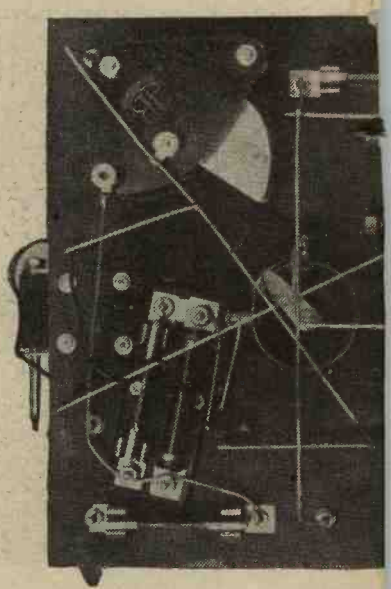
THE receiver about to be described consists of a detector valve with reaction, followed by one stage of low-frequency amplification. Special switching arrangements are incorporated so that separate values of high-tension may be used on the two valves, despite the fact that the switch cuts the last valve out of circuit, but still leaves the telephones connected to the normal H.T. positive terminal.

Switching

This particular arrangement allows of the use of one of the small types of power valve now on the market, so that the maximum amount of amplification may be obtained from this stage, and hence the receiver is suitable for use with a loud-speaker up to several miles from a main station, whilst beyond this distance it constitutes an admirable arrangement for using telephones. Although no high-frequency valve is incorporated in the receiver, given a reasonably good aerial and earth system and a little skill in tuning, a number of the distant stations may be received at excellent strength. The type of circuit used is, in fact, that favoured by a number of amateurs whose feats of long-distance reception during the winter constitute some highly praiseworthy achievements.

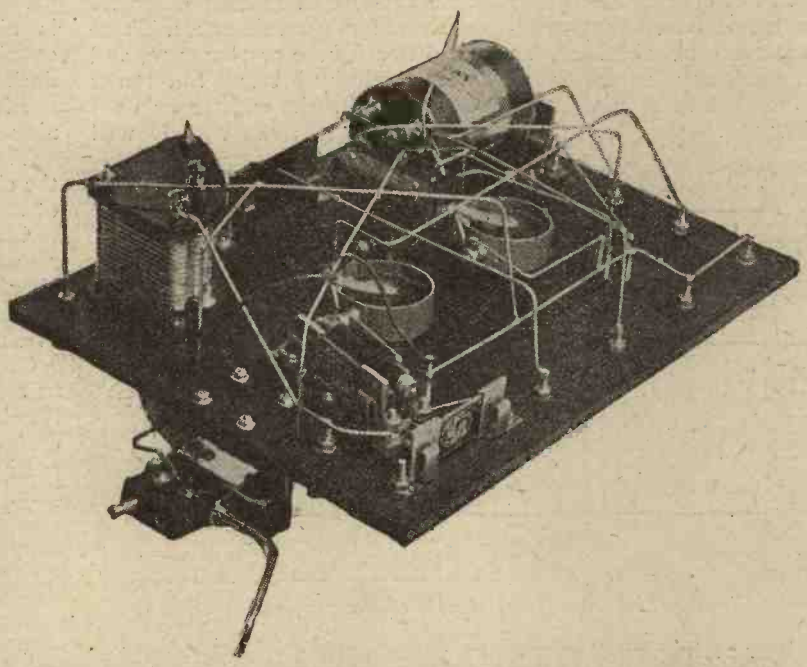
H.T. Connections

Transformer coupling is used to couple the detector to the amplifying valve, and the only part of the circuit which calls for comment is the somewhat unusual arrangement of switching which allows of the telephones being inserted between the terminals marked "Tel" when either one or two valves are in use, but at the same time allows of each valve receiving its appropriate value of high tension. A double-pole two-way switch is used, and on referring to the circuit it will be seen that with the switch in the position marked 1 connection is from the reaction coil L2, through the telephones to H.T. + 1, which is the high-tension supply to the detector valve. With the switch in the position marked 2, the circuit is now through the primary of the L.F. transformer, but still goes to H.T. + 1. The telephones are now in the anode circuit of V2, and the appropriate high-tension value of H.T. + 2 is applied to the plate of this valve. Two by-pass condensers, C4 and C5, each of 0.001 μF, are used across the primary of the L.F. transformer and across the telephones. Since a power valve, or, in fact, any valve with an appropriate value of high-tension for



A plan view of the back of the p the practical

npact appearance. The switch may entre of the panel.

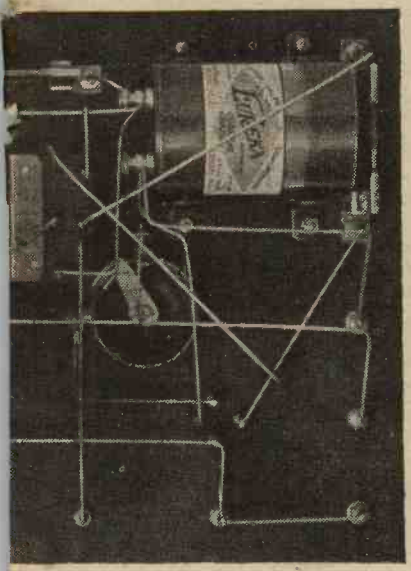


The connections to the coil holder and the grid leak unit may be clearly seen from this photograph.

Purpose Two-Receiver

INDERDOWN

rporated in this receiver so s may be used for the two g the voltage applied to the d valve is switched out of cuit.



anel, which may be compared with wiring diagram.

low-frequency amplifying purposes, may be used, provision is made for grid-bias, as shown in the circuit diagram.

General Arrangement

The set is conveniently arranged with all the components mounted on one panel, so that little difficulty is experienced in building, and the whole is incorporated in a sloping type of cabinet so that the coils are arranged with their axes vertical, thus obviating any tendency to flop when heavy coils are used.

The Layout

From the photographs the general neatness of the layout will be appreciated, as will the convenient positions of the tuning controls. To the left hand of the panel will be seen the two-coil holder, which takes the aerial coil in the fixed block and the reaction coil in the moving, and also the 0.0005 μF variable tuning condenser. In the top left-hand corner is the constant aerial tuning terminal, whilst directly below it is the terminal A1, giving plain parallel tuning. The earth terminal is seen in the left hand bottom corner. The two filament rheostats and the switch allowing the use of one or two valves are seen near the centre of the panel. Along the top of this latter are the three high-tension terminals, whilst low-tension and grid-bias terminals are seen on the right of the panel. The two bottom terminals on the right hand side are for the telephones, the bottom one marked plus being that to which the plus tag of the telephones or loud-speaker should be attached. With the switch in the "up" position one valve only is in circuit, whilst bringing this down to the lower position allows of the use of both valves. The last valve should, of course, be switched in and out of circuit on its own filament resistance, as well as by the use of the switch.

Components

In order that constructors may exactly duplicate the receiver, which practice is to be advised unless the constructor possesses sufficient powers of discrimination to choose suitable components, the makers' names as well as the components used are given below.

One ebonite panel, 12 in. by 9 in. by $\frac{1}{4}$ in. thick. The panel used has a matt surface, and was obtained from Messrs. Peter

Curtis, Ltd. Any good make of ebonite will, of course, do equally well, but it is advised that guaranteed material be obtained, as this obviates any necessity to remove the surface skin whether polished or not.

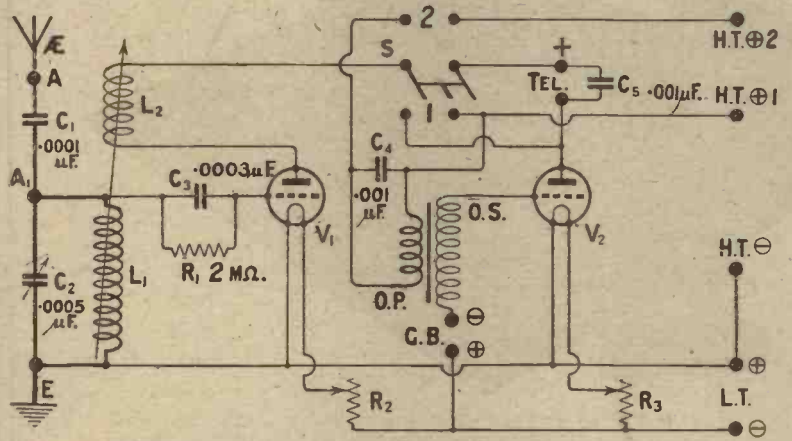


Fig. 1.—The theoretical circuit of the receiver.

One oak or mahogany sloping-type cabinet to take the above-sized panel. That shown in the photographs was made by Henry Joseph & Co., Ltd.

One Magnum two-coil holder. (Burne-Jones & Co.)

One .0005 µF square law variable condenser. (Jackson Bros.)

Two filament resistances. Those used were of the 30 ohm type, and were made by Messrs. Shipton & Co. The bright emitter or dual type resistances can equally well be used in the set, and naturally the choice of these components will be decided when you have chosen the type of valves to use.

Eight valve legs. (Burne-Jones & Co.)

One Utility two-pole double-throw anti-capacity switch. (Wilkins & Wright.) That used is nickel-plated, but these may equally well be obtained with a dark finish.

Eleven W.O. type lacquered or nickelled terminals.

Three clip-in condensers with the clips, one of .0001 µF and two of .001 µF capacity.

One .0003 µF condenser and a 2-megohm leak mounted on ebonite platform.

All of these were obtained from Messrs. L. McMichael, Ltd.

One first stage low-frequency transformer. That used is a Eureka Concert Grand. (Portable Utilities, Ltd.)

Eight 4 B.A. screws and nuts ½ in. long.

Quantity of No. 16 gauge tinned copper wire. Either round or square section may be used, but, generally speaking, it will be found easier to wire with the ordinary round section wire, and this has been used. Short lengths of flex for the flexible connections to the two-coil holder.

Drilling the Panel

Provided a guaranteed leakage-free panel is obtained, the drilling

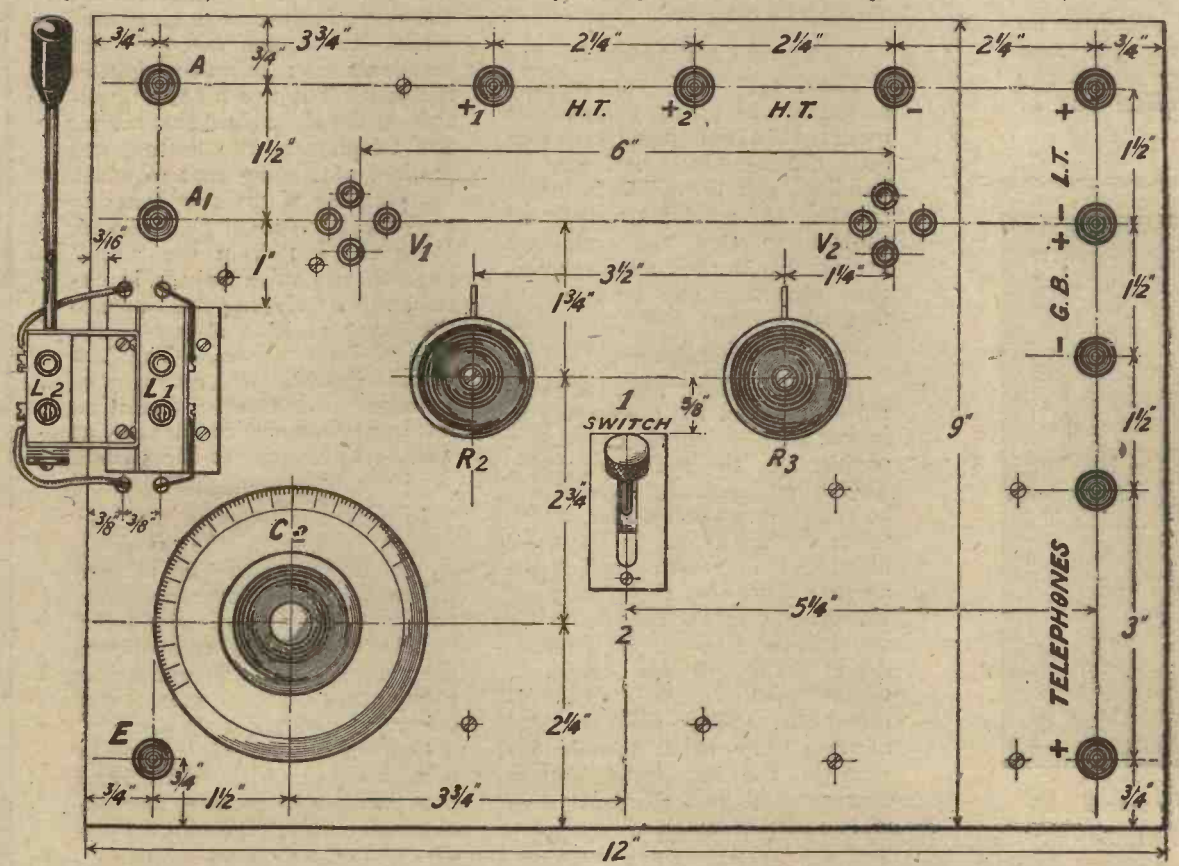


Fig. 2.—Drilling dimensions and all details relating to the layout of the panel may be obtained from this illustration.

may be carried out with little difficulty by reference to the front of panel drilling diagram of Fig. 2. If, however, such a panel is not obtained, it is advisable that the surface be first removed, using emery cloth. The only hole which may present difficulty is that which allows of the mounting of the double-pole two-way switch. If, however, two ¼-in. holes are drilled at a distance of about 1 in. apart on the centre line which takes this component, the necessary slot may be readily made by using an ordinary fret saw. In the actual receiver shown the holes for the valve legs have been tapped and no nuts used, but it will not be found detrimental if clearance holes are drilled and nuts used to secure the legs. The variable condenser is of one hole fixing type, and no difficulty will be found in mounting this, while the transformer is secured merely by four screws through the panel, and nuts. The clips for the plug-in condensers are similarly secured, as is the unit taking the grid condenser and its attendant leak. One clip of the constant aerial tuning condenser is held by the A terminal nut, as are both clips of the condenser across the telephone terminals.

Wiring

Wiring is carried out with No. 16 gauge tinned copper wire, as this is amply rigid for the purpose, and will be found less difficult to handle than that of square section type. It is advisable that the filament circuits and others with the wiring close to the panel be first completed, and finally the wires to the switches should be soldered in position. The long lead seen going from the centre right-hand contact of the switch has its end near the edge of the panel close to the coil-holder inserted into a small hole in this latter for the sake of rigidity. To it is soldered a small length of flex, which is taken through the panel and actually makes the connection to the reaction socket. For the other reaction lead a length of flex has been used, and this is taken from the plate of V1 through the panel to the plug of the coil-holder. In order to further remove any difficulty which may exist a drawing of the switch is given in Fig. 3, and the connections from the various contacts clearly marked.

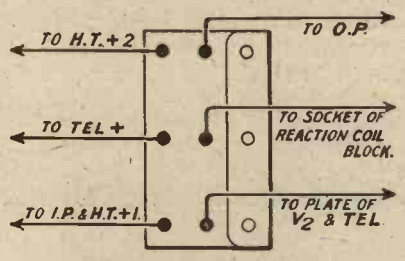


Fig. 3.—The connections to the switch.

Testing the Receiver

To test the set for wavelengths below 420 metres, first connect the aerial to terminal A and earth to E, inserting a No. 50 coil in the aerial socket, that is, the fixed socket of the two coil-holder, and a No. 50 or 75 in the reaction socket. For wavelengths above 420 and below 600 a No. 75 should be used for the aerial with a reaction coil of the same

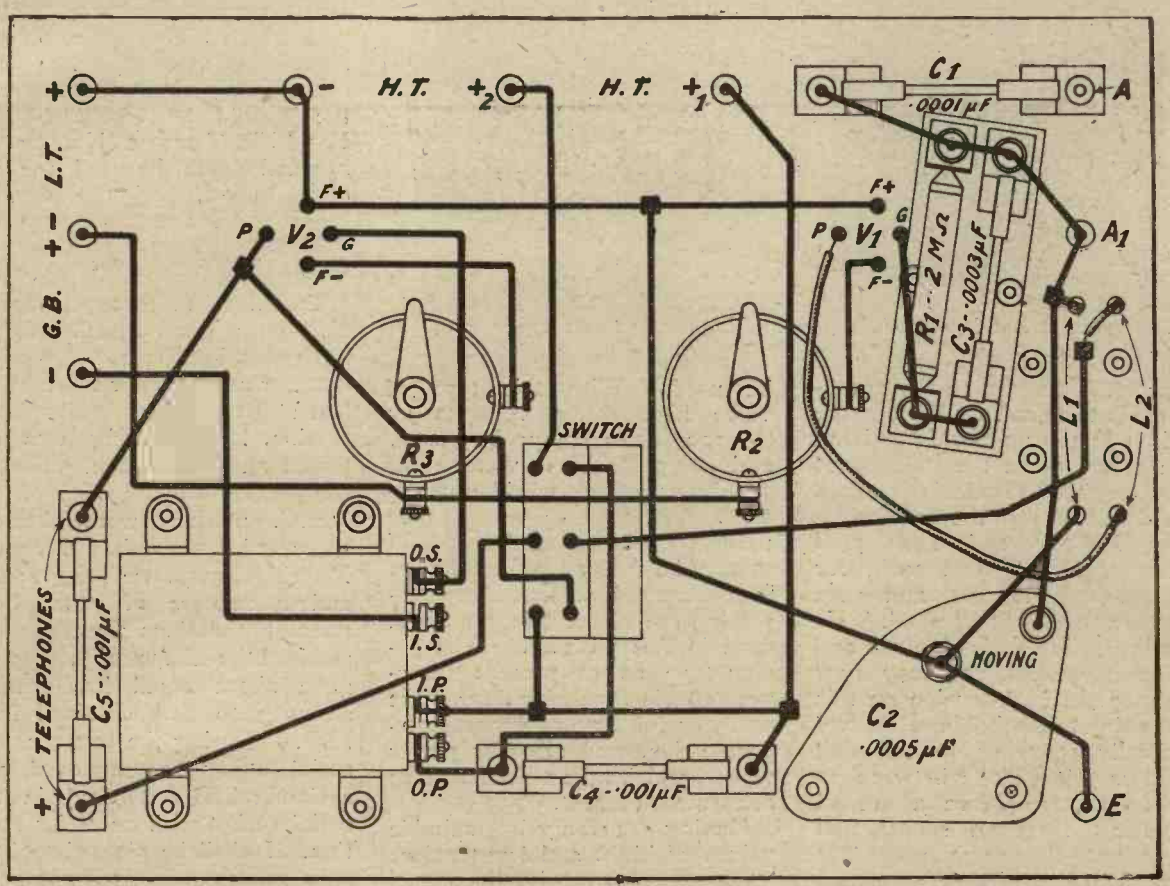
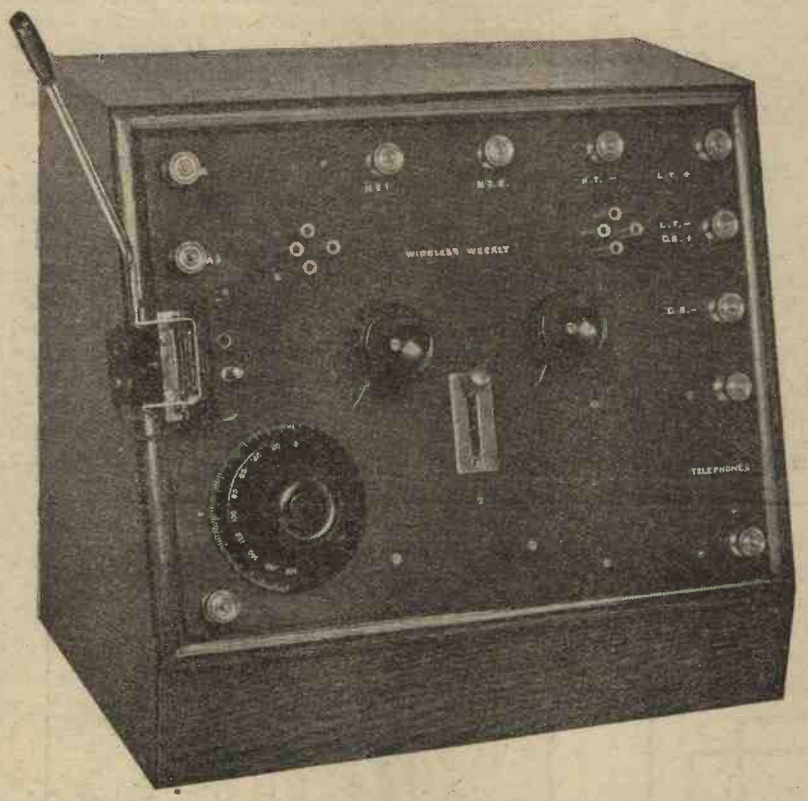


Fig. 4.—The wiring of the receiver may be carried out with the assistance of this practical illustration.

value. First connect an appropriate low-tension battery between the L.T. plus and minus terminals, and this in the case of .06 valves may be either a 4½-volt dry cell or a 4-volt accumulator. With the rheostats in the off position, first plug the valve into the socket V1 and turn the filament resistance on slightly, noting whether the valve lights correctly. Carry out the same procedure for the second valve, and then connect the negative of your H.T. battery to the appropriate terminal. With the switch in the up position giving one valve, place the telephones between the terminals marked "Tel" and tap the connection from H.T. + 1 into a small value of high-tension such, for example, as 6 volts, and note whether a slight "plonk" is obtained. If this is obtained and all seems correct, you may now advance the high-tension on this first valve to a suitable value, and generally speaking for .06 dull emitters this will be between 30 and 60 volts. Place a second valve in the second socket, and carry out the same procedure with regard to its high-tension supply with the switch, of course, in the 2-valve position. Satisfied that all is correct so far, it now remains to insert a suitable grid-bias battery between the plus and minus grid-bias terminals. This will, of course, depend on the type of valve used in the second socket, and if an ordinary .06 valve is used up to 80 volts H.T. may be applied with a grid-bias battery of about 3 volts. Alternatively, in the last socket one of the small-power valves, such as the B.6, etc., may be used. With this type of valve high-tension voltages up to 120 volts may be used, and a grid bias voltage of the order of 4½ will be necessary. The type of valve to be used in the last stage should, of course, be decided before the set is constructed, so that an appropriate type of resistance may be used in this position. The 30-ohm type as at present incorporated is suitable for the ordinary .06 type of general-purpose valve, and also for power valves, which take a similar value of filament current.



The symmetrical layout of the panel adds greatly to its appearance.

Having arranged suitable values of high- and low-tension, it now remains to give the set an aerial test. To carry this out, first arrange the aerial and reaction coils at right angles and rotate the condenser C2 until signals are heard. Next bring the coil L2 nearer to L1, retuning on C2, and note whether the signal strength improves. Providing that the set is wired as per instructions, signal strength will be found to improve as L2 is brought nearer to L1 and retuning carried out on the aerial condenser. If, however, some other type of coil-holder or arrangement is adopted, and bringing L2 nearer to L1 does not increase signal strength, the leads to the former coil should be reversed.

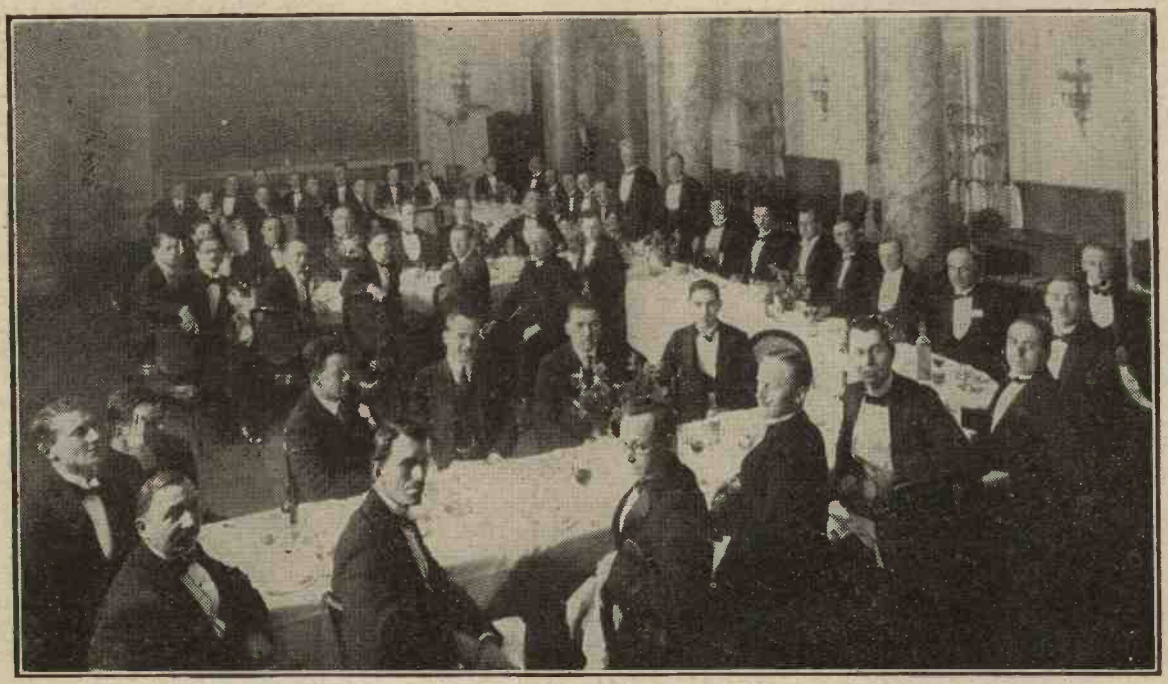
Using plain aerial tuning, it will be necessary to use a No. 25 or 35 for stations up to 400 metres or so, and above this a No. 50 should be employed. For reaction a No. 50 or 75 will be necessary, depending upon the efficiency, etc., of the aerial system. The correct size of reaction coil will, of course, be determined by experiment. The coils given are for the broadcasting wavelengths, and for 5XX a No. 150 coil will be necessary for L1, using plain parallel tuning, whilst for reaction a No. 200 coil should be satisfactory. These coils will also be satisfactory for the reception of Radio-Paris. For Eiffel Tower a No. 200 or 250 coil should be used for the aerial socket, and a somewhat larger coil for reaction purposes.

Test Report

Tested 12 miles south-east of 2LO on a good aerial, using a .06 general-purpose valve as a detector and a power valve in the last stage with 100 volts high-tension, loud-speaking was obtained on that station, whilst in the phones the majority of the B.B.C. stations were obtained at good strength. Munster, Madrid, Postes et Telegraphes, and a number of other Continental stations were also received satisfactorily. 5XX gave about equal loud-speaker strength to that obtained from 2LO. During the test constant aerial tuning was employed, and a Gambrell B coil used in the aerial socket with an A for reaction. I shall be pleased to hear from readers who decide to build this receiver.

OUR AMERICAN VISITORS

Radio Society Dinner to Well-known U.S.A. Amateurs



The company assembled for dinner at the Waldorf Hotel.

TAKING advantage of the presence in this country of the delegates sent by the United States and Canada to the recent wireless conference in Paris, the transmitters and relay section of the Radio Society of Great Britain entertained the visitors to dinner at the Waldorf Hotel on Friday, April 24. The chair was taken by Mr. Bevan Swift, chairman of the T. and R. section committee, among the guests being Mr. Hiram Percy Maxim, President of the American Radio Relay League; Mr. Kenneth Warner, Secretary of the League and editor of the famous American radio journal, *Q.S.T.*; and Major Borrett (representing Canada).

As will be seen from the photograph on this page, there was an excellent attendance, most of the British amateurs who have done so well in communicating with the United States, Canada, Australia and New Zealand, being present. Captain Durrant (GHH), whose wireless transmissions from Mosul, Mesopotamia, have become famous, reached England just in time to attend the dinner, and made a most interesting speech.

The Society were also fortunate in being able to include in the invitation M. Mesger, the French representative of the newly-formed International Committee described in our last issue.

The meeting broke up at quite a late hour, and will be long remembered as one of the most pleasant events in the history of British amateur radio.

A corner of the studio of the Eiffel Tower. A full description of this station was given in our February 11th issue.

LONG LEADS FOR LOUD-SPEAKERS.

Mr. A. E. R. Gilligan, the England cricket captain, broadcasting from the London station.

A GREAT many people nowadays desire to make use of an arrangement which will enable the loud-speaker to be used at will in one or two rooms. In other cases, again, two loud-speakers are required to work simultaneously from the same receiving set, as, for instance, when one is in the drawing-room and the other in the servants' quarters. To obtain pure and undistorted reception of broadcasting either from the same loud-speaker when used in different rooms or from a pair of loud-speakers working in different parts of the house, is sometimes rather a problem, especially if one point is much more distant from the set than the other.

A Common Arrangement

One of the commonest arrangements is that shown in Fig. 1, in which plug and socket attachments in two rooms are seen wired in parallel. With this arrangement the loud-speaker is usually placed in room No. 1 whilst tuning is done, and is then taken to the second room. If the two are a good distance apart it is often found that reception here is of not nearly such good quality as it was in the first instance. The reason is that there is considerable capacity between the flex leads which are generally used for wiring up loud-speaker points.

When the loud-speaker is removed to a distant room there

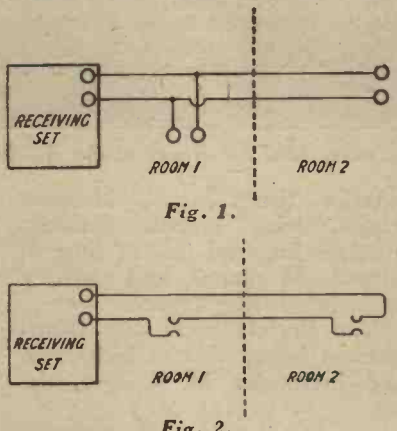


Fig. 1.

Fig. 2.

Showing two methods for wiring distant loud-speakers.

is a great deal of wire in use, and the extra capacity is often sufficient to produce woolly and rather muffled reception. A simple and often quite satisfactory way of dealing with this is to remove the condenser across the output terminals of the receiving set and to fit in its stead a pair of clips on the surface of the panel. A clip-in condenser of suitable value can then be used when the loud-speaker is in room No. 1, and if necessary another suitable condenser when it is in the second room. Or again, one may find by experiment a shunt capacity which will give satisfactory results in both rooms, a capacity, that is, not large enough to cause muffling in either room.

On the whole, however, it is, I think, better to adopt the method shown in Fig. 2. Here jacks wired in series are used, the leads of the loud-speaker itself being connected to a plug. In this case the amount of wire in circuit in the loud-speaker leads is always the same to whichever point the loud-speaker may be connected, so that the results obtained in one room will be identical with those in the other.

Plug and Socket

A very satisfactory method of carrying out series wiring without the use of plugs and jacks is seen in Fig. 3. The jack is replaced by an ordinary plug and socket mounting fixed to the wall in any convenient position. Normally the connecting plug, which is simply a plug and socket coil mount with a metal strip connected across its terminals, is kept in the mounting upon the wall. When it is desired to use the loud-speaker this plug is removed and replaced with that attached to the leads of the instrument. This method is equally useful for working one loud-speaker at will in

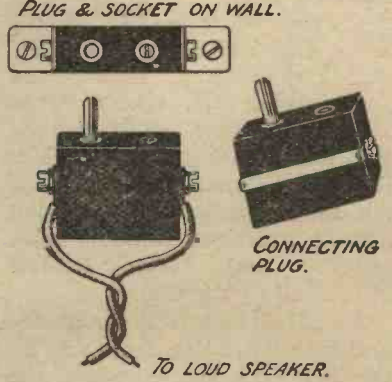


Fig. 3.—A suggested wall plug arrangement.

different rooms or for operating two simultaneously in distant parts of the house.

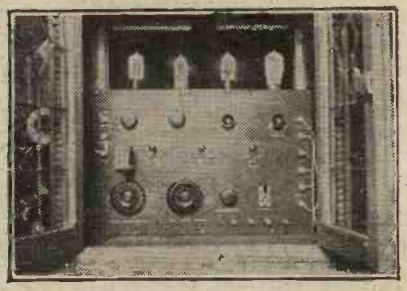
R. W. H.

ENVELOPE NO. 2

SIR,—I enclose herewith photographs of a Family Four-Valve Receiver, Radio Press Envelope No. 2, which I have constructed, and wish to say that I find the set a very useful and interesting one. I can receive every B.B.C. station at sufficient strength to work a loud-speaker, and have also received many foreign stations at loud-speaker strength.

As well as being an ideal family set, it is as suitable for a keen amateur.

Being only a mile and a half from the Hull station, I can work a loud-speaker at terriffic strength.



Mr. Hubbard's Four-valve Family Receiver

I have built many sets, but find this set far superior in every way, and the "people" are delighted at the ease of operation, just pulling a switch over.

I wish to say that I am a regular reader of *Wireless Weekly*, *Modern Wireless* and *The Wireless Constructor*.—Yours faithfully,

A. KEN. HUBBARD.

Hull.

AN INTERESTING POINT

SIR,—In "Random Technicalities," April 22 issue, I note that Mr. Percy W. Harris refers to the use of a voltmeter for measuring the voltage across the filament of a valve, but there is one point in connection with this use of a voltmeter which he does not mention, but which is in many cases of great importance. I refer to the resistance of the voltmeter, which should be as high as possible, particularly when used in connection with dull emitter valves of the .06 type, otherwise the filament voltage while the voltmeter is connected across it is considerably lower than when the instrument is removed, and I have known a .06 valve to be ruined through the use of a cheap voltmeter in this way. Many cheap voltmeters have a resistance of about 25 ohms, and if such an instrument is used across a .06 valve and the rheostat adjusted to give a reading of 3 volts, the battery voltage being 6 volts, a simple calculation will show that on removing the voltmeter the filament will have a voltage of nearly 4½ volts across it. Of course a 4-volt battery is generally used with such a valve, and the effect is not then quite so bad, but even with a 4-volt battery and a Weston Model 301-0-5-volt voltmeter having a resistance of about 250 ohms the increase on removing the instrument is about 5 per cent. Personally I use a voltmeter having a resistance of about 2,000 ohms, which is, of course, quite satisfactory.

Thanking Mr. Harris for the interesting notes he gives week by week in "Random Technicalities," which, I may say, is usually the first section I turn to upon receiving *Wireless Weekly*.—Yours faithfully,

T. A. LEDWARD.

Great Crosby.

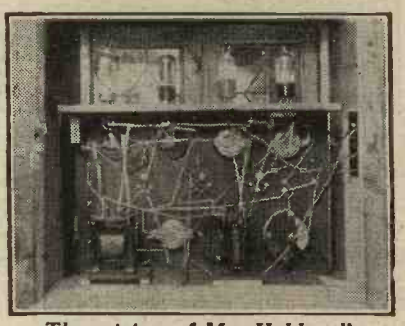
AERIAL INTERACTION

SIR,—*Re* the remarks in your paper on the dates of March 4 and 11, concerning the interaction between transmitters and receivers placed in the same room, I have noticed the same effect with the aerial current obtained at 2ACK when the receiver has been tuned to the same wave as the transmitter. I have a 1D.H. transmitter, using a Mullard 0/10 valve with 300 volts D.C. on the plate and with input of 32 milliamps. I usually have .43 amps in the aerial, but with the receiver tuned to the same wave the reading is .54 amps., and signals reported by 6UY as weaker than usual. Upon detuning the receiver the aerial current drops back, but signals increase in strength. The next experiment was to connect one side of the twin inverted L aerial direct to the fan counterpoise, which put the aerial current up to .83, but signals were hardly audible at a distance of five miles. After this different sized counterpoises were tried, but no difference was noticeable in the strength of signals received by 6UY. The fact that the aerial current increased by connecting one side to counterpoise I cannot explain, as this has still to be experimented with, I am sure some other transmitters have had the same experience, and I should be interested to know how they succeeded in overcoming same.

Wishing all your papers the best 73's.—Yours faithfully,

C. PROSSER (2ACK).

East Aberthaw, near Cardiff.



The wiring of Mr. Hubbard's receiver.

A LOW-LOSS TUNER FOR SHORT WAVES

SIR,—Although a number of reports have appeared in *Wireless Weekly* of this fascinating instrument, I feel that another would not be amiss.

I constructed this set last January according to instructions by Mr. Percy W. Harris, and had no difficulty in receiving KDKA the first time I tried it out, also a number of amateurs from "all parts." I experienced, however, considerable trouble with the reaction having a lot of overlap. This difficulty was surmounted by fitting a variable grid-leak, which in my case effected an improvement.

I was using a Marconi R valve as detector, followed by a D.E. 5. I found, however, an R. 5V. gave far better results than the R, but still the set was inclined to oscillate too freely. I decided to use separate H.T. to each valve, using 45 volts on the detector and 90 volts on the magnifier. This improved reception

by 50 per cent., and the set was much easier to handle.

I have now replaced the R. 5V. with a D.E. 5B.; this is the best combination so far, using 30 and 90 volts on the detector and the L.F. valve respectively; reaction control is perfectly smooth and signals are received with great volume.

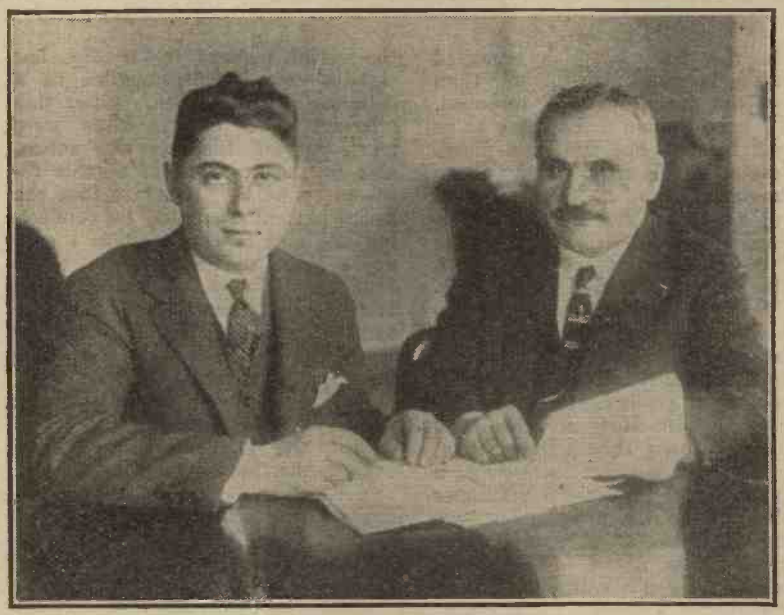
I am now about to try a D.E.V. as a detector.

Without using any aerial connection at all I have received a number of Continental and American amateurs, and also an Italian station.

Mr. Percy W. Harris is to be congratulated on such an efficient set combined with simplicity.—Yours faithfully,

R. AMOORE.

Midhurst.



Dr. Marius A. Latour (right), the well-known French inventor, who is now in the States investigating the question of infringement of his patents.

THE TWIN VALVE RECEIVER

SIR,—I think you might be interested to hear of some results from your "Twin Valve" described in *The Wireless Constructor* for January.

Results are the finest that myself and scores of friends have ever heard, the aerial being about 80 ft. long and average height about 35 ft. single.

All stations in England come in, Birmingham and Bournemouth while 2LO is working, the latter (Bournemouth) on Sterling "Dinkie," perfectly audible at about 7-8 ft. on speech, while music is quite loud. Sunday nights between 5.30 and 8.30 most of the French and German stations are quite audible in the phones. Three Sundays ago conditions must have been very good, or else I was particularly lucky, as Hamburg, broadcasting opera, was heard by all the members of my family on the loud-speaker, sitting about 3 ft. away. I have now had sufficient time to judge the capabilities of this set, and I doubt whether there is a more efficient type of set on the market made by an amateur.

London is painfully loud on the speaker, and the set has to be detuned.

I hope this letter will be of some interest, and if only those howlers would give up those "super" sets and build one such as the "Twin Valve," I think there would be more peace during broadcast hours and better results.—Yours faithfully,

E. W. SHEPHERD

Upton Manor, E.

P.S.—This is no first set effusion, as I have made four sets from *Modern Wireless* and *The Wireless Constructor*.

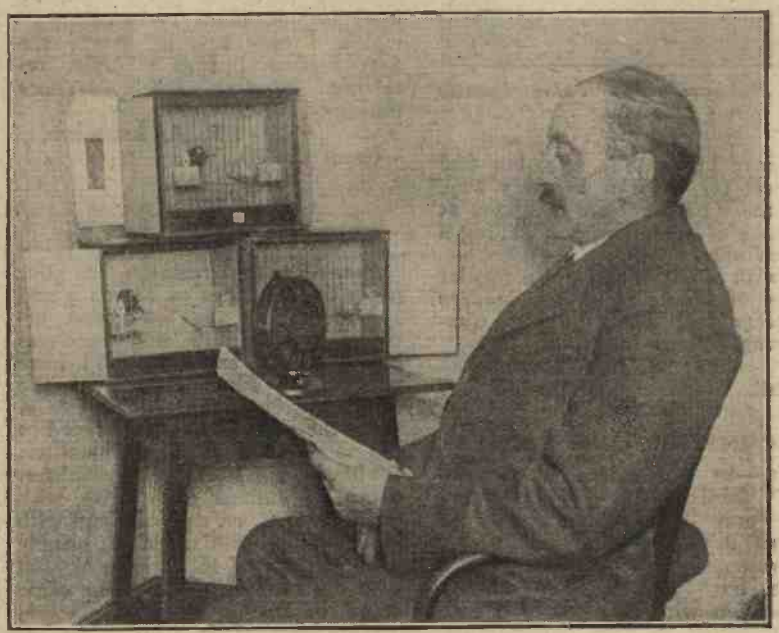
ANGLO-AMERICAN SET

SIR,—Once more I must heartily congratulate Mr. Harris on his "largest" production. I have now completed the set, and enclose brief note of results obtained the first evening; as a matter of fact, I find it takes at least a month to really learn all the fine shades of handling several valves.

It may be assumed that my aerial and earth are very good, but I am in the midst of bricks and mortar and partly screened by a big factory and barely three miles from 2LO.

The constructional description has been rigidly adhered to, and the only change in components is that the dual condenser is Sterling Square Law.

Valves are 5 D.E.R. and last stage D.E.6. Within a few minutes of completing the wiring I was listening to Rome, obtained with a purity that was astonishing. No doubt it was a good reception night, for the strength was strong phone, and so clear that I could actually follow the leading players in the orchestra. Other stations were equally good in every respect; in



Mr. J. Tomlinson and his canaries broadcasting from the Birmingham station.

fact, my marginal notes were "Crystal Purity," and there was no forcing whatever necessary, and the control of reaction was as smooth as is possible to imagine. With the aid of a wave-trap Manchester was received at full phone strength, and not the slightest vestige of the 2LO band could be heard, a condition I have not obtained before without Manchester being more or less distorted.

As one would imagine, tuning three stages of H.F. would be so difficult as to make one hesitate before adopting it. However, on trial, I can confidently say that the tuning is so easy that I almost feel that the charm of searching has been lost. Perhaps a strange way to word it, but, nevertheless, it is absurdly simple. Since then I have had several American stations at decent strength, but feel that I shall do better when I have got the neutrodyne condensers properly adjusted. This, of course, is the ticklish part, but, after all, not above the ordinary wireless fan's capacity. Yes, the set is more than worth while; it is a perfect treasure, and, like many others, I feel that I have probably reached high-water mark at last. Like the tale, my wife says, tell Mr. Harris not to dare to produce another and better set. Well, in the natural order of progress I suppose he will, but I think it will be a long time before he does.

I have also received several stations not before heard and untraceable, and as I know a smattering of French, Italian, Spanish and German, these were ruled out.

I should finally like to thank Mr. Harris for the several splendid sets he has produced for us at different periods.

Recently I had a particular friend to test the set, one who has jibbed at two stages of H.F. tuning, but he left quite converted to three stages, and we both agreed that it was a circuit without parallel and could be highly recommended to any amateur with a certainty that the utmost satisfaction would be guaranteed.

So far I have not tested out the low-frequency thoroughly, as I wished to get the H.F. perfect first, but I have heard enough to convince me that the L.F. stage will be quite up to the standard.

One word, so far as my set is concerned. The filament control is very critical and requires care, but once set it can be left untouched if a master rheostat is used.

Wishing you every success and promising to let you know at a later date some more results.—Yours faithfully,

CAPTAIN J. P. HALL.

Kentish Town, N.W.

A NEW CRYSTAL-VALVE CIRCUIT

SIR,—*Re* the single valve-crystal receiver described in the March issue of *The Wireless Constructor*, I beg to thank you for publishing this arrangement.

I have made up a rough set according to the theoretical diagram, and am so satisfied with it that I have coupled it up to a power amplifier. I have had Glasgow on the loud-speaker (when London had closed down) and I have been able to identify four U.S.A. stations. This is the more remarkable inasmuch as I only use an indoor aerial (of my own design). The "earth" is the input water pipe, crystal "Neutron" Formo 3:1 transformer, a DE5B valve which I borrowed from my five-valver.—Yours faithfully,

R. J. WAINWRIGHT-BROWN.

London.

BROADCASTING IN INDIA

SIR,—The enclosed cutting *re* broadcasting in India may be of interest to you.

The conditions out here are very difficult and X's and mush perfectly awful. Some evenings it is impossible even to put the headphones on, the noise is so terrible.

Situated as I am in the centre of India and with Indian stations at

present only of 500 watts, using a Marconiphone V2 set, one has on most occasions to bring reaction absolutely to the critical point.

This is also due to the difficulty of getting a good earth with the ground absolutely baked and subsoil water level being about 25 ft. below ground level.

I have worked with a counterpoise and have had better results, but it is very difficult I have found to make the V2 stable with that arrangement. Some "body" capacity has to be applied by keeping hold of the aerial tuning side handle, otherwise howling starts immediately.

Your articles on "Reception Conditions Week by Week" are interesting reading, and if I can find time I shall write you a few notes on Indian conditions more fully.

I had my set in Bexhill for eight months in 1924, and I am therefore able to judge better the difference than most people in India who have never heard home broadcasting.

I got a European station one night at 9.30 p.m. to 10 and could recognise *the announcing* as being German or Dutch, as I had heard it so often last year. I was unable to identify the station, as reception was only good now and then. An organ recital came in well. The wavelength was about 330 metres.

During the last month I have on Thursday evenings been getting "Colombo Calling," *i.e.*, 1,200 miles from here, and the results, with much X's, were fit to go on to the loud-speaker.

Quite a number of the ruling princes in Central India are interested, and now that an Indian company for broadcasting is to be formed, there will be a big demand for good, powerful sets from them in the near future.

The dry atmosphere in the Central parts of the country is, however, making rather a sorry mess of the cabinets, even though mine are kept covered all day and a bowl of water beside them.

Your new journal, *The Wireless Constructor*, is very interesting, and fills a demand which only your firm foresaw.

Best wishes to *Wireless Weekly*, *Modern Wireless* and *The Wireless Constructor*.—Yours faithfully,

Indore. A. E. J.

"It is officially announced that the Government of India is prepared to grant a licence to private enterprise, under certain conditions, for the provision of a broadcasting service by means of stations to be erected in British India. The Government will require one company to be registered under the Indian Companies Act with rupee capital, of which at least 60 per cent. must be offered for subscription in India and with a majority of directors in British India. A licence will be granted to the company for a period of ten years, and during the first five years the company will enjoy a monopoly of broadcasting. The Government will not undertake to contribute any capital nor to guarantee interest on capital. No restriction will be imposed upon and no monopoly will be permitted as regards to manufacturing and sale of apparatus for wireless telegraphy.

"The Government of India are further prepared to consider, if necessary, the formation of a separate company to provide broadcasting services for Burma under similar conditions."—Associated Press.

A LOW-LOSS CRYSTAL SET

SIR,—I thought it might interest you to know the excellent results which I have had from a "Low-Loss" crystal set as described by Mr. Percy W. Harris in the February issue of *The Wireless Constructor*. The set has been made exactly to specifications, the connections being soldered and square-section wire being used. The coil

is as described, about ¾ lb. of 16 d.c.c. wire being used. The condenser is a Fallon 0.0005 μF and the crystal detector a G.E.C. unit detector with a Neutron crystal and silver catwhisker. The aerial is 70 ft. long and 25 ft. high, and the earth consists of a galvanised iron rod 4 ft. in length driven into the ground immediately below the set and about 6 ft. away. The results, which are as follows, surprised me exceedingly: London (40 miles) comes in at excellent strength, while Chelmsford (70 miles) is so loud as to be almost uncomfortable. Bournemouth (85 miles) is easily readable, and a station which I believe to be Radio-Paris comes in regularly every evening. Its wavelength is about 1,700 metres, so I think that it must be so, as its times correspond with those of Radio-Paris. I have also received two other stations, one of which I believe to be Newcastle. It was, however, too faint to be readable.

Thanking you for the splendid set and wishing your publications every success.—Yours faithfully,

PHILIP R. N. HEATH

Horsham.

AN IMPROVED TWO-VALVE RECEIVER

SIR,—I have much pleasure in sending report of success obtained with the "Improved Two-Valve Set" by Stanley G. Rattee, in *Modern Wireless*, January issue.

On an ordinary single wire outdoor aerial 70 ft. long, 30 ft. lead-in, we received Manchester, Liverpool, Birmingham and Chelmsford on loud-speaker moderately loud. All the B.B.C. stations, including relay stations, good 'phone strength. We consider it exceptionally good to get four stations at loud-speaker strength on a two-valve set. We are 21 miles from Manchester and 30 miles from Liverpool, and greater distances from Birmingham and Chelmsford.

I thought you might be interested to know our results.

Thanking you for your valuable information given in *Wireless Weekly*, *Modern Wireless* and *The Wireless Constructor*.—Yours faithfully,

J. AND J. E. KETTLE.

Northwich, Cheshire.

THE 3-VALVE DUAL RECEIVER

SIR,—Regarding the Three-Valve "Dual" set of *Modern Wireless*, April issue, 1924, doubtless you and perhaps your readers will be interested in the results I have obtained with this set. I can get at least one American station *every night* after 11 p.m. The extent of audibility depends not so much upon the state of the atmospherics as upon the local oscillating fiends, who, unfortunately, are very many. I have had both WGY and WBZ on the loud-speaker. Madrid, several German and French, and Brussels quite good on the loud-speaker. I am less than one mile from 5IT, and yet I can pick up all the B.B.C. stations whose wavelengths are below Newcastle's on the loud-speaker while 5IT is transmitting, without any interference. I have built several valve sets, but in my opinion this set is equal to the best four-valve set yet known. I think it will beat your splendid staff to devise a better circuit. Wishing you and your papers every success.—Yours faithfully,

W. T. PARKER.

Birmingham.

Apparatus we have tested

Conducted by A. D. COWPER, M.Sc., Staff Editor.

The "Ultra" Hornless Loud-Speaker

The latest pattern of the "Ultra" hornless loud-speaker, reference to an earlier pattern of which was made some time ago in these columns, has been put to an extended practical test in daily broadcast reception for several hours a day, by the writer. This instrument, supplied by Messrs. E. E. Rosen & Co., resembles a small cake-basket or bonbon box in outward appearance, being only 5¼ in. diameter and standing 2¾ in. high on its rubber feet. It is highly finished in polished nickel plate, with a coloured lining visible through the perforated sides and grid top; it is actually inconspicuous in appearance in a living-room, when stood on a table or mantleshelf, and can readily be concealed by flowers or table decorations. Some suggestion of the modern small type of broadcast microphone is given by the general appearance, though it is intended for use in a horizontal position.

The Working Principle

The principle is that of a very large, light, thin-dished diaphragm concealed behind gauze, and actuated by a normal type of electro-magnetic mechanism in the base. The tone is actually rather better on music than on speech, but the latter comes out much clearer than in many types of horned instruments. The power is slightly less than with an efficient modern instrument of the latter type. With a sub-urban aerial and three valves (o—V—2, transformer-coupled), the last a small power valve, music and speech are audible throughout a large house if the instrument is placed in the hall; but in general, it is rather an every-day speaker for a living-room of moderate size than one suitable for use in large halls, etc. For this purpose, and for carrying about from point to point in a house for convenience in listening to an extended programme, at the moderate price asked for this little instrument it can certainly be recommended. Critical tests, as, for example, on a special piano recital recently transmitted from 2LO showed a very pleasing quality and wide range of response.

Information Department

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A.F.(LEEDS) uses a 4-valve receiver consisting of one H.F., detector and two low-frequency valves, the latter two stages using power valves, and complains that his loud speaker, is frequently breaking down.

The windings of some loud-speakers are delicate in nature, and we suggest that your own instrument is not sufficiently robust for use directly in the anode circuit of the last valve. We would advise that some method of isolating the windings from the direct anode supply to the valve should be adopted. Two simple methods may be adopted, and these are as follows: (1) The use of some type of filter circuit. This may consist of an ordinary type of choke coil, such as is used for low-frequency amplification, and should be placed in the anode circuit of the last valve. Between the anode side of this choke coil and the loud-speaker should be connected a large condenser of 1 to 2 μF, and in this position a Mansbridge type is suitable. The other side of the loud-speaker should be connected to the side of the choke going to the high-tension supply. With this arrangement the direct current supply to the anode of the valve is carried by the choke and does not pass through the loud-speaker windings, since the large condenser in series with the loud-speaker windings completely stops the passage of direct current. The fluctuating currents representing signals are, however, communicated through this and actuate the loud-speaker. (2) An output transformer in the anode circuit of the last valve. This may be either of a 1 to 1 ratio or one suitable for use when 120-ohm telephones or loud-speaker are used.

J.U.R. (BEXLEY) possesses a loud-speaker of the hornless type which he built from published instructions, using a pleated paper diaphragm. When first used the instrument gave quite good reproduction, but in the course of a few weeks the results steadily deteriorated, and now the quality is harsh and certain notes produce entirely false sounds from the instrument.

We have met with a number of

cases of this general type in which the loud-speaker diaphragm consists of paper which has not been protected in any way against damp. The cause has proved in most cases to be simply an alteration in the tension of the diaphragm produced by moisture, which is usually unequal to its distribution. Very careful and slow drying at some little distance from a fire will usually effect a cure. Attempts have been made to render such diaphragms proof against moisture, but so far no success has been reported to us. It seems extremely difficult to discover a varnish or other proofing agent which furnishes really adequate protection to the paper without unduly increasing its thickness.

H.K. (BROCKLEY) submits two alternative panel layouts for a two-valve receiver and asks us to pass an opinion as to the relative desirability of the two arrangements.

Our correspondent's two panel designs illustrate very forcibly some of the mistakes which the beginner is apt to make, and the points which they raise should be of general interest to our readers. The two designs were drawn for him by two different friends, and while one incorporates a number of serious mistakes, the other strikes us as an extremely good and practical layout.

The first one shows both the valves and the two condensers arranged in a row along the back of the panel, it being understood that the panel would be mounted to form the lid of a flat-topped box, while the two-coil holder is along the front of the panel, in line with the two rheostats, the single socket for the aerial coil being placed upon the end of the box. It is to be observed that in the case of a lay-out of this sort it is necessary to stretch one's arms up across the top of the panel, close to the coils, in order to reach the tuning condensers. Hand capacity effects are therefore likely to be troublesome, and it will be easy to inadvertently upset the coupling adjustments between the coils. Further, the arrangement of the two condensers is undesirable, in that the anode condenser is placed upon the left, whereas the aerial condenser is upon the right, and from this it follows that the leads to these two condensers would be unnecessarily long. Their positions should be reversed.

The position of the socket for the aerial coil is also open to question, since there is ample space for this socket upon the panel and it could quite easily be placed so as to be comfortably out of the way of the operator's hands and at the same time to dispense with the necessary flexible leads which would be involved by the alternative position upon the side or end of the box.

The alternative design shows how by a little thought one can overcome all such little difficulties as these, and the general layout is as follows: The two valves are placed at the back of the panel, and midway between them is placed the two-coil holder, in such a way that there is ample room for the two coils to open and so that the adjusting knob may easily be reached. At the left-hand rear corner of the panel the socket for the aerial coil is located, while along the front are the two filament rheostats, and immediately behind them the two tuning condensers, these latter being correctly placed so that the leads from them to their respective coils are reasonably short. It will be seen that in operating the set, with the hands resting upon the two condenser knobs, the wrists only pass over such portions of the wiring, etc., as are at earth potential so far as high-frequency oscillations are concerned.

The Latest in

Wireless Receiver Design

Not a month passes without various improvements and sometimes important advances being made in the field of science. New principles are discovered, the application of old ones more thoroughly understood, and fresh developments made.

This applies in particular to the science of wireless, and here progress is so rapid that sometimes barely a day passes but some new discovery is announced.

You can keep in touch with these new movements and read of the latest developments and schemes within the shortest possible time of their inception, by reading "Modern Wireless."

Every month this valuable paper brings you the most recent discoveries and presents them to you in clear non-technical articles. They can be read with perfect understanding by the novice and yet are detailed enough to give the advanced experimenter a clear insight into the matters dealt with.

The May issue of "Modern Wireless," for example, contains detailed descriptions of many new and original sets, which fully cover the latest trend in design of wireless receivers incorporating the most modern improvements. Not only are photographs shown of the actual sets but all the completely dimensioned diagrams necessary to construction are given with full instructions as to assembly and operation.

Of particular interest is Mr. John Scott-Taggart's article describing a new and powerful "Nine-Valve Supersonic Heterodyne Receiver," as illustrated above. Full constructional details are given and the information contained in this article goes far beyond anything that has yet appeared in print on this fascinating subject.

Sets of simple design suited to the beginner, technical articles for the amateur and pages of interesting information all combine to make this issue of "Modern Wireless" one of the finest numbers that has yet appeared. You should not be without a copy, and if you would make sure of getting this issue buy or order it at once from your local bookseller.

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Buy or Order Your Copy To-day

A Selection from—

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Modern Wireless

Edited by John Scott-Taggart, F.Inst.P., A.M.I.E.E.

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Wireless Weekly

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MOISTURE AND TUNING COILS

By G. P. KENDALL, B.Sc.

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EDITED BY JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

First-Hand Information for Radio Press Readers

FOR some time past Radio Press, Limited, have been considering how best they can present to their readers a true picture of wireless conditions in America, in regard to both technical developments and the conduct of broadcasting. Although a number of articles by eminent Americans have appeared in the pages of the periodicals controlled by this organisation, it has been realised that a true picture can only be presented by one who is in a position to make accurate comparisons between British and American methods, and who fully realises the true significance of the technique in both countries.

Bearing these facts in mind, Radio Press, Limited, have now arranged to send Mr. Percy W. Harris, Editor of *The Wireless Constructor* and Assistant Editor of *Wireless Weekly* and *Modern Wireless*, on a visit to the United States and Canada. He will investigate thoroughly the present position of radio, while his own prestige in America and the letters of introduction he will carry will enable him to obtain an insight into transatlantic conditions, which will be reflected in an important series of articles he will forward to this country from time to time. Readers of *Wireless Weekly*, *Modern Wireless* and *The Wireless Constructor* will therefore be in the happy position of learning from the pen of one who is known so well to all of them, whether or not the average American receiver is superior in selectivity and range to the average British instrument; just what reliance can be placed upon the reports of long-distance reception which figure so prominently in American radio magazines; if the interference between broadcasting stations is really so bad as is so often suggested; how the American amateur builds his own receiver; how American valves compare with British valves; and hundreds of other matters which are of everyday interest in wireless, and to which satisfactory answers have never yet been given.

Mr. Harris will pay particular attention to the present state of the supersonic heterodyne receiver in America, and will have an opportunity of testing under working conditions all the leading makes and circuits which are in favour at the present time.

Mr. Harris will sail for America on Saturday next, May 16, on the great Cunard liner, the *Berengaria*, and will commence his investigations in New York. From this city he will proceed to other great centres, including the Middle West and the Pacific coast, concluding his trip in Canada. His articles will, of course, appear exclusively in *Wireless Weekly*, *Modern Wireless* and *The Wireless Constructor*, and will be eagerly awaited by the great public for which these journals cater.

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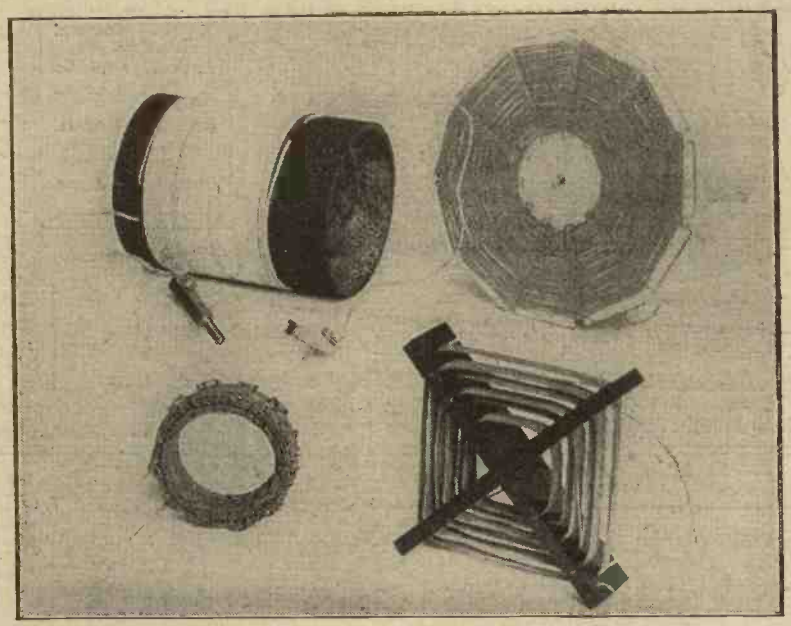


These four coils were used as typical specimens of their various classes in the measurements described in this contribution.

Moisture and Tuning Coils

By G. P. KENDALL, B.Sc., Staff Editor.

I SUPPOSE that most of the readers of *Wireless Weekly* will have seen at some time or other statements to the effect that moisture is a most prolific cause of trouble in tuning coils, that extreme care must be taken to exclude it, and so forth. The whole matter is one which has always seemed to me well worthy of investigation, and with the aid of the Moullin voltmeter method for determining signal strength, I have recently been carrying out a long series of simple tests which are designed to determine to what extent damp is dangerous, in what types of coils it is most harmful, and to what extent the effect can be mitigated by the means of impregnations of different types, and so on. The results have been exceedingly striking, and have proved a considerable surprise to me, so that I believe an account of some aspects of them will prove of general interest.

Proposals

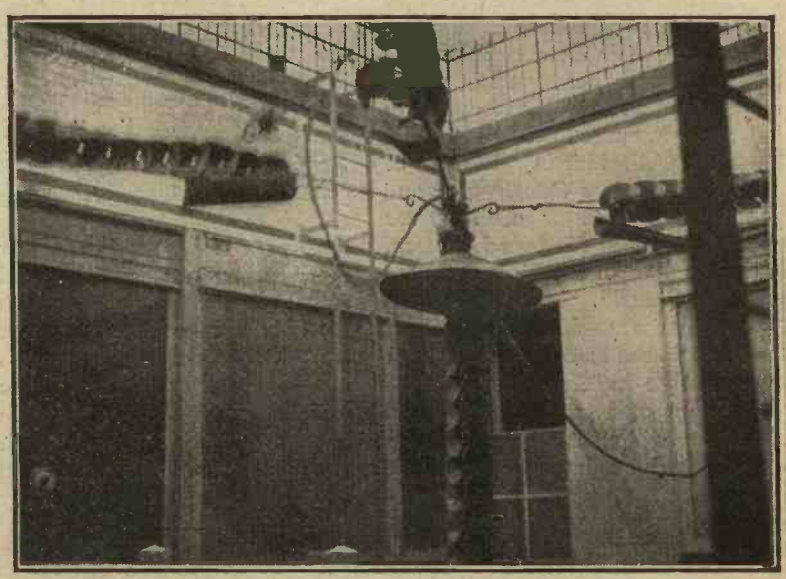
I propose in this article to give a description of certain selected experiments which will show the effect produced by damp in some typical forms of coils, from which I believe the reader will be able to derive some useful information, and which seem to me to decide fairly definitely several of the points at issue.

Experiments

The actual experiments under consideration were of an extremely simple nature, consisting merely of the choice of typical specimens of the various kinds of coils, their exposure to different conditions as regards dampness or dryness of surroundings, and the measurement of the signal strength which was obtained from a more or less constant transmission, comparison being made with a given standard coil in unvarying condition. The exact procedure in each case was to measure the signal strength obtained with the coil in the normal condition represented by its state after exposure for some days to the air of a living room in which a fire was constantly burning, after which the coil was baked for some hours in as hot an oven as the former upon which it was wound would stand, signal strength being then measured.

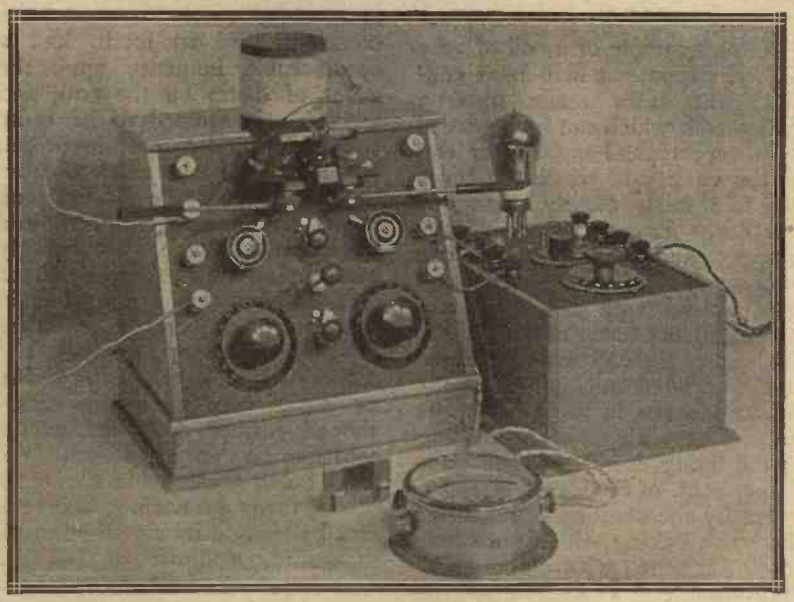
Exposure

The coil would then be exposed to either the air of a somewhat damp and unused room for some days, or in some cases to the outdoor air in damp weather. In either case, the signal strength was measured, with the coil in its damp condition. No attempt was made to determine the actual weight of moisture absorbed by a given coil under varying conditions, since the object was to determine to what extent actual signal strength would be affected by possible working conditions, or conditions to which a coil might conceivably be exposed in the intervals of its use.



The lead-in at the Eiffel Tower station seen from the interior of the building.

Mr. Kendall describes in this contribution a series of experiments undertaken in an attempt to settle some of the vexed questions concerning the effects of damp in inductance windings. His conclusions will be found to possess a very definite practical value to every experimenter.



The actual apparatus used by the author possesses various refinements, but the measurements can be carried out with extremely simple appliances.

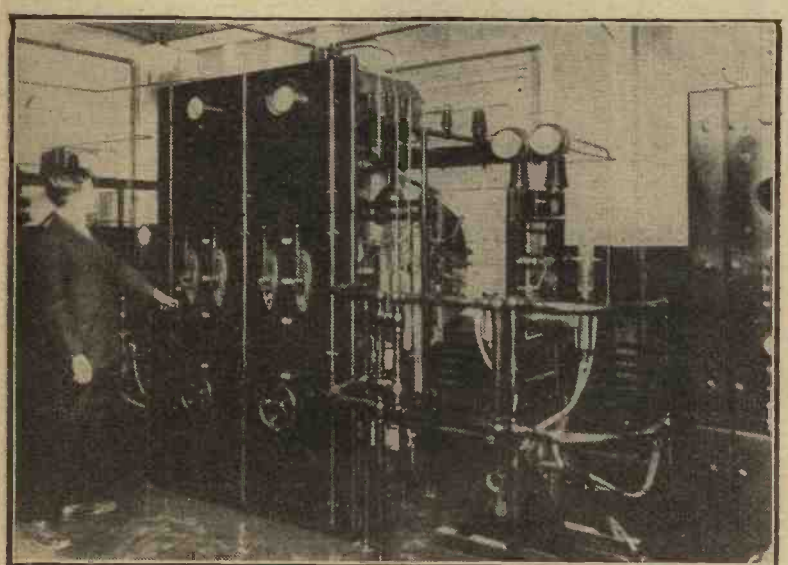
Before commencing upon these experiments, it was necessary to determine what type of covering should be adopted for the investigation, and since double cotton is the form of covering in widest use, this was decided upon, silk being rejected for the reason that inquiry in textile circles showed that silk absorbs considerably more moisture than cotton under given atmospheric conditions. Enamelled wire, of course, is practically impervious to the effect of even a considerable amount of moisture, and does not enter into our calculations.

First Specimen

The first specimen to be experimented upon was a simple basket coil wound upon a thin cardboard former, the former itself being damp-proofed by lightly varnishing. The coil consisted of 60 turns of No. 24 d.c.c. wire, which was, of course, left without impregnation. The coil was left exposed to the air of a moderately dry living room for one week, the signal strength given by the coil was then compared with that of the standard coil which was used throughout these tests, and it was found that adopting the convention that the standard gave 100 per cent. the basket coil gave 102 per cent. The coil was then thoroughly baked, and signal strength again measured, the figure now obtained being 109 per cent. There was no perceptible change in the condenser reading when tuned to the standard transmission.

Exposure to Weather Conditions

Since the gain was represented by only 7 per cent., it began to appear that in the case of this particular coil at any rate, moderate amounts of dampness did not have very serious effects, and accordingly for the next test the coil was submitted to somewhat more severe conditions. It was exposed to the outer air of a cold and misty day in January for 24 hours, and signal strength again measured. It had now fallen to 78 per cent., and the condenser reading had altered by 2 degrees, the condenser being one of .00075 μF capacity, connected in series with the coil and aerial and earth. Although this loss of signal strength may seem a fairly serious one, nevertheless it was very much less than has been obtained with other types of coils under similar conditions, and it was therefore decided that this type of coil was one in which damp did not have very serious effects, unless present in very large quantities, certainly larger than those which were likely to be met with under ordinary working conditions. In justification of this conclusion, it should be mentioned that coils which, after exposure to outdoor conditions of the type mentioned, give a signal strength of 70 per cent. or over when compared with their possible signal strength in a thoroughly dry condition, do not as a rule suffer anything serious in the way of diminution when exposed to any normal indoor conditions.



The main transmitter at the G.E.C.'s station at Schenectady, New York.

A Lattice Coil

As an example of a coil of very different type, we will next consider the tests made upon a lattice coil, which can be regarded as a very typical multi-layer coil of the variety in which the turns are laid fairly closely upon one another, cross in numerous places, and press upon one another fairly heavily. This coil was wound with No. 26 d.c.c. wire, and the turns numbered 58. As before, the coil was connected in the aerial circuit, with a .00075 μF condenser in series. In its normal condition, after keeping in the living room, this coil gave 84 per cent. of the signal strength given by the standard, and, after thorough baking, this figure rose to 96 per cent., with a change of approximately 1 degree in the condenser reading. (This change in condenser reading appears to be some indication of the change in capacity of the coil, due to the presence between the turns of moisture with its high dielectric constant.)

Signal Strength

The coil was now exposed to the same damp outdoor conditions (approximately) as the first coil, again for 24 hours. The signal strength now fell to the extraordinary figure of 2.2 per cent. and the change in condenser reading was no less than 8 degrees. It appeared from this test that the coil was extremely sensitive to damp, and it was therefore once more baked, the signal strength checked, and then placed in a moderately damp disused room, and left there for a period of four days. The signal strength reading was now 49 per cent., this being a discrepancy of 4 degrees in the condenser reading from the figure given when the coil had been specially baked.

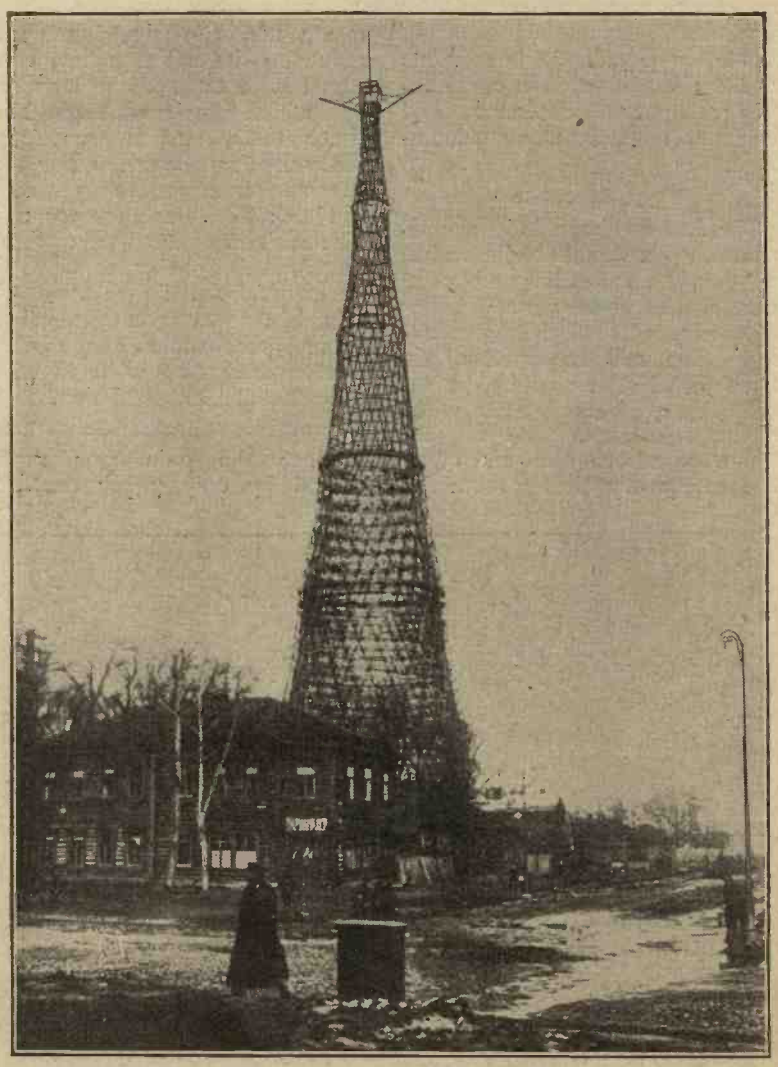
Conclusions

From these figures it will be seen that a multi-layer coil of this general type is extremely sensitive to damp, and the statements with which we are familiar as to the evil effects of moisture are fully justified in this case.

As a result of this test, and several others upon similar types of coils, I gathered the impression that the actual tightness with which the turns were laid upon one another, the number of crossings and so forth, had a considerable influence upon the effect of damp on the coil, and therefore it seemed to be quite possible to find a multi-layer coil which would be no more affected by damp than the basket coil which has been mentioned, and experiments were accordingly made upon one of the multi-layer cross-coils, which I described in a recent number of *Wireless Weekly* (February 11 issue). The coil consisted of 60 turns of No. 24 d.c.c. wire upon the cross-shaped former described in the contribution in question, the turns being arranged in six layers of 10 turns in each. This coil was baked and its signal strength measured, a figure of 122 per cent. being obtained, by comparison with the standard coil.

A Further Test

It was then kept in the living room for a further four days, and the signal strength was found to have fallen to 118 per cent., no perceptible difference being discovered in the condenser reading. This seemed promising, and a more severe test was then applied of 24 hours' exposure to the outdoor air of a misty January day. At the conclusion of this test there were actually beads of moisture in one or two places upon the coil former, and yet the signal strength obtained was still 82 per cent. of the standard. The day upon which this test was carried out was distinctly moister than usual, and therefore it was felt that the coil had turned out exceedingly well in this particular test. It was next baked once more, signal



The Tower of Shablovka, which acts as one of the masts at the Moscow broadcasting station.

strength checked, and placed in the damp indoor conditions for four days. At the conclusion of this period the signal strength was found to be still 114 per cent. of the standard, no change in the condenser reading being noted. It is to be observed that the difference in condenser readings, even after exposure to the outdoor conditions mentioned, was only between 1 and 2 degrees.

A Single-Layer Coil

Finally, experiments were conducted upon a single-layer coil consisting of 50 turns of No. 22 d.c.c. wire, wound tightly and closely upon a 3-in. diameter ebonite tube. This coil, after prolonged exposure to the air of the living room in which all the coils were tested, gave a signal strength of 118 per cent. of the standard, and, after baking, this figure rose to 132 per cent., with a just perceptible change in the condenser reading. The coil was then given four days in the damp indoor condition, whereupon signal strength fell to 96 per cent., with a change of 2 degrees in the condenser reading. It was therefore seen that this particular coil is one in which the effects of damp are only moderately serious, and other tests upon similar coils have confirmed this as a characteristic of the single-layer type. In general, if a single-layer coil is wound rather loosely and without close packing of the turns together, damp is not so serious in its effects as in most other types.

Conditions

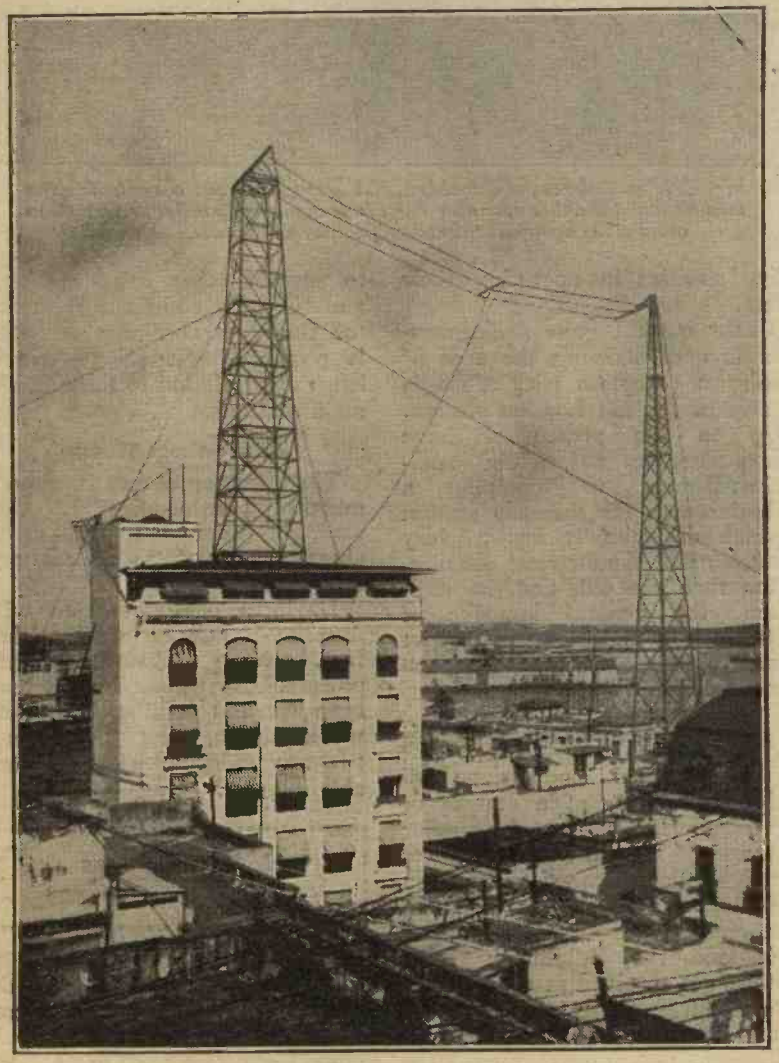
The experiments which have just been described were all carried out under closely similar conditions, in the course of a few days, and therefore the comparative results may be regarded as a fairly good guide to the characteristics of each particular type of coil. A considerable variety of other tests have been undertaken and have confirmed in a general way the results of those we have just been considering; but, of course, it has proved a decidedly difficult matter to secure anything like uniformity of conditions.

Loose Turns

The conclusions to which I have been led by this work may be summarised thus: in a coil in which the turns are comparatively loosely arranged, where they do not press at all heavily upon one another, and possibly only touch each other at intervals, the effects of moderate amounts of damp are not really very serious, and it is arguable that it is by no means necessary to impregnate the covering with any damp proofing material, such as shellac varnish or paraffin wax, bearing in mind that it is usually considered that such impregnation is extremely harmful from other points of view. For an example of a coil of this general type, observe the figures given by the cross coil mentioned, and for a less favourable example refer to the basket coil upon which experiments were carried out. (This particular basket coil had been wound rather loosely.) Where, on the other hand, the coil consists of a number of layers, possibly super-imposed in some fashion which causes the turns to press tightly upon one another, with very numerous points of contact, as in the lattice coil considered, damp is indeed a most formidable enemy.

A Final Remark

A final word as to the figures given by the different types of coil: it should not be thought that the figures obtained with each coil enable the reader to compare the merits from the viewpoint of actual signal strength of the various types mentioned, since to enable such a comparison to be made fairly it is necessary to adjust the inductance of all the specimens to approximately the same value, and this was not, of course, done in this case, since all that was desired was to obtain a series of readings for the same coil under different conditions of dampness.



The masts and aerial at WKAQ, the broadcasting station at San Juan, Porto Rico.

Reception Conditions Week by Week

By W. K. ALFORD.

Review of reception for week ended May 3.

RECEPTION generally has suffered very greatly during the week owing to the prevalent thundery weather which has also brought to the fore the apprehension of a great many people as to the "attraction" for lightning caused by an aerial.

As I said in a recent Broadcast talk, this apprehension is quite unfounded, as an efficiently earthed aerial is more of a protection to property than a danger, and, after all, the fatalistic attitude of some people is even more justifiable than the timidity of others.

Sparks

During the week I have observed sparks, up to one-eighth of an inch in length, passing across a safety gap of a fairly large aerial, which can do quite a lot of damage to coils, etc., in a receiver if left in circuit.

As to the reception of our own broadcasting stations, the heavy "X's" have completely spoilt any enjoyment which might be derived from listening to any of the more distant stations, although the generally agreed excessive amount of S.B. rather damps people's enthusiasm in this direction.

Long-Range Sets

The other evening the Technical Topics broadcast from London ventured on to a very dangerous discussion on the various sets required for long-distance reception, selectivity, and other things. This seems rather a questionable policy, firstly as it will have a direct effect, one way or the other, on the manufacturers of sets who know their market far better than the B.B.C. can ever do, and secondly, the man with what may be termed a "local" set can very often do more in the way of long-distance reception than the man with the "reaching out" set, as the Americans term it, according to their relative abilities in operating their sets.

Mr. Eric H. Palmer, of Brooklyn, N.Y., mapping out a route for the trip he will take this summer for the purpose of studying reception conditions on mountain tops, plains, and in deep canyons.

Last week I gave a diagrammatic map showing the area of uniform reception with a single valve of the old London station. Up to the present I have been unable to obtain sufficient data to compile a similar map for the new station which undoubtedly has a very much more symmetrical distribution than the old, and, in addition, the general increase of strength in almost every district makes the matter of comparison more difficult.

Signal Strength Comparisons

The actual comparison of signal strength of a station of given power with that of a similar station of several times the power at a similar distance away often yields curious results. Thus, at many places in the south of England the Edinburgh relay station is received at roughly the same strength as the Glasgow main station, which I suppose employs about six times the power. The same thing applies to several other relay stations, and the only contributory factor for their extraordinary strength is possibly their shorter wavelengths in relation to those of the main stations.

Ultra-short Waves

The attention of most "experimental" enthusiasts is very strongly directed to the ultra-short waves of 20 metres and less.

Daylight communication with America is now an accomplished fact, using absurdly small powers. Australian signals have been heard at good strength, and we await the first trans-world two-way working with considerable interest.

Marconi-Sykes Microphone

On page 97 of our issue of April 29 mention is made of the Round Microphone at the Rome station. This, of course, should have been referred to as the Marconi-Sykes microphone.

Jottings by the way

The Call of Duty

"DO stay to tea, Mr. Wayfarer," said Mrs. Goop, as I stood chatting with her in the garden at "The Microfarads," after putting in a strenuous afternoon's work with the Professor on the new circuit which is engaging all our spare time at the present moment. "I only wish I could," I replied, taking two steps towards the gate, "but unfortunately I must write my weekly account of the doings of the Little Puddleton club before the post goes." Here I took three more steps, but this time they were in the direction of

. . . *I consumed my third cup* . . .

the front door. "I really could not possibly stay," I said, following her into the hall, "much as I should like to do so. In fact (and here I sat down in a comfortable chair) I have so much work to do that I scarcely like to think about it." "Then don't," said the Professor, coming in at this moment. "Ah, Professor," I said, "if only I had your knack of working quickly I should be able to stay. We slow workers . . . No sugar, thank you, Mrs. Goop." The Professor refused to believe that I was a slow worker, and I had consumed three cups of tea and the best part of a very inviting cake before he was convinced. Then just as I really was going he started a most interesting topic, and I had three more cups.

Coils

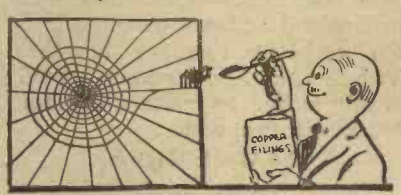
"Have you ever thought much about coils?" asked Professor Goop. I told him that I had; in fact, for weeks at a time I had thought of nothing else. I told him of a scheme that I had once thought out for feeding spiders on copper filings and training them to spin basket coils, and of my other particularly brilliant scheme for obtaining air spacing by winding inductances in the winter time on formers of ice made by filling jampots with water and allowing it to freeze. When the winding was properly completed the former was to be placed in the oven and baked, thus automatically reducing the self-capacity of the inductance to a minimum. I went on to tell him of many others, such as the little idea that I had for self-winding coils.

Wax Dressing

To make these you simply attached a holder for your former to the spindle carrying the hands of a grandfather clock. You then anchored the starting end of your wire and went to bed, leaving the clock to do the rest. There was the idea, too, for obtaining a proper wax dressing for honeycomb coils by placing them, after winding, for a short time in one's beehives. The only time that I tried this the insects went rather too far with the good work, and on endeavouring to make a central tapping I was badly stung by a baby bee, which emerged from one of the cells and fairly set about me, resenting, I suppose, my application of a hot soldering iron. Anyhow, I know how that little busy bee employed one shining minute.

A Miraculous Cure

Talking of bees, I have often been told that their stings are an excellent remedy for rheumatism. I had always been inclined to regard this statement with a certain amount of scepticism until I witnessed one day the miraculous cure of Poddleby. The poor fellow was so doubled up with rheumatism that he could hardly hobble down the garden with the aid of two sticks. Being, as you know, always willing to lend a helping hand I offered to tighten up his aerial for him. Just as I had straightened out the halliards I saw a bee alight on Poddleby's neck. Like a flash, what I had heard about bees and rheumatism came back to me, and as Poddleby's back was turned at the



. . . *Feeding spiders on copper filings* . . .

moment, I was able to give the insect a gentle prod with my pipe. Though Poddleby had been unable to walk for weeks, he leaped at least nine feet into the air, and his run back to the house screaming for the blue bag must have constituted record time for the seventy-five yards welter weight. I would never have believed that any cure could have been so wonderfully rapid.

A New Idea

Let us come back to the Professor once more. Really we have made rather a hole in our manners by leaving the kindly fellow standing so long upon his hearthrug whilst we digressed about bees and things of that kind. The Professor, I gathered, after hearing him talk for some

time, had suddenly been inspired with perhaps the greatest idea ever yet conceived for winding coils of low resistance and small self-capacity. "If," he said, "you wish to reduce the resistance of the wiring of your set, my good Wayfarer, what do you use for making your connections beneath the panel?" "Gloves," I said at once; "I always burn my fingers if I solder without gloves. Those infernal wires get so hot." "Yes, yes," said the Professor; "I am referring, however, not to the method of making connections or to the garments with which it is necessary to clothe oneself.

Square Rod Coils

"What material would you use for connecting terminal to terminal and thingmejig to whatsitsname?" "Oh, square rod," I answered in a flash, for I am very intelligent at times. "Just so," went on Professor Goop. "Now if we use square copper rod for connecting this point to that, why should we not employ the same excellent material for making our inductances?" The idea seemed an excellent one, and the only flaw that I could find was that square rod appears to come into the world in two-foot lengths. Two feet, as I pointed out, would hardly suffice to make a coil for broadcast reception.

The Work Begins

The Professor explained that all we had to do was to solder together end to end as many two-foot lengths as were needed for the purpose. He suggested that we should start at once to make our preparations for the square rod coil. To this I agreed, and we began. The first length was laid down in the Professor's study and we worked gradually down the garden, soldering with the aid of a blowlamp. We then returned to the house and prepared a special low-loss former with notches ¼ inch apart to accommodate the turns of square rod. This being completed, we anchored the "in" end of the windings by soldering it to the shank of the terminal provided. We then made up a neat little attachment by means of which we could fit the former to the spindle of the knife-cleaning machine, which we removed from the scullery and fitted up temporarily by bolting it down to the Professor's writing table. Professor Goop, armed with a pair of gardening gloves, now made ready to feed on the wire whilst I seized the crank.

Winding

I gave two rapid turns, putting my back into it. We athletes seldom realise our own

. . . *Screaming for the blue bag* . . .

strength; apparently I did not in this case, for though the Professor suffered no great inconvenience, poor little Bingo was rather badly lashed by the far end of the wire, which was going on anyhow down at the end of the garden. Eventually, however, by dint of strenuous toil on my part, careful guiding on the Professor's, and discreet retirement to his kennel on little Bingo's, we got the turns safely on. By this time my labours had come to an end, but the Professor was panting hard, for the end of that wire took some holding.

Disaster

Professor Goop now instructed me to hold down the end whilst

. . . *Looking like German students after a duel* . . .

he prepared the soldering iron in order to attach the end to its terminal. I proceeded to carry out this duty, obtaining a good purchase by pressing my foot against the edge of the table.

A Horrid Swishing Sound

Whilst the iron was heating, the Professor applied flux to the wire and the terminal in my hands, with his usual liberality in these matters. Then when green flames were showing, he grabbed the iron, ran about half a stick of solder on to its bit, and advanced to apply the finishing touch. I think that I have told you before that the Professor has a fine free style with the soldering iron. Just before he applied it he looked at me and said, "This is a great moment, my friend." He emphasised his point by a wave of the iron, in the course of which a large blob of solder descended lightly upon my flux-covered fingers, flowing beautifully over them. With a yell I dropped the end of the wire. With a horrid swishing sound it uncoiled, smiting the Professor and myself many a shrewd blow as it did so, and fairly played havoc in his study.

Once Bitten, Twice Shy

At the present moment we both of us look like German students who have recently fought a duel, or schoolboys after their first shave. On the whole, I do not think that I am going to wind my next set of inductances with square rod. The Professor has vowed to have another try, and has, I believe, booked Poddleby's services. That, I should think, would finish off the good work begun by the bee.

WIRELESS WAYFARER

The Marconi International Marine Communication Co., Ltd.

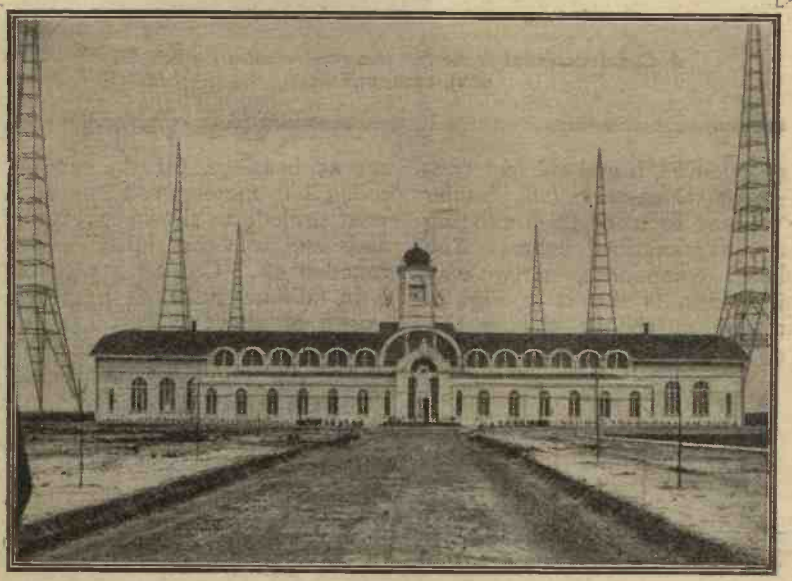
This year the Marconi International Marine Communication Co., Ltd., celebrates its 25th anniversary. Its influence has been world-wide, and there are now few ships of importance that are not fitted with wireless apparatus for commercial and navigational purposes.

The R.S.G.B.

An informal meeting of this Society will be held at the Institution of Electrical Engineers, Savoy Place, W.C.2, at 6 p.m. on Wednesday, the 13th May, when Mr. R. H. Kidd, B.A., will open a discussion on "An Attempt at Quantitative Experiments on Modulation." Members of the R.S.G.B. and its Affiliated Societies are cordially invited to attend, and a number of seats are also available to the general public.

EARTHS FOR SUMMER CONDITIONS

A note of interest to every listener.



The giant towers at the Lafayette station near Bordeaux are a landmark for many miles.

NOW that the warmer days and (let us hope) drier weather are approaching, the question of the earth becomes an increasingly important one. In winter time reception conditions are extraordinarily good. We do most of our reception during the hours of darkness, the ground is moist and the trees, which later will become full of sap and covered with juicy foliage, are in winter time dry and bare, so that their screening effects are not very noticeable. All this means that quite passable results may be obtained even when the earth connection is not particularly efficient. But as the hours of daylight increase in length it behoves one to pay careful attention to this most important part of the receiving system if the range and signal strength of the set are not to suffer unduly.

A Good Earth

An excellent type of earth which has been advocated by the writer on more than one occasion in *Wireless Weekly* consists of a large biscuit tin or zinc bath buried three feet below the surface of the earth, and immediately under the suspended wires of the aerial. If this is used the soil above it should be made into a

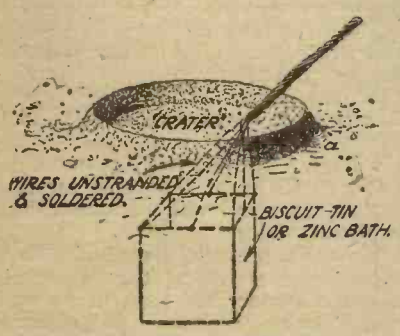


Fig. 1.—A very popular type of earth connection.

kind of little crater (Fig. 1), the raised rim being beaten hard with a trowel. The provision of the crater makes it easy to keep the earth moist even in the most torrid weather. It should be filled with water at frequent intervals, and one can feel confident that this water will soak down to the place where it is most required. The earth lead should consist of heavy stranded cable, and it is probably preferable that it should be insulated until it reaches the surface of the ground. At this point the wire should be unstranded, each strand soldered separately to a different part of the biscuit tin or bath.

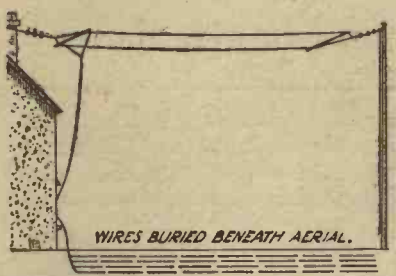


Fig. 2. — Another good earth consists of buried wires beneath the aerial.

Buried Wires

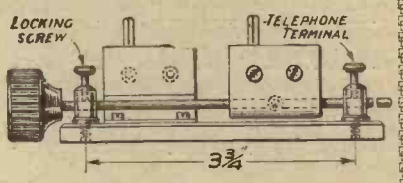
An earth system which is very little affected by drought, and is therefore particularly suitable for summer use, is that shown in Fig. 2. Here from two to six bare wires, each rather longer than those of the aerial, are buried immediately under it and about six inches below the surface of the ground.

As a rule it will be found sufficient to use two buried wires spaced as suggested, but in certain cases results are improved by adding others in between them.

R. W. H.

A USEFUL TWO-WAY COIL HOLDER

A Constructional Note for the reader who makes his own components.



A USEFUL and efficient two- or three-way coil holder may be made from existing parts, as described below. The finished component, a two-way coil holder, is shown in Fig. 2. First cut an ebonite base, 2½ in. x 4½ in. x 3/16 in. or ¼ in. thick.

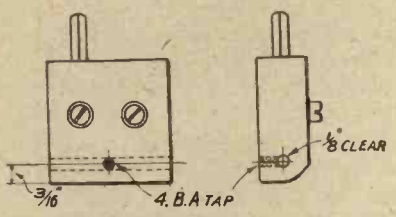


Fig. 1.—Showing how the socket for the moving coil is drilled.

Mount a fixed coil holder in the position indicated. Next mount two telephone terminals, which act as bearings for the moving coil. The moving coil socket is next drilled, as shown in Fig. 1, and one of the lower edges rounded off. Cut off a piece of ⅛ in. diameter brass rod to a length of about 7 in. The rod should be a smooth fit in the hole drilled in moving coil socket.

Two Actions Possible

One end of the rod is equipped with a small ebonite knob, the other end being passed through the hole in one telephone terminal. Pass the rod into the moving coil socket and secure by means of a 4B.A. screw, the rod passing finally through the hole in the other telephone terminal. The moving coil has two actions, one a radial action operated by the

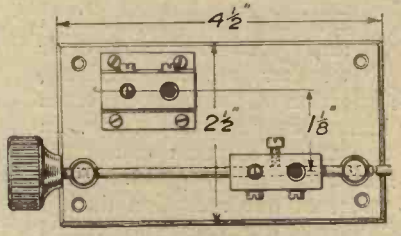


Fig. 2.—Plan and elevation diagrams showing constructional details.

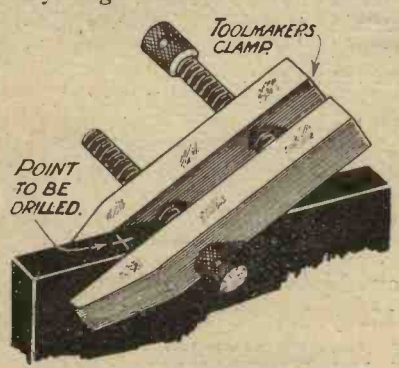
ebonite knob, and the other a sliding action operated by pushing the rod backwards or forwards through the telephone terminals. The moving coil may be firmly locked in any desired position by tightening up the telephone terminal screws. The finished coil - holder, though simple in construction, is quite satisfactory in use. H. B.

□ □ □

Drilling the Edge of an Ebonite Panel

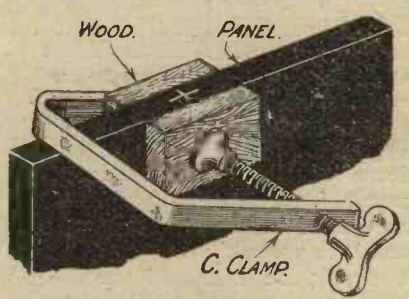
A VERY awkward job that may require doing at some time is to drill a hole into the edge of an ebonite panel. Even if the greatest care is taken the panel is liable to split, and the process becomes more risky if it is necessary to tap the hole.

There is, however, a method by which a hole can be drilled at the very edge itself of the ebonite



The use of a toolmaker's clamp.

without any risk of breakage. First mark the position at which the hole is to be drilled with a pair of dividers or a scriber, then take two small pieces of wood and clamp them tightly on each side of the place where the hole is to



This arrangement may be used when it is not convenient to clamp the panel in a vice.

be drilled. If the hole is at the end of the ebonite the clamping can be done in the vice, but if a large panel is being drilled with the hole somewhere in the centre then a C clamp will be required.

No Risk of Splitting

This should be well tightened and the hole can then be drilled and tapped without risk of splitting the ebonite. If the amateur happens to be in possession of a pair of toolmaker's clamps, then the pieces of wood can be discarded and the clamps tightened straight on to the ebonite itself. The sketches show the two methods outlined above and should remove any possible doubt as to the method to be employed.

C. P. A.

The "A.A. Six" in South Africa

SIR,—Since seeing the articles by Mr. Percy W. Harris on the Anglo-American Six in the January and February issues of *The Wireless Constructor*, I was tempted to build this set.

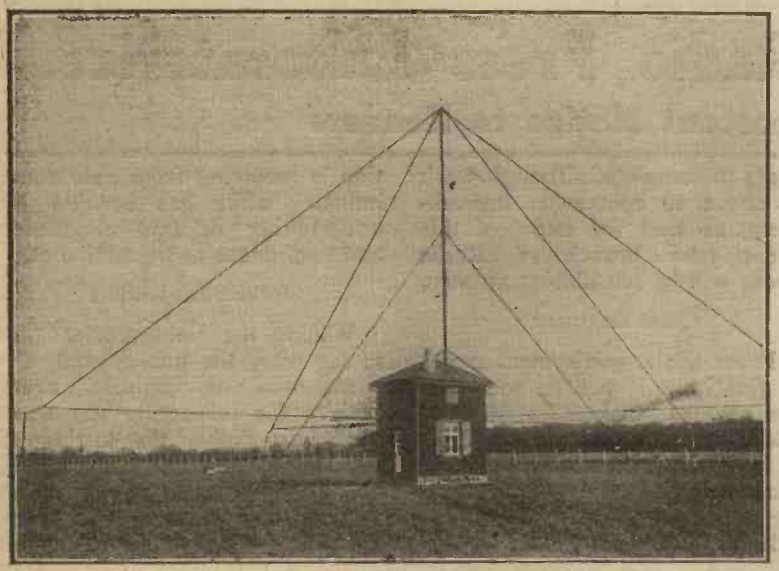
I have, however, been compelled to make many of the parts for it myself, as they were unobtainable in South Africa.

Up to the present I have had little opportunity of testing the receiver, but on February 18, 1925, at about 12 o'clock, I tuned in either London or Bournemouth.

Time does not permit me to give you further details by this mail.

Thanking you for a most excellent receiver, and wishing *The Wireless Constructor* every success.—Yours faithfully, H. ATKINSON.

Cape Town, S.A.



The receiving station at the Basle Aerodrome, Switzerland. A photograph of the transmitting aerial is given on another page.

How to Make a Cheap and Efficient Aerial Mast

By B. BRAMWELL.

A STRONG and reliable aerial mast may be made cheaply on the lines indicated below and illustrated in the accompanying diagrams.

Buy seven or eight cuttings of suitable size of ordinary wrought iron tubing of "black" quality, these being obtainable in any metal scrap yard. The most suitable sizes are 3 in. dia., 2 in. dia., and 1½ in. diameter.

Piece these together, as shown in Fig. 1, using short-cut lengths of suitable sizes to form spigots for joining the larger tubes together. These spigot pieces should be about 18 in. long.

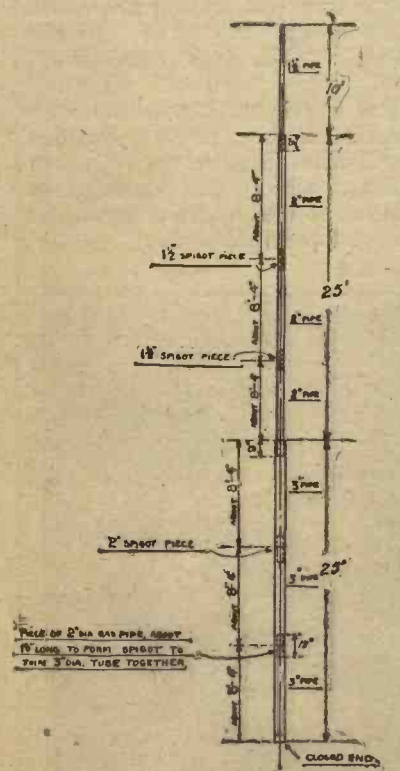


Fig. 1.—Illustrating how spigots are used for joining the larger tubes.

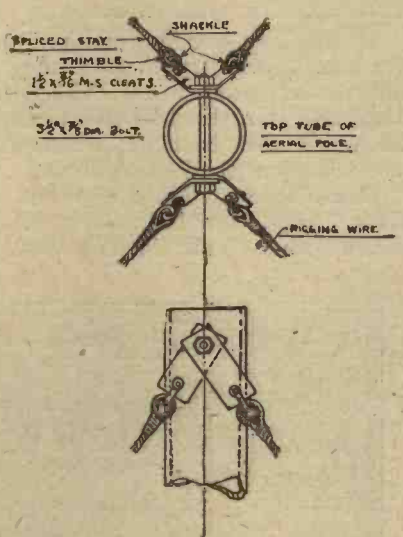


Fig. 2.—Showing how stays may be attached to the mast if desired.

An Example

When the pole is built up with the spigot pieces in place, plug up one end and fill up with concrete grout, the mixture consisting of about four parts sand to one part cement by volume.

For example, to make a 50 ft. or 65 ft. pole use three pieces of 3 in. diameter tube so as to make up a length of about 20 or 25 ft., three pieces of 2 in. diameter tube to make up a length of about 25 or 20 ft., and one length of about 10 or 15 ft. of 1½ in. diameter.

Stays

For attaching stays drill a 7/16 in. diameter hole, for a ⅜ in. bolt in the top of the 1½ in. diameter piece, attach the small cleats for the stays to the pole with the ⅜ in. diameter bolt through the hole, as shown in Fig. 2.

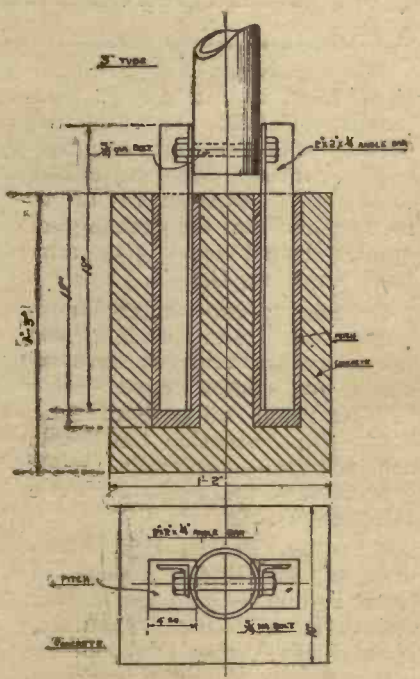


Fig. 3.—The fitting of a hinge to the base of the mast allows for easy lowering.

In order that the pole may be taken down for painting, etc., the

(*Continued on page* 182.)

Great New Radio Press Laboratories

An Important Notice to Readers

RADIO PRESS, LTD., the proprietors of numerous radio publications, including *Wireless Weekly, Modern Wireless,* and *The Wireless Constructor,* have purchased the freehold of seven acres of land at Elstree (twelve miles north of London), as the site for new wireless laboratories which they are establishing for technical development, research work, testing and measurement, and the efficient design of wireless apparatus.

These new laboratories are to be carried on as part of the policy of producing original designs and the placing of technical data on the soundest possible basis. The laboratories in the earliest stages will cost in the neighbourhood of £20,000, and the full scheme will take three years to complete, although work is about to commence immediately, so that the effect of this great new branch of Radio Press will be felt almost at once.

Chief Engineer

From the advertisement pages of this issue it will be seen that the post of Chief Engineer to take charge of these laboratories is offered, the salary being £2,500 per annum. Applications for junior posts will also be considered, but only those highly qualified in the technical side of wireless need make application.

This great new enterprise is to be carried out solely to ensure for many years to come the supremacy of Radio Press in their field of activity, and only the great support this organisation is receiving from public and industry alike has enabled an undertaking of this magnitude and usefulness to be carried out.

Public Inspection

When the laboratories are under way, the public and the trade will be afforded every facility for inspecting the work of Radio Press, the testing of sets, the development of designs, and all its other activities, which will include the carrying out of accurate measurements in all phases of wireless work. The ensuring of development in designs and circuits will do much to maintain and increase interest in radio, and the industry will derive great benefit, as well as those who read Radio Press publications.

□

RADIO NOTES AND NEWS

We understand that on Saturday, May 2, Mr. E. J. Simmonds, G2OD, of Gerrards Cross, established two-way daylight working with Australian 2CM on a wavelength of 20 metres, and that the exchange of signals lasted from 5.52 a.m. until 7.15 a.m. G.M.T.

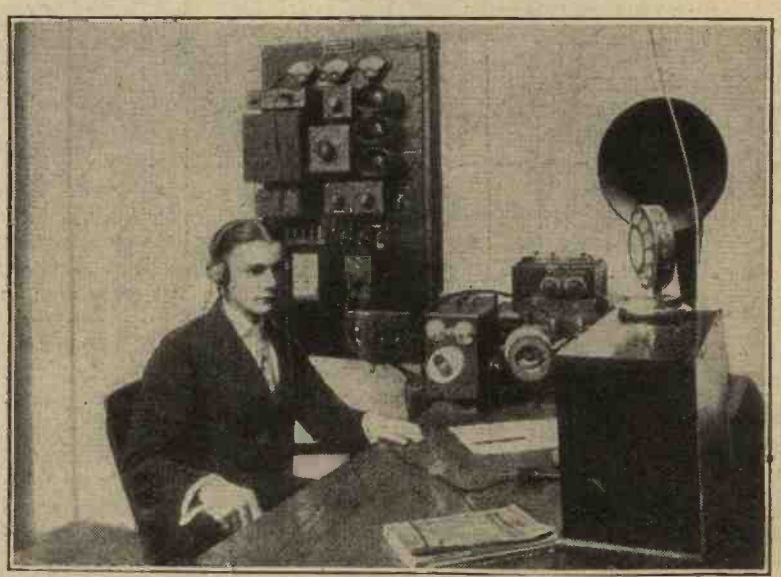
On Sunday two-way communication was re-established, and the following messages were received and acknowledged :—

"To Prime Minister of England,—On occasion of this achievement — Australia sends greetings. (Signed) Prime Minister of Australia."

"To Dr. Eccles, Past President of the Radio Society of Great Britain,—Greetings to your society from Wireless Institute, New South Wales Division, by first 20-metre daylight working. (Signed) Machercan, President."

G2OD sent the following message: "Greetings to Wireless Institute by direct amateur 20-metre working from Radio Society of Great Britain.—Eccles." This was accomplished with a T.250 M.O. valve and D.E.Q.'s for reception.

An amusing and unusual programme is being given from the Manchester Station on Friday, May 29. Mr. Herbert Heyner, the well-known baritone, will be in a frivolous mood and will sing "Half-a-dozen More What Nots," by Sterndale Bennett, and a group of six limericks by E. B. Manning. The 2ZY Orchestra will make merry with such pieces as "The Chicken Reel," "The Jolly Musicians," and the "Village Circus." More merriment, though not of a musical nature, will be provided by Vivian Foster, the Vicar of Mirth, who twice during the course of the programme will be relayed from London.



Mr. Enrique Camunas, the operator of station WKAQ. Some of the apparatus including one of the microphones may be also seen.

The FOREIGN RADIO TIMES

Edited by Captain L. F. PLUGGE, B.Sc., F.R.Ae.S., F.R.Met.S. MAY 13, 1925.

NOTE :—All Hours of Transmission are in British Summer Time.

WEDNESDAY, MAY 13th

FRANCE.

PARIS.—*Station :* Eiffel Tower.—FL.
Wavelength : 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists : M. Maurice Gouineau, Mlles. Helene Baudry (Vocalist), Eliane Zurfluh (Pianist), M. Dany Brunsvvig (Violinist), Vincent Davico (Composer), and Marcel Raby (Pianist).

1. Scientific Address. M.M. Gouineau.
2. Minuet (Pugnani).
3. Sarabande (Corelli).
   M. Dany Brunschvvig and Marcel Raby.
4. Lasciatemi Morise (Monteverdi).
   Mlle. Helene Baudry.
5. Nostalgie (F. Alfano).
6. Bells Through the Mist. (Davico).
   Mlle. Eliane Zurfluh.
7. Arietta (Lotti). Mlle. Helene Baudry.
8. Pascua di Risurrezione (Malipiero).
   Mlle. Eliane Zurfluh.
9. Il poema della morte. (Santoliquido).
10. Il Prato Verde (Clausetti).
    Mlle. Helene Baudry.
11. (a) Legende (Guerrini), (b) Melodia (de Sabata). M. Brunschvvig and Marcel Raby.
12. (a) Melopea Antica (Rocca), (b) Nabbie (Respighi). Helene Baudry.
13. Bossorilievo Eroico (Bossi).
    M. Brunschvvig and Marcel Raby.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

PARIS.—*Station :* Radio-Paris.—SFR.
Wavelength : 1,750 metres—8 kw.

12.30 p.m.—Concert. Directed by M. Lucien.

1. Sevillian March (Rey).
2. Waltz of Mam'selle Boy Scout (Goublier).
3. The Millions of Arlequins—Violin (Drigo).
4. Three Fragments (Moretti).
5. Zika—czardas (Michiels).
6. Appassionato (Sandre).
7. Brazilian Song (Fauchey).
8. Hindoo Ballet (Langlois-Gilson).
9. Aubade (d'Ambrosio).
10. The Village Fiddler (Wieniawsky).
11. I Have Seen in Thine Eyes (Denisty).
12. Song of Love (Georges-Charmettes).
13. Spring Song (Vidal).
14. Lise and Lucas (Mouton).
15. Ascanio—Trio.

1.50 p.m.—News Bulletin and Close Down.

8.15 p.m.—News Bulletin.

8.45 p.m.—Fragments from Act 1 of "Louise" by Gustave Charpentier.

10.0 p.m.—Close Down.

SWITZERLAND.

ZURICH.—*Station :* Radio-Genossenschaft.
Wavelength : 515 metres—500 watts.

5.0 p.m.—Concert by the Hotel Baur-au-Lac.

8.30 p.m.—Concert. Programme of International Songs.

Artists : Maxim Orloff (Vocalist), Max Siegrist (Pianist), and the Station Orchestra.

1. (a) Ariette (Weber), (b) Song from "The King of Saba" (Goldmark). Maxim Orloff and Max Siegrist.
2. Selections by the Station Orchestra.
3. (a) Nina (Pergolese), (b) Caro mio Ben (Giorani), (c) Reading and Song from "Don Sebastien" (Donizetti). Maxim Orloff and M. Siegrist.
4. Selections by the Station Orchestra.
5. (a) The Night (Rubinstein), (b) The Song (Felemann).
   Maxim Orloff and Max Siegrist.
6. Selections by the Station Orchestra.

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station :* Unione Radiofonica-Italiana.

Wavelength : 425 metres—3 kw.

5.15 p.m.—Orchestral Concert from Albergo di Russia.

5.45 p.m.—Jazz Band.

6.15 p.m.—Close Down.

8.20 p.m.—News Bulletin.

8.30 p.m.—Concert.

1. William Tell (Rossini). Mr. Paoletti's Orchestra.
2. (a) "O Paradise," from "Africana" (Meyerbeer), (b) Selections from "Faust" (Gounod). Balduino Bernabei (Tenor).
3. Ave Maria (Schubert). A. del Signore (Violinist).
4. (a) Amarilli (Caccini), (b) Song (Pergolesi). Signora Loufty Bey (Soprano).
5. (a) Spring Song (Mendelssohn), (b) Melody (Jessel). The Station Orchestra.

Conference. F. L. Marinetta.

6. (a) Racconto (Puccini), (b) Cavalleria Rusticana (Mascagni). Balduino Bernabei (Tenor).
7. Aria (Wieniawsky). Alessandro del Signore (Violinist).
8. (a) Sad is the Steppe (Gretchaninoff), (b) Berceuse (Gretchaninoff). Signora Loufty Bey (Soprano).
9. (a) Hesitation — Song of Love (Casolla), (b) Polonesa (Lopez y Villanueva). Prof. Benedetto di Ponio.
10. Selection from "Cavalleria Rusticana" (Mascagni). Mr. Paoletti's Orchestra.

10.30 p.m.—Jazz Band—Orchestra from Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station :* Radio-Wien.—IKL.
Wavelength : 530 metres—1.5 kw.

4.10 p.m.—Concert. Spring in Music.

1. Spring's Awakening (Bach).
2. Children of Spring (Waldteufel).
3. Spring Suite (Nevin).
4. Spring Sonate Second and Third (Beethoven).
5. (a) Dream of Spring (Schubert). (b) The Coming of Spring to Me (Schubert).
6. To the Spring (Grieg).
7. Rustling of Spring (Sinding).
8. Voices of Spring (Strauss).
9. Spring Song (Mendelssohn).
10. The Spring is There (Hildach).
11. The Blackbird in May (Ascher).
12. (a) Once in May (Stolz), (b) Spring in Vienna (Stolz).

6.30 p.m.—Women's Hour.

7.45 p.m.—English Lesson.

8.30 p.m.—Musical Programme.

Artists: Prof. K. Stix (Bass), Prof. A. Polatschek (Clarinet), Prof. Strobl (Bassoon), Prof. Stiegler (Horn), and the Sedlak-Winkler Quartet.

1. Septet for String Instruments (Kreutzer).
2. Octet in F Sharp (Schubert).
3. Songs (Schubert). Berta Katzmayr.

10.0 p.m.—Light Music.

GERMANY.

HAMBURG. — *Station:* Nordische-Rundfunk.
Wavelength: 395 metres—1.5 kw.

8.0 p.m.—"Die Csardasfurstin." Operette in Three Acts by Leo Stein and Bila Jenbach. Music by Kahan.

PERSONÆ.

Leopold Marie (Kurt Rodeck); Anhilte, his wife (Edith Scholz); Countess Stasi (Gretchen Wagener); Edwin Ronald (Ferd. Schneider); Count Kancsiam (Erwin Bolt); Eugen Bohnsdorf (Max Pratsch); Feri von Kerikes (Bern. Jakschtat); Kiss, Notary (Fritz Max).

10.30 p.m.—News Bulletin, given partly in English. Dance Music, and Close Down.

THURSDAY, MAY 14th

FRANCE.

PARIS.—*Station:* Eiffel Tower.—FL.
Wavelength: 2,650 metres—1.5 kw.

6.15 p.m.—Concert.

Artists: M. Givelet, Mme. de Marquette, M. Pierre Fournier (Violoncellist), and Mlle. Denise Lanquetin (Pianist).

1. Moonlight (Debussy). Mlle. Denise Lanquetin.
2. You are Like a Flower (La Loreley) (Liszt). Mme. Demarquette.
3. Concerto (Couperin). M. Pierre Fournier.
4. The Death of Isolde from "Tristam and Isolde" (Wagner). Mme. Demarquette.
5. Toccata (Ravrl). Mlle. Denise Lanquetin.
6. Had I the Wings of a Dove from "King David" (Honnegger). Mme. Demarquette.
7. Prelude (Karjansky). M. Pierre Fournier.
8. Rondel of Charles of Orleans (Debussy). Mme. Demarquette.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

PARIS.—*Station:* Radio-Paris.—SFR.
Wavelength: 1,750 metres—8 kw.

12.30 p.m.—Concert.

1. March (Parera).
2. Esmeralda (Albersenn-Tavan).
3. Serenade (Drdla).
4. Quo Vadis (Nougues).
5. Selection (Delay).
6. Reverie—Cello Solo (Dunkler).
7. The Pigeon (Yradier-Mouton).
8. The Heights—Selection (Yvain).
9. Spanish Serenade (Albeniz-Huguet).
10. Serenade (d'Ambrosio).
11. Laendler (Lacombe).
12. Salterelle (Lacombe).
13. Sarabande—Grave (Couperin).
14. Sympathy (Sarrut).
15. The King of Ys—Trio (Lalo-Alder).

1.50 p.m.—News Bulletin and Close Down.

8.15 p.m.—Women's Talk by Mme. Yvonne Delay.

8.45 p.m.—Concert organised by Radio-Magazine.

10.30 p.m.—Close Down.

SWITZERLAND.

ZURICH.—*Station:* Radio - Genossenschaft.
Wavelength: 515 metres—500 watts.

5.0 p.m.—Concert by the Orchestra of Hotel Baur-au-Lac.

8.30 p.m.—Concert. Programme of Slavic Compositions. The Station Orchestra.

1. Kuslan and Ludmilla—Overture (Glinka).
2. Nocturne of Second String Quartet (Borodin).
3. Slavic Dance No. 6 and 8 (Dvorak).
4. Legende —Violin Solo (Wieniawsky)
5. Valse Caprice (Rubinstein).
6. Aria from the Opera "Eugen Onegin" (Tschaikowsky).
7. Selection (Smetana).

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station:* Unione Radiofonica-Italiana.
Wavelength: 425 metres—3 kw.

5.15 p.m.—Orchestral Selections from Albergo di Russia.

5.45 p.m.—Jazz Band.

6.15 p.m.—Close Down.

8.20 p.m.—News Bulletin and Weather Forecast.

8.30 p.m.—Selections from the Opera "Madame Butterfly," by Puccini.

PERSONÆ.

Madame Butterfly (Signora Baldassarre Tedeschi, Soprano); Suzuki (Signora Luisa Castellazzi, Mezzo-Soprano); Pinkerton (Signor Balduino Bernabei, Tenor); Sharpless (Signor Ugo Donarelli, Baritone). Mr. Alberto Paoletti (Pianist).

Act I.—Duet (Sharpless-Pinkerton), Scene (Madame Butterfly - Sharpless-Pinkerton). Duet (Butterfly-Pinkerton).

Act II (Part 1).—Song (Madame Butterfly). Duet (Madame Butterfly—Sharpless). Duet (Madame Butterfly—Suzuki). Finale.

Act II (Part 2.)—Scene (Butterfly — Suzuki). Terzetto (Suzuki — Pinkerton—Sharpless). Song by Pinkerton. Final Scene (Butterfly).

10.30 p.m.—Ballet Music from Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station:* Radio-Wien.—IKL.
Wavelength: 530 metres—1.5 kw.

4.10 p.m.—Concert.

1. Overture from "Peter Schmoll" (Weber).
2. Evening Star (Lanner).
3. Overture from "Phadra" (Massenet).
4. Passionate Devotion (Richter, sen.)
5. Ritornelle (Drdla).
6. Eroica (Beethoven).
7. Hungarian Dance (Brahms).
8. Happy is he, who forgets (Strauss).
9. The Blue Mazur (Lehar).
10. Intermezzo (Formoso).

8.0 p.m.—Opera "Mignon" (Ambroise Thomas). By the Soloists, Choir and Orchestra of the Station, under the direction of Dr. Ludwig Kaiser.

GERMANY.

HAMBURG. — *Station:* Nordische-Rundfunk.
Wavelength: 395 metres—1.5 kw.

6.0 p.m.—Concert. Programme of the Works of Hans Ehrke.

Artists: George Clasen and Rudolph Moller.

7.15 p.m.—Spanish Lesson Hans Bredow School.

8.0 p.m.—Musical Programme.

1. First Hungarian Rhapsody (Liszt). The Station Orchestra.
2. Concert in A (Vieuxtemps). Jan Oosterkamp.
3. Italian Caprice (Tschaikowsky). The Station Orchestra.
4. Prelude and Allegro (Pugnani). Jan Oosterkamp.
5. Causasienne Suite (Iwanoff). The Station Orchestra.
6. Viennese Caprice (Kreisler). Jan Oosterkamp.
7. Overture from "Benvenuto Cellini" (Berlioz). The Station Orchestra.

10.0 p.m.—News Bulletin, given partly in English. Dance Music and Close Down.

FRIDAY, MAY 15th

FRANCE.

PARIS.—*Station:* Eiffel Tower.—FL.
Wavelength: 2,650 metres—5 k.w.

6.15 p.m.—Concert.

Artists: M. Paul Dermee, Mme. Fernande Ponche (Vocalist), Mlle. Yvonne Pineau (Vocalist), Mlle. Blanche (Pianist) and Mme. Delepalme (Pianist).

1. Talk on Literature. M. Paul Dermee.
2. La Biondina—Cycle of Melodies (Gounod). Mme. Fernande Ponche.
3. Andante of the First Symphony (Gounod). Mlle. Blanche.
4. (a) Barcarolle (Gounod), (b) The Spring (Gounod). Mlle. Yvonne Pineau.
5. Duet of Mireille (Gounod). Mmes. Ponche and Pineau.
6. Life and Death (Gounod). Mlle. Blanche.
7. Duet of Romeo and Juliet (Gounod). Mmes. Ponche and Pineau.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

PARIS.—*Station :* Radio-Paris.—SFR.
Wavelength : 1,750 metres—8 kw.

12.30 p.m.—Concert.

1. Tarazona—March (Teddy Moon).
2. Pursuit—Scherzettino (Jacquemont).
3. The Cup—Violin Solo (Wieniawsky).
4. Czardas (Michiels).
5. Ay, Ay, Ay (Osman-Perez-Freire).
6. Caprice—Cello Solo (Marc Markus).
7. Ballad of Love (Delay).
8. Slave Idyll (Ackermans).
9. Scherzo Varie (Fauchey).
10. Sicilienne and Rigaudon (Francœur-Kreisler).
11. Karama (Vivian Grey).
12. Venician Serenade (Fourdrain).
13. First Humoresque — Cello Solo (Julian).
14. For Pity (Gracey).
15. The Navarraise (Massenet-Alder).

1.50 p.m.—News Bulletin and Close Down.

8.15 p.m.—News Bulletin.

8.45 p.m.—Fragments from "Madame Chrysantheme" (Messager).

10.0 p.m.—Close Down.

SWITZERLAND.

ZURICH.—*Station :* Radio - Genossenschaft.
Wavelength : 515 metres—500 watts.

8.15 p.m.—Address (Dr. Bouler-Waser).

8.30 p.m.—Opera : "The Twilight of the Gods" relayed from the Zurich State Theatre. Selections by the Station Orchestra.

9.15 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station :* Unione Radiofonica-Italiana.
Wavelength : 425 metres—3 kw.

5.15 p.m.—Orchestral Selections from Albergo di Russia.

4.45 p.m.—Jazz Band.

6.15 p.m.—Close Down.

8.20 p.m.—News Bulletin and Weather Forecast.

8.30 p.m.—Concert.

1. Finland—Poem (Sibelius). Mr. Paoletti's Orchestra.
2. (a) Serenata (Brahms), (b) Song (Brahms). Signora Annabella do Marzio (Soprano).
3. (a) Prelude (Respighi), (b) Tambourin (Rameau). Signora Giuditta Sarotri (Soprano).
4. (a) Selection from "Rigoletto" (Verdi), (b) A Virgin—from "Favorita" (Donizzetti). Signor Balduino Bernabei.

Conference. Francesco Sapori.

5. Prelude to "Rienzi" (Wagner), (b) Dervish Dance (Bendix). The Station Orchestra.
6. Two Songs (Giarda). Signora Annabella di Marzio (Soprano).
7. (a) Nocturne (Chopin), (b) Selection (Chopin). Signora di Marzio.
8. (a) Andrea Chenier (Giodano), (b) Selection (Verdi). Signor Bernabie (Tenor).
9. Selection from "Mignon" (Thomas). Mr. Paoletti's Orchestra.

10.30 p.m.—Dance Music from Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station :* Radio-Wien.—IKL
Wavelength : 530 metres—1.5 kw.

4.10 p.m.—Concert. Programme of Overtures by Rossini.

1. The Barber of Seville.
2. Tancred.
3. The Thievish Magpie.
4. Semiramis.
5. The Siege of Corinth.
6. Othello.
7. Italian in Algiers.
8. William Tell.

6.10 p.m.—Children's Hour.

7.45 p.m.—English Lesson.

8.30 p.m.—Play "When We Are Old" (Blumenthal).

Programme by the Artists of the City Theatres.

GERMANY.

HAMBURG. — *Station :* Nordische-Rundfunk.
Wavelength : 395 metres—1.5 kw.

6.0 p.m.—Lecture on the City of Stade. Kurt Siemers.

7.0 p.m.—English Lesson. Hans Bredow School.

8.0 p.m.—Comedy "Master O! Master," by G. W. Spitzen.

PERSONÆ.

Jan Duker (Herm. Moller); Gretje, his wife (Ada Hamer); Geerd, their son (Walter Bullerdieck); Busemann (Julius Fels); Theda, his daughter (Erna Schuhmacher); Gottfried Lammers (Willi Scholz); Mayor (Bruno Walberts); Kapser Pull (Dr. Richard Ohnsorg); Harms (Adolf Johannessen).

10.0 p.m.—News Bulletin, given partly in English. Dance Music.

SATURDAY, MAY 16th

FRANCE.

PARIS.—*Station :* Eiffel Tower.—FL.
Wavelength : 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists : Mlle. Suzanne Tessier, Mmes. Madeleine Millochau (Violinist), Suzanne de Chaumesnil (Violoncellist), Lucie Gay (Vocalist), and M. Gadenne (Pianist).

1. Fashion Talk. Mlle. Suzanne Tessier.
2. Trio for Violin, Violoncello and Piano (Beethoven). Mlles. Millochau, de Chaumesnil and M. Gadenne.
3. Cycle of Melodies (Beethoven). Mlle. Lucie Gay.
4. Rondino for Violin (Beethoven). Mlle. Millochau.
5. Sonate in G. (Beethoven). Mlle. de Chaumesnil and M. Gadenne.
6. Suite Ecossaise (Beethoven). Mlles. Millochau, de Chaumesnil, and M. Gadenne.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

PARIS.—*Station :* Radio-Paris.—SFR.
Wavelength : 1,750 metres—8 kw.

12.30 p.m.—Concert.

1. The Soul of Toledo (Chillemont).
2. North Star (Waldteufel).
3. Romance (Svendsen).
4. Intermezzo (Rhene-Baton).
5. Promenade (Absalon).
6. Serenade on the Water (Vidal).
7. The Dream of Phryne (Delay).
8. Ginette of the Argonne (Boischot).
9. Pavane (Scassola).
10. Czardas (Monti).
11. When Re-Reading Your Letters (Masson-Kick).
12. Rustic Melody (Hedvige-Chretian).
13. Canzone (Tartanac).
14. South Sea Moon (Hirch-Buch).
15. Coppelia (Delibes-Alder).

1.50 p.m.—News Bulletin and Close Down.

8.15 p.m.—News Bulletin.

8.45 p.m.—Special Gala Concert organised by "Le Matin."

10.45 p.m.—Close Down.

SWITZERLAND.

ZURICH.—*Station :* Radio-Genossenschaft.
Wavelength : 515 metres—500 watts.

5.0 p.m.—Concert by the Station Orchestra.

6.15 p.m.—Concert by the Handharmonica-Jugend Club of Zurich.

8.30 p.m.—Concert.—Programme of Old Compositions.

Artists : Emmy Fries (Soprano), Paul Fries (Violin), Maz Siegrist (Pianist), and the Station Orchestra.

9.50 p.m.—Close Down.

ITALY.

ROME.—*Station :* Unione Radiofonica-Italiana.
Wavelength : 425 metres—3 kw.

5.15 p.m.—Orchestral Selections from Albergo di Russia.

5.45 p.m.—Jazz Band.

6.15 p.m.—Close Down.

8.20 p.m.—News Bulletin and Weather Forecast.

8.30 p.m.—Concert.

1. (a) Overture (Suppe), (b) Souvenir de Capri (Becce). M. Paoletti's Orchestra.
2. (a) Il Trovatore (Verdi), (b) Aria from "Mephistopheles" (Boito). Signor Casini Allessandro (Bass).
3. Prayer (Franck). Signora Claudia Astrologo (Violinist).
4. (a) Selection (Handel), (b) Tedosco (Castelnuovo). Signora Loufty Bey (Soprano).
5. (a) Cantique of Love (Schutt), (b) Pastorale Symphony (Beethoven). The Station Orchestra.
6. (a) Sonnambula (Bellini), (b) The Barber of Seville (Rossini). Signor Casini Alessandro (Bass).
7. (a) Introduction, (b) Dance, (c) Son (Picenardi). Signorina Claudia Astrologo (Violinist).

8. (a) If I Had You (Tschaikowsky), (b) Oh, When I Sleep (Liszt). Signora Bey.
9. "The Mastersingers" (Wagner). M. Paoletti's Orchestra.

10.30 p.m.—Dance Music from Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station :* Radio-Wien.—IKL.
Wavelength : 530 metres—1.5 kw.

4.10 p.m.—Concert.

1. Prelude from "Eugin Onegin" (Tschaikowsky).
2. The Moth (Strauss).
3. Overture (Suppe).
4. Adelaide (Beethoven).
5. Meditation of Thais (Massenet).
6. Selection from "Lohengrin" (Wagner).
7. Still As the Night (Bohm).
8. Vilanelle—Serenata (Dell'aqua).
9. From the Time the Young Love (Komzak).
10. Hungarian Maiden (Ottinger).

8.0 p.m.—Operette "Hoheit Tanzt Waltzer" (Leo Ascher).

10.0 p.m.—Light Music.

GERMANY.

HAMBURG. — *Station :* Nordische-Rundfunk.
Wavelength : 395 metres—1.5 kw.

6.0 p.m.—Programme of German Folk and Children's Songs.

Artists : Ober-Realschule Choir of Hamburg. Directed by Ad. Winklehake.

8.0 p.m.—Concert.

Artists : Curt Pabst, Bernhard Jakschtat and the Station Orchestra.

1. Overture from "The Flying Dutchman" (Wagner). The Station Orchestra.
2. Monologue from "The Flying Dutchman" (Wagner).
3. Adagio from the Fifth Symphony (Beethoven).
4. The Crane of Ibvkus (Schiller). Curt Pabst.
5. Overture from "Coriolanus" (Beethoven). The Station Orchestra.
6. Final Scene from "Faust" (Gounod) Faust (Ferd. Schneider); Gretchen (Erna Kroll-Lange); Mephisto (Bern. Jakschtat).
7. (a) Selection (Meyer), (b) The Pagan Boy (Hebbel). Curt Pabst.
8. Andante from the Pathetic Symphony (Tschaikowsky). The Station Orchestra.
9. (a) The Dwarf (Schubert), (b) Balsazar (Schumann). Bern. Jakschtat.
10. Pidder Lung (Liliencron). Curt Pabst.
11. Overture from "Egmont" (Beethoven). The Station Orchestra.

10.0 p.m.—News Bulletin, given partly in English. **Dance Music.**

SUNDAY, MAY 17th

FRANCE.

PARIS.—*Station :* Eiffel Tower.—FL.
Wavelength : 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists : Dr. Pierre Vachet, Mme. Levorsen (Vocalist), M. Guy Moufflard (Flutist), M. Rene Devaux (Violinist), Mlle. Alice Devaux. Andrieu and M. Joachim Garcia (Pianists).

1. Medical Talk. Dr. Vachet.
2. Sonate for Violin and Piano (Grieg). M. Rene Deveaux and Mlle. Andrieu.
3. (a) I Love You (Grieg), (b) The Old Mother (Grieg). Mme. Levorsen.
4. The Spring (Sinding). M. J. Garcia.
5. (a) The Song of a Bird (Sinding), (b) Melodie (Weisse). Mme. Levorsen.
6. Sonate for Flute and Piano (Grieg). M. Moufflard and M. Garcia.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

PARIS.—*Station :* Radio-Paris.—SFR.
Wavelength : 1,750 metres—8 kw.

12.45 p.m.—Concert. Directed by M. Roland Lenoir.

1. March of the Wooden Soldiers (Jessel).
2. Princess Czardas (Kalman).
3. Beautiful Rosemary (Kreisler).
4. Serenade in the Evening (Grecourt).
5. Mazurka (Chopin).
6. Alpen Scenes (Carcel).
7. Song—M. Roland Lenoir.
8. Dances (German).
9. Tarentelle (Popper).
10. Farandole (Pierne).
11. Song—M. Roland Lenoir.
12. Spanish Dance (Moszkowsky).

1.45 p.m.—News Bulletin and Close Down.

8.15 p.m.—Esperanto Lesson.

8.45 p.m.—Jazz Music by Mario Cazes and his Orchestra.

10.30 p.m.—Close Down.

SWITZERLAND.

ZURICH.—*Station :* Radio-Genossenschaft.
Wavelength : 515 metres—500 watts.

8.15 p.m.—Address : "The Valley of the Rhone" Alice Scheurer.

8.30 p.m.—Dance Music.

1. Viennese Waltz.
2. Bagdad—Foxtrot.
3. There's Yes in Your Eyes.
4. Barney Google.
5. Dreamy Melody.
6. Dromedary.
7. Titiane.
8. Electric Girl.

10.0 p.m.—Dance Music.

1. Foxtrot.
2. Eve—Waltz.
3. A Polka Mazurka.
4. To-morrow—One-Step.
5. Clo-Clo—Foxtrot.
6. Bub—Foxtrot.

11.0 p.m.—Close Down.

ITALY.

ROME.—*Station :* Unione Radiofonica-Italiana.
Wavelength : 425 metres—3 kw.

5.15 p.m.—Orchestral Selections from Albergo di Russia.

6.45 p.m.—Close Down.

8.20 p.m.—News Bulletin and Weather Forecast.

8.30 p.m.—Scenes from the Opera "La Gioconda," by Ponchielli.

PERSONÆ.

La Gioconda—Signora Gina Valadier (Soprano); Laura — Signora Maria Lazzari (Mezzo Soprano); Alvise—Signor Casini (Bass); La Cieca—Signora Maria Gabrielli (Contralto); Enzo Grimaldi—Signor Franco Caselli (Tenor); Barnaba — Signor Ugo Donarelli (Baritone). Mr. Alberto Paoletti (Pianist).

Act I.—Selections (The Orchestra). Scene and Terzetto (Gioconda—Barnaba—La Cieca); Romanza (La Cieca); Monologue (Barnaba).

Act II. — Barcarolle (Barnaba); Romance (Enzo); Scene and Duet (Laura—Enzo); Duet (Gioconda — Laura).

Act II.—Scene and Song (Alvise—Barnaba); Dance (The Radio Orchestra).

Act III.—Scene and Aria (Gioconda); Terzetto (Laura — Gioconda — Enzo. Duet and Finale (Barnaba—Gioconda);

10.30 p.m.—Orchestral Selections from Albergo di Russia.

11.0 p.m.—Close Down.

GERMANY.

HAMBURG. — *Station :* Nordische Rundfunk.
Wavelength : 395 metres—1.5 kw.

6.0 p.m.—Concert. Flowers in Music.

Artists : Edith Scholz and the Station Orchestra.

1. Forget-Me-Not (Waldteufel). The Station Orchestra.
2. The Flowers of Little Ida (Anderson). Edith Scholz.
3. The Flower's Dream (Lederer).
4. The Flowery Meadow (Waldteufel). The Station Orchestra.
5. Rose and Thorn Bush (Grete Voigt). Edith Scholz.
6. When the Roses Bloom (Siede). The Station Orchestra.
7. The Fable of the Fool and the Violet (Paula Dehmel). Edith Scholz.
8. Children of Spring (Waldteufel). The Station Orchestra.

7.15 p.m.—English Lesson. Hans Bredow School.

8.0 p.m.—Romantic Opera, in Three Acts, **"Hans Heiling."** Heinrich Marschner.

PERSONÆ.

The King of Erdgeister (Mara Friedfeld); Hans Heiling, his son (Curt Rodeck); Anna (Erna Kroll-Lange); Gertrud (Clara Voss); Conrad Leibschutz (Ferdinand Schneider); Stephan (Bernhard Jakschtat); Nikolaus (Erwin Bolt).

10.30 p.m.—News Bulletin, given partly in English. **Close Down.**

Experimenting on Two Metres

By JOHN L. REINARTZ.

In experimenting with these high frequencies Mr. Reinartz has observed some as yet unexplained phenomena, whereby it seems possible now actually to see through metal plates with the naked eye.

THE strangest things imaginable happen when we begin to work a radio transmitter at the ultra high frequencies that lie below the two-metre wavelength band. The experiments to be described were begun only a short time ago, and there are still many points in the collected data which are, so far, unexplained, and many others for which only the merest guesses are at hand.

Peculiar Phenomena

What strange characteristics and phenomena shall we find when we finally reach and are able to control the frequencies higher than 150,000 kilocycles corresponding to wavelengths below two metres? That is

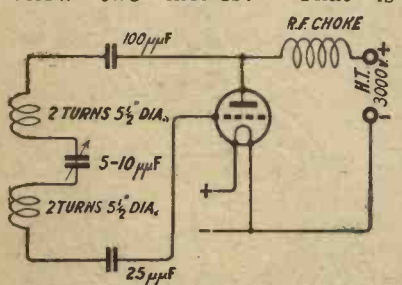


Fig. 1.—A simplied circuit giving the values employed by the author in 5-metre transmission.

the question which will probably be asked when the peculiar effects, obtained by making a half-kilowatt valve oscillate and generate frequencies somewhere in this band, are told.

To start at the beginning: Along with my work on 40 and 20 metres, I have been constantly pushing downward in the wavelength band, seeking greater and greater frequencies. The huge increase in range for the same power input, gained with the use of the shorter waves, leads the experimenter who is after efficiency constantly in this direction.

Mr. John L. Reinartz (centre), who will sail with the MacMillan Arctic Expedition which leaves in June, at his first meeting with Commander Donald B. MacMillan (left) and Commander E. F. McDonald (right).

Experimenting on Two Metres

Some weeks ago, after making my regular transmitter work down to 5 metres, I decided to ascertain how high in frequency it was possible to make the valve oscillate. Accordingly, the clips of the tuning inductances were moved closer and closer to the inside ends of the plate and grid coils and the tuning condenser was moved until the circuit was brought into resonance. The frequency was constantly checked as the clips were moved.

Early Observations

When the aerial circuit was connected to the valve and absorbed the power generated by it, the action of the set was regular in every way. The parts functioned as they should, and everything worked as usual.

But when the aerial and counterpoise were disconnected and removed from the valve, things began to happen which were most peculiar in nature and which, to date, I have not been able to explain satisfactorily.

Refer to Fig. 2, which shows a diagram of the half-kilowatt valve which was used in the experiments. This valve is the standard Radio Corporation product, being manufactured by the General Electric Company. It is rather old, has seen a great deal of service and is of old design.

Valve Construction

About the only point of difference in the form of this valve and those now being manufactured by the company under the same designation is the location and shape of the grid lead, which runs from the element of the valve to the lug at the base which serves to make the outside connection.

The grid connection in question is formed from a small wire of some metal which is used in the regular valve construction. It leads directly from the supporting collar to a larger piece of wire which is carried through the wall of the valve to the base, but it is wound pig-tail fashion. This seems to be of the utmost importance in the results obtained—therefore the detailed description of the difference.

Purple Corona Formed

When the valve was set into operation as described, without aerial or earth, as soon as the plate voltage was applied—in this case 3,000 volts—the first point noticed was a dark blue-purple halo, or corona, which formed itself at both the narrow sides of

the anode, as shown in the sketch. It was not like ordinary brush discharge, in that it seemed a bit thinner and was slightly away from the surface of the anode, there being possibly a sixteenth of an inch between them. The exact nature of the phenomenon

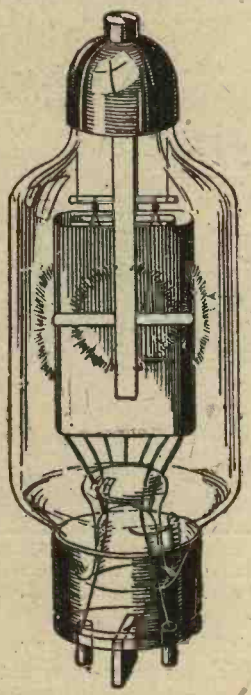


Fig. 2.—Diagrammatic representation of the phenomena referred to in the article. Note the black spot on the anode.

cannot be described accurately. The nearest comparison which may be drawn is that of a spot of very dim blue-purple light seen through a very fine cloth or ground glass screen, with the edges of the spot diffused rather than brought to sharp focus. This was evident on both the small sides of the anode and has persisted in its original form since the first time it was noticed.

Another Peculiarity

The second curious effect was found at the approximate centre of the large side of the anode. Here, as shown in the diagram, another somewhat similar occurrence took place. At first, the spot of light covered a circle about $\frac{7}{8}$ in. in diameter. The characteristics of this light were very similar to the other, except as to the colour, which was more of a pink-purple. It seemed, in other words, to be more of a blue-purple, similar to the first, with a slight tinge of red which was not entirely merged into the other.

From time to time, as the valve was used again and again for observation of the phenomenon, the spot gradually grew in diameter. With the increase in diameter of the spot, the intensity of the glow became less and less at the centre—falling off to total blackness in the centre and stopping abruptly at the circumference.

Visibility Established

But the most important of all was the visibility established through the anode. This was noticed at the same time as the other points, and has given more concern as to explanation. When the valve was put into operation and the light produced at the centre and edge of the anode, simultaneously a spot occurred at the point noted in Fig. 2. It seemed at first to be an incandescent point on the surface of the anode, but investigation proved shortly that such was not the case. In spite of the light that showed on the surface and at the edges of the anode, it remained perfectly cold all during the demonstration.

An Examination

Examination of the spot proved to admit of only one explanation, *i.e.*, that there was a hole through the plate which made the filament, inside, visible! A revolving mirror or various shutter movements before the spot served only to prove this point further. It could be nothing but a hole through the plate made by the emanations from the filament, or some other cause yet to be determined.

One theory which would serve well as an explanation of the formation of the hole is that some parasitic frequency is generated in the valve, when it is operating in the manner described, which has a new and unknown property. It might be rationalised by saying that the emission—whatever its nature—pushes the molecules of the anode metal into some sort of line, thus forming the hole and allowing the passage of the emission.

It is possible that the stream of vibrations from the filament simply crowds the molecules out to one side, in order to make room for their own escape.

Not a Real Hole

Of course, a thorough examination of the anode proves that there is not a real hole in it at other times than when the valve is operating in this strange manner. At five metres, working with or without an aerial, none of the phenomena noted above occur.

A test was made for X-rays with the aid of a dentist's film, and proved the absence of this ray. A number of other tests of the same type were made, but brought negligible results.

Other Experiments

The low wave work led to a number of other experiments which proved exceedingly interesting, if not particularly enlightening. Among the most important of these was the behaviour of a Tungar charger bulb when placed in the high-frequency circuit.

There occurred a number of phenomena in this investigation which are extremely similar to

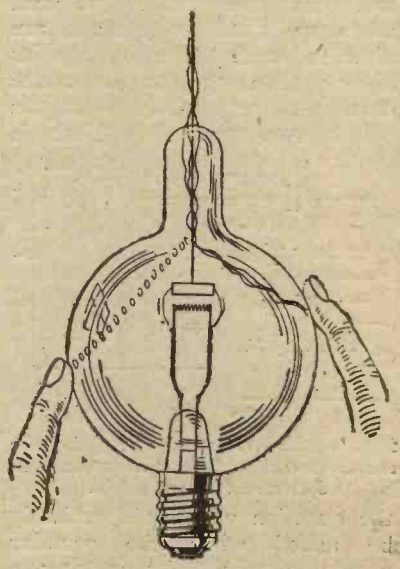


Fig. 3.—Illustrating the effects observed in the experiments with a Tungar charger bulb.

the ordinary Geissler tube discharge, but at the same time have characteristics which cannot be explained by the known laws. The foremost of these is the beading effect shown in Fig. 3. If the finger is placed on the glass of the bulb, a line of current makes its way from the anode or cathode, as the case

may be, to the tip of the finger. If it is gradually moved farther and farther from the elements of the bulb so that the high-frequency current must travel over an increasing path, the stream will gradually form itself into a number of globules or small spheres until, just before the cessation of current to the finger-tip, each of these little balls will be entirely dissociated from the next, while the current is still travelling. The passage of the current is, of course, in the usual form seen in the Crookes tubes.

If a heavy output is employed numbers of bright spots like small stars will make their appearance at points along the elements of the rectifier bulb. What the reason is for such formations is not known. Possibly it may rest in some inherent characteristic of the metal employed in the elements, or it might logically be the result of some electrical cause. The exact determination of the cause is yet to be made.

Visible Passage of Current

One of the most interesting demonstrations, which might well be used in teaching beginners, is the passage of the current along the wires of the elements. It actually *does* pass along the outer surface of them, with the very smallest amount of penetration possible. As a matter of fact, in many instances the current takes the form of a sort of rope, twining itself around the wires and so passing through the bulb.

When holding the bulb in the hand, the current jumps from the elements to the flesh touching the glass, forming a sort of spot, as if making a condenser plate for itself. If the bulb is suspended from the top—near the input terminal—the current will have a tendency to spread out, after the fashion of lightning.

Field Strength

This is the latest branch of the investigation, and has, as yet, scarcely been begun—if the results which may be arrived at are considered.

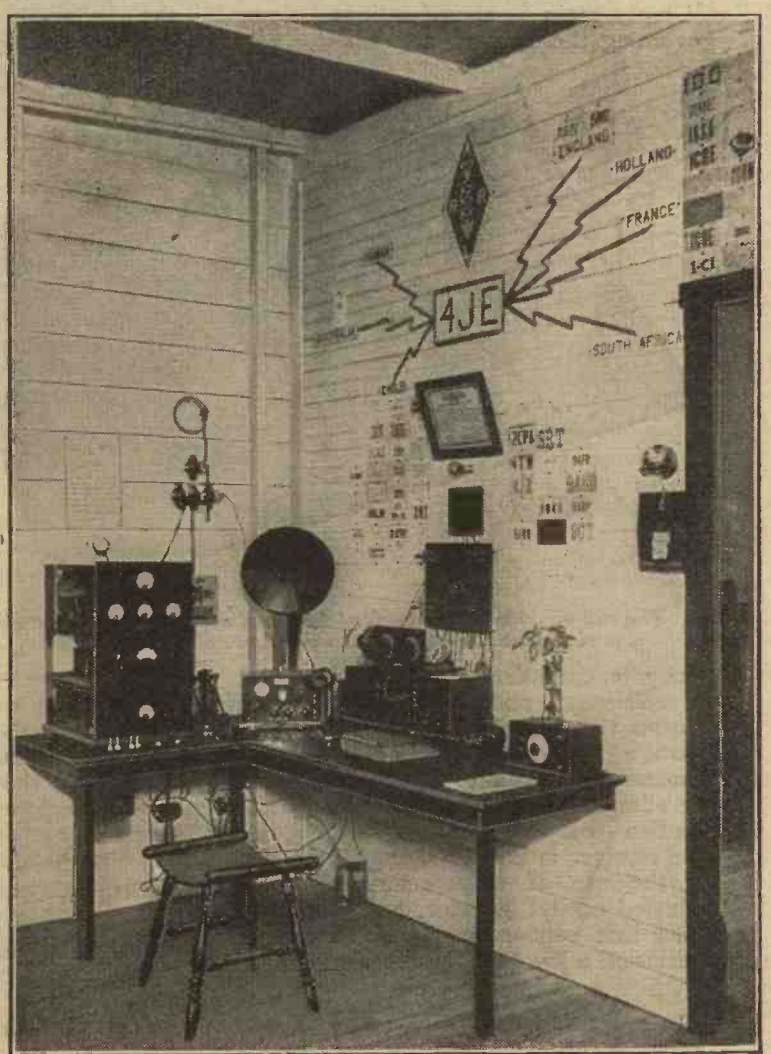
Though it may mean anything or nothing, a test may be made with the same rectifier bulb around the field of the tuning coils of a set working on five metres, which may result in some astounding revelations regarding the location of the maxima and minima in field strength.

Weather Reports by Wireless

AGRICULTURISTS, navigators and airmen derive great benefit from a knowledge of the weather conditions to be expected in their neighbourhood, and the use of wireless for the interception of weather reports is rapidly increasing.

The director of the weather bureau at Rio de Janeiro has just arranged for the installation of wireless apparatus for the reception of the meteorological reports which are transmitted from many of the world's large wireless stations. The receiver is of the Marconi RP 4 B type, which is a special type of portable five-valve receiver. Tuning is effected by means of a single circuit, which makes it extremely flexible and easy to operate. The intervalve coupling employed is the resistance capacity method, and the wavelength range is from 1,000 to 25,000 metres.

A PORTO RICO AMATEUR STATION



The private transmitting and receiving station of Mr. J. Augusty, the announcer at WKAQ.

LOUD-SPEAKER RECEPTION

By STANLEY G. RATTEE, M.I.R.E.,
Staff Editor.

THE receiver to be described is one which fills the need of a simple apparatus which may be operated by any member of the family with a view to tuning in a main B.B.C. station at loud-speaker strength up to distances of about ten miles. Considerably longer distances can be obtained, of course, if telephones are used.

Considerations in Design

The main considerations governing the design are simplicity in operation without loss of efficiency, and for these reasons the difficulties which the average non-technical user of wireless apparatus experiences are eliminated, as, for instance, reaction coupling adjustment. The receiver is further simplified by the use of a permanently adjusted crystal detector, and in order that volume may not be sacrificed, a low-loss coil is used.

Auto-Coupling

In order that the receiver may be selective enough to eliminate local interference for short-wave B.B.C. reception auto-coupling is employed.

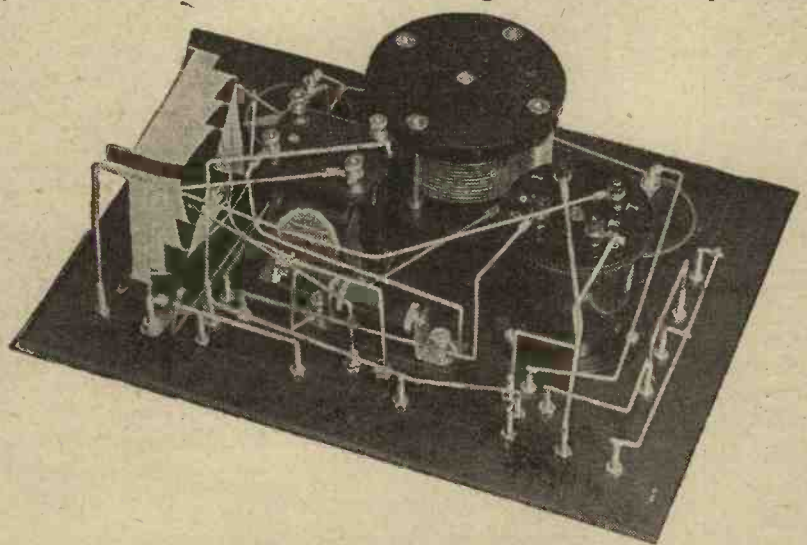
Terminal Arrangements

Two stages of transformer coupled low-frequency amplification follow the crystal, arranged with the necessary separate H.T. terminals for small-power valves to be used if desired; terminals for suitable grid-bias are also provided.

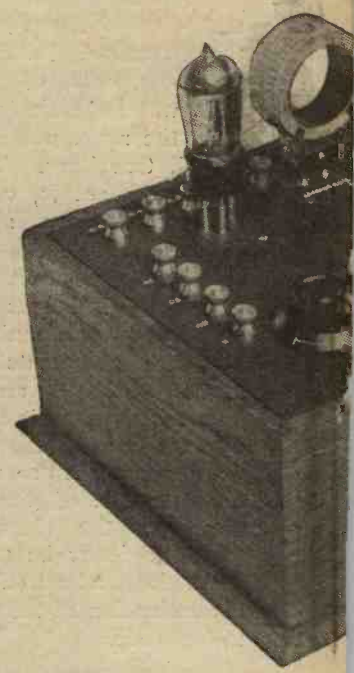
Looking at the centre photographs, the terminals situated along the back of the panel are the various battery terminals marked in accordance with the instructions given in the illustration of the panel layout, whilst those terminals on the left and right sides of the panel are for the aerial, earth and telephone connections respectively.

Simplicity of Control

It will be observed that the only controls which demand the attention of the operator are the two filament rheostats and the variable condenser, the crystal



The components on the back of the panel are disposed with a view to simplifying the wiring, as the above photograph shows.



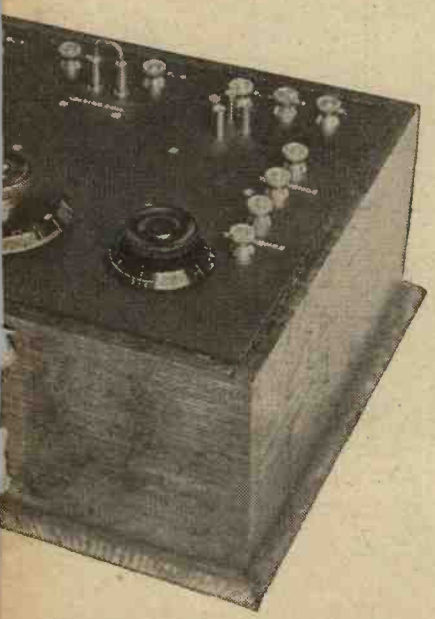
The completed instrument i symmetrical panel layout. Chelmsford is seen insert

In this photograph the valve the socket of the latter no

FROM THE LOCAL STATION

Constructional details are here given for the building of a simple receiver which will allow of the local station being received on a loud-speaker up to distances of about ten miles from a main B.B.C. station

dignified in appearance, due to the A loading coil for the reception of ed in a socket between the valves.



s and loading coil have been removed, v being bridged by a shorting plug.

detector, low-loss coil, etc., all being beneath the panel. The socket in the centre of the panel is for the inclusion of a loading coil when receiving Chelmsford or other stations above 600 metres approximately.

Materials and Components

The receiver as photographed is made up of the following components and materials, and though this list does not necessarily mean that the makes given should be used in all duplications of the set, it is strongly recommended that, where departure is made from this list, the component chosen be of good make and of a suitable value or type to do the work required of it :—

One ebonite panel of guaranteed material measuring 9 in. × 12 in. × $\frac{1}{4}$ in. (Paragon). This may be either matt-finished or polished.

One containing box to take panel and $4\frac{1}{2}$ in. deep.

One H.T.C. fixed detector (H.T.C. Elect. Co., Ltd.).

One variable square law 0.0005 μF condenser (Peto-Scott Co., Ltd.).

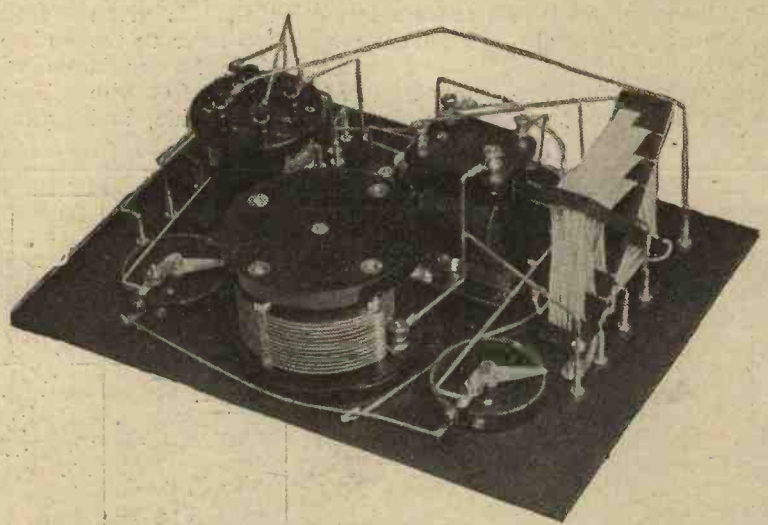
Two dual rheostats (L. McMichael, Ltd.).

Sixteen nickel-plated terminals (Burne-Jones & Co., Ltd.).

Eight nickel-plated valve sockets (Burne-Jones & Co., Ltd.).

One Kendall coil former (Burne-Jones & Co., Ltd.).

One coil socket for panel mounting with short-circuiting plug.



This general back of panel view shows the position of the coil and its method of mounting.

One Super-Success L.F. transformer (Beard & Fitch).

One Powquip L.F. transformer (Power Equipment Co., Ltd.).

Set Radio Press panel transfers.

Half-pound No. 22 d.c.c. wire.

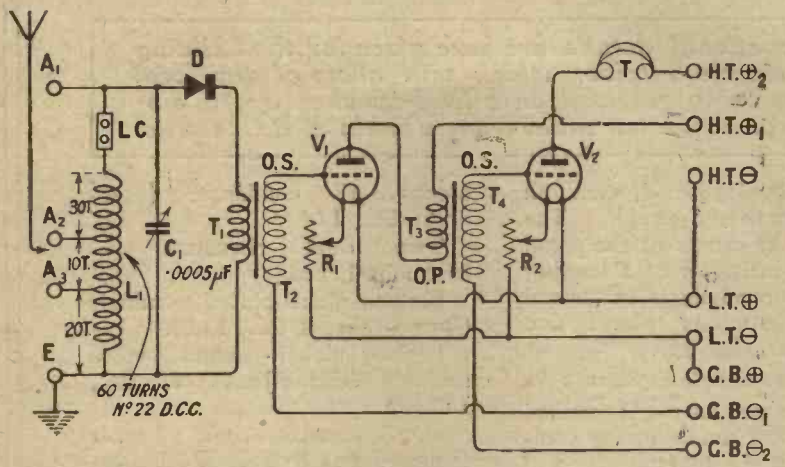
Quantity of square-section or round No. 16 S.W.G. tinned copper wire.

The Coil

The construction of the receiver is extremely simple, and the layout is such that there is easy access to every terminal and

component with even a large-sized soldering iron. Before commencing with the drilling of the panel, however, it is as well to turn attention to the making of the coil, illustrated in the photographs showing the underside of the receiver.

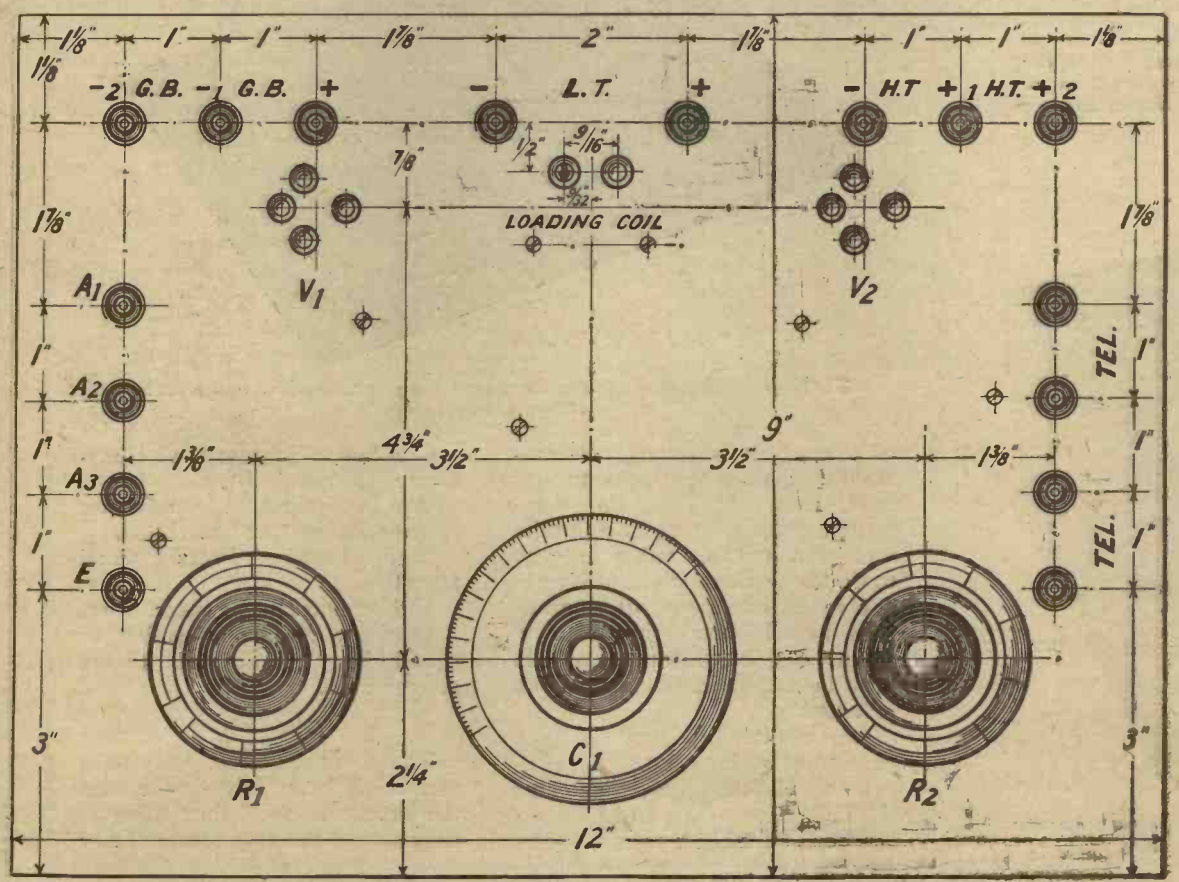
To constant readers of *Wireless Weekly* this type of coil will need no introduction, for its merits and construction were fully described by its designer, Mr. G. P. Kendall, in Vol. 5, No. 17, and readers requiring more information than is given here are advised to refer to the above article. The former is made up of two strips of ebonite 5 in. long and 1 in. wide, and may be obtained completely slotted from advertisers in this and other Radio Press journals. The actual coil in the receiver under description is wound with 60 turns of No. 22 d.c.c. copper wire tapped at the 20th and 30th turns.



The theoretical circuit diagram showing the arrangement of the aerial coil tappings.

Method of Winding

To wind the coil, take the No. 22 d.c.c. wire and secure one end in one of the slots nearest to the centre of the former and proceed to wind round the former, laying each turn in the slot of each arm nearest to the centre until ten complete turns have been wound. With this done, cross over to the next slot on the opposite side of the former and proceed to wind a further ten complete turns, when a tapping should be made by making a loop and twisting the wire round so as to make it secure. Next proceed to wind ten more complete turns in the third slots and again make a tapping as before. This constitutes the last tapping, so proceed to wind the



All necessary drilling dimensions are included in the above diagram of the panel layout. Blueprint No. 116a.

remaining turns ten in each slot until 60 turns complete the coil, the end of the winding being secured by threading the wire through one of the small holes provided on the former.

Fixing the Coil

In order to secure the complete coil to the panel, the most convenient method so far available is the use of two small brass strips and 6 B.A. screws and nuts, as will be seen upon inspecting the photographs showing the underside of the panel.

The Layout

The panel upon which all the components are mounted is, as previously stated, 9 in. × 12 in. × ¼ in., and is drilled in accordance with the instructions given in the dimensioned drawing. Should the reader choose makes of components other than those given earlier, it is as well to lay these out upon the panel before commencing the drilling in order to see that sufficient clearance is given for the moving vanes of the condenser, etc. Again, should the reader choose to use a cat-whisker type of crystal detector, this should, of course, be mounted on the upper side of the panel, when it may be necessary to move the loading coil socket a little nearer the back edge of the panel.

Wiring Up

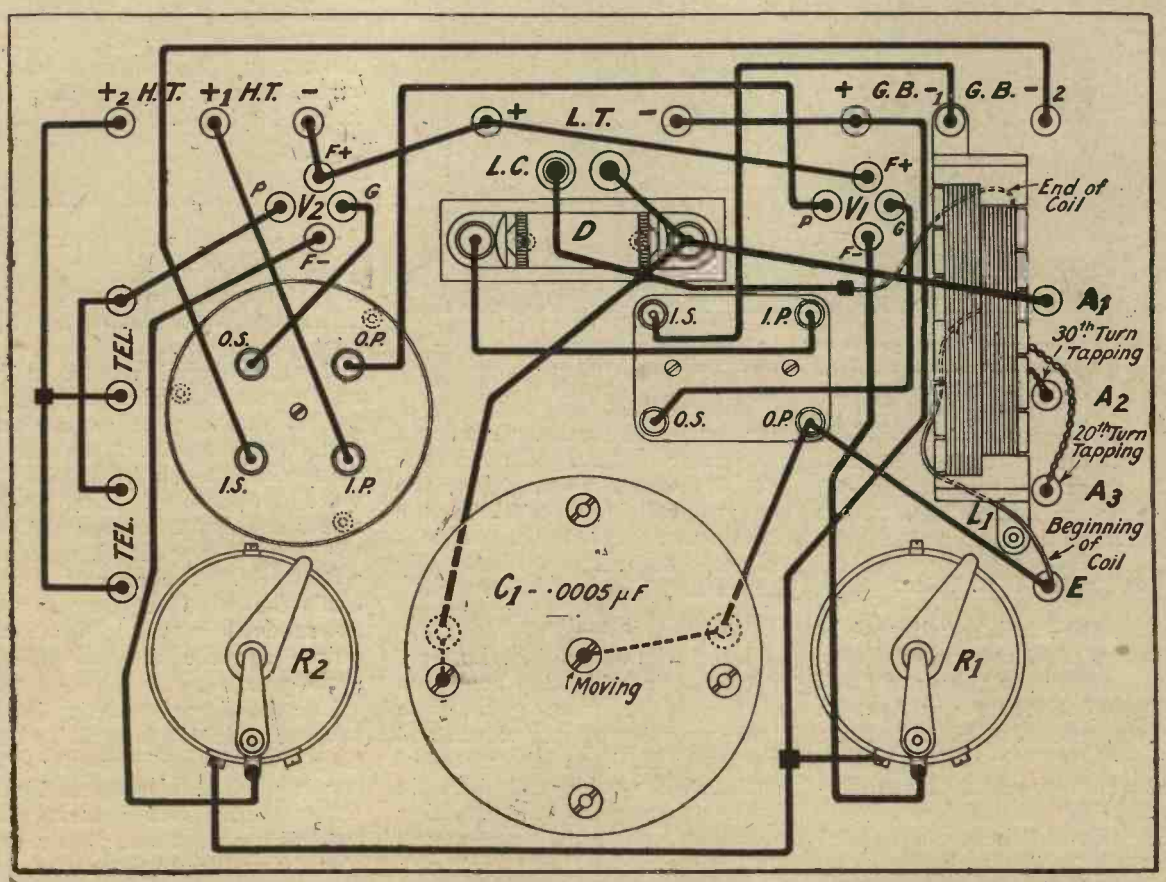
The wiring of the receiver is perfectly straighforward, and so long as the lead which connects the two filament resistances to the L.T. negative is fitted first of all, the remaining connections are easily accessible.

All connections should be kept as short as circumstances will allow and should be well spaced. Those readers who desire to make their connections by securing them with nuts and washers may of course do so, though soldered joints are much to be preferred.

The connections to the low-frequency transformers as shown in the wiring diagram are the best arrangement for the two makes chosen, and should other makes or make be favoured by the reader, then some experimenting with the IP; OP, IS, OS connections may be necessary in each case.

Battery Connections

If the reader does not care to go to the expense of power valves, then the ordinary general-purposes valves may be used even with voltages up to 120 or more so long as attention is given to grid-bias values for the clearest and best results. When connecting this battery to the receiver, the positive connection is made to the G.B.+ terminal of the receiver, whilst the G.B. – 1 terminal (which is connected to the grid of the first valve through the secondary winding of the first L.F. transformer) should be connected to the 1½- or 3-volt tapping with 100 volts H.T. The G.B. – 2 terminal applies to the second L.F. stage and should be connected to the 3- or 4½-volt



The wiring diagram which should be followed carefully when connecting up. Note specially the coil tappings arrangement. A full-size Blueprint, No. 116b, may be obtained, price 1/6 post free

tapping. The three H.T. terminals on the right-hand side of the receiver are connected H.T. – to negative of battery; H.T.+1 is connected to about 100 volts and H.T.+2 to, say, 120 volts. The best values for both batteries for purest results will, of course, be found by experiment, and will vary in all probability with each different valve tried.

Operating

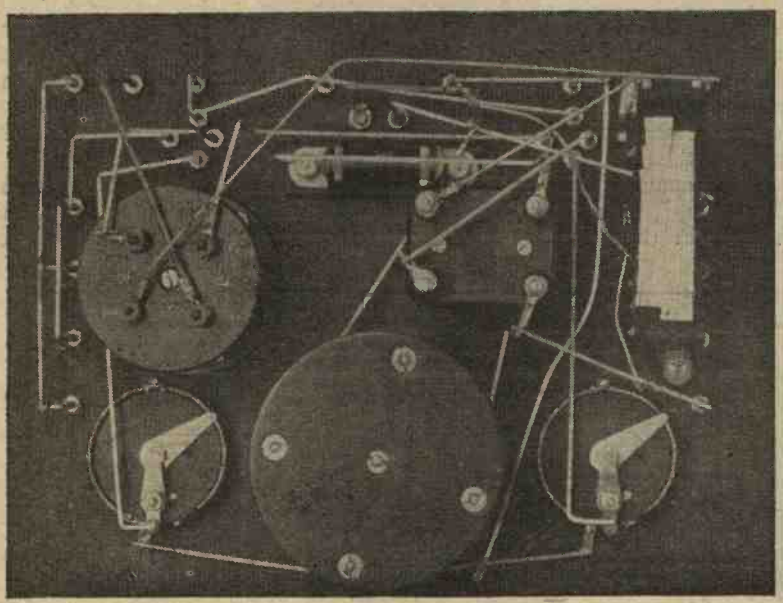
With the receiver completed and the batteries connected in the manner suggested, turn the filament resistances to the off position, insert the valves, connect the telephones, place the short-circuiting plug in position, connect the earth to E, and with the aerial connected to A3, tune for the loudest result from the local station.

Adjusting H.T. Voltage

With the receiver adjusted in this way, experiment should now be made with the values of H.T. and grid bias for the purest and loudest results. Should there be any difficulty in understanding how best to go about this adjustment of voltages, then the reader should make a careful study of the instructions usually given with the wrappers of the valves or else consult the characteristic curves of the particular valves in use. Further, some brief notes upon "How to Use a Power Valve" appear in the current issue of *Modern Wireless*.

The Aerial Connection

The best results having been obtained with the aerial connected to A3, the other connections should be also tried, always retuning on the variable condenser. As the best position for the aerial and earth connections will differ with different aerials the set is tried on, it is obviously a matter of experiment for the reader to find out which are the best positions for aerial and earth with his own particular system. In the case of Chelmsford when a No. 100 or 150 coil is inserted in the loading coil socket, the positions of aerial and earth will invariably be A1 and E respectively.



This back of panel photograph may be used advantageously in conjunction with the wiring diagram when wiring up.

Results

Using the set in S.E. London, a district in which the new 2LO station is far from good, with two general purposes valves and 120 volts H.T. on the plate of each, with 3-volt grid bias in both cases, good loud-speaking was obtained both for speech and music when the aerial was connected to A3 and the earth to E.

Chelmsford

On substituting a No. 150 coil for the short-circuiting plug, Chelmsford was tuned in also at good strength after changing the aerial connection to A1. These connections, though having no bearing upon the best obtaining with different aerials, go to show that some attention should be paid to how the aerial and earth are connected. In cases where interference is being experienced, then the smallest number of turns between the aerial and earth, that is with the aerial to A2 and the earth to A3, will make the receiver extremely selective, though the desired station may be reduced in volume somewhat.

The receiver was also tested upon an aerial of average dimensions at a distance of thirteen miles east of 2LO. Using two ordinary bright emitter valves with 100 volts H.T., and 3 volts grid bias, and with the aerial connected to A3, comfortable loud-speaker results were obtained in a room of normal size. The Chelmsford station (seventeen miles distant) gave noticeably greater signal strength, a No. 150 loading coil being employed.

A Cheap and Efficient Aerial Mast

(Concluded from page 173)

fitting of a hinge is recommended, as illustrated in Fig. 3.

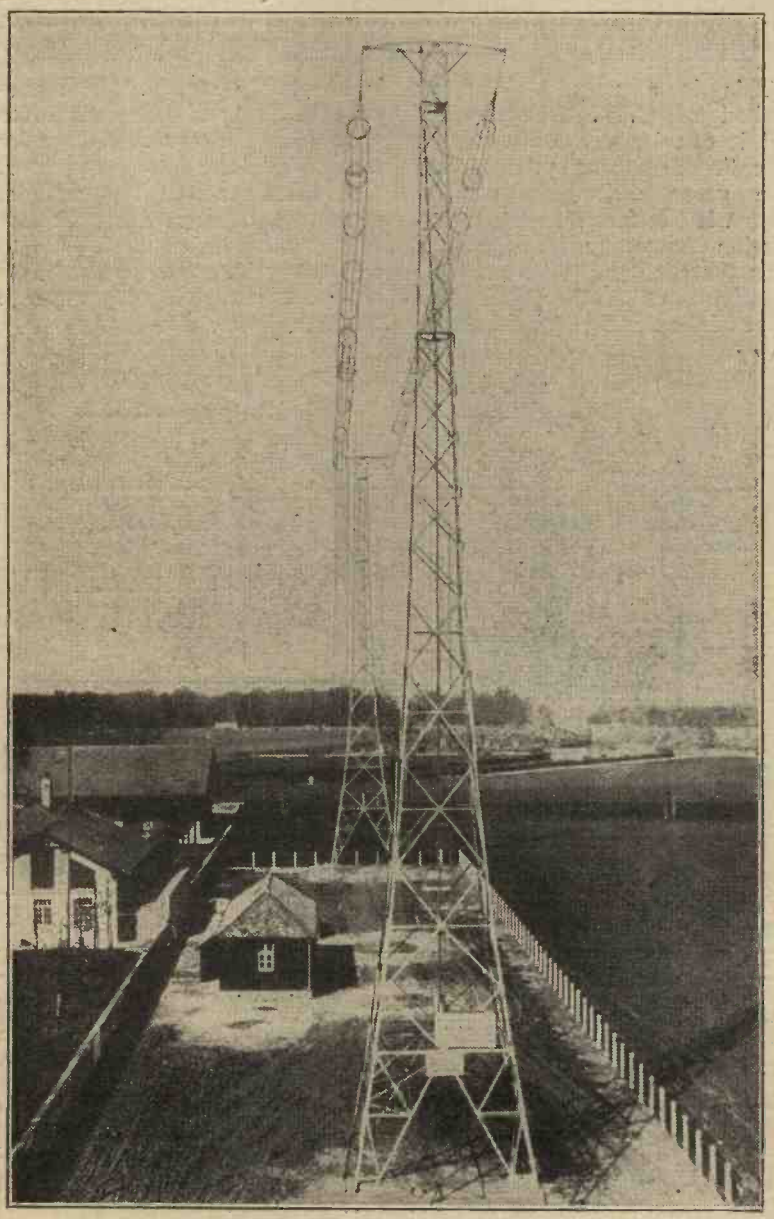
This design provides a cheap and strong mast, and any scrap tube cuttings can be used, provided they are of suitable diameter and that the tubes used for the spigots enter the pieces of the pole freely. The concrete grout binds the tubes together so that no screwed connections are required for the erection of the aerial pole.

The drawing shows clearly the support which is formed by bedding two scrap pieces of angle-bar in pitch in a concrete block. Other methods of securing the base of the mast will readily suggest themselves to those who may be unable to carry out this part of the design as suggested above.

Random Technicalities

By PERCY W. HARRIS, M.I.R.E.
Assistant Editor.

THE sudden increase in the number of permanent or semi-permanent crystal detectors placed upon the market seems to be due to the discovery that the bright yellow, waxy-looking mineral known as Arzenite works well with Bornite or a similar crystal. Arzenite also works excellently with Tellurium, this combination being hidden beneath the finished exterior of one of the permanent detectors now sold. Certainly these detectors represent a distinct advance, for while it is not possible, save with a few picked specimens, to obtain quite so sensitive an arrangement as an expert can get with a good piece of Galena and a carefully adjusted cat-whisker, it yet gives the average crystal user a far better signal than he would himself be able to get with the old cat-whisker and crystal. Of their robustness there is no question, and I have recently used two or three different kinds in a crystal set which could be dropped a foot on to the table without upsetting the signal strength to any material extent.



The elaborate masts and aerial at the Marconi station at Basle Aerodrome, Switzerland.

* * *

I listened to Capt. Eckersley's technical talk from 2LO recently, and was quite surprised at the information he gave us regarding long-distance reception. Some of us certainly opened our eyes wide when we heard the gallant captain describe the neutrodyne as " three tuned anodes " with a linking of condensers between the plates of the valves. The Hazledyne neutrodyne, of course, is a transformer coupled arrangement, and the neutrodyne tuned anode is that first described in *Wireless Weekly* by Mr. A. D. Cowper. As readers know, I have applied the neutrodyne tuned anode principle to several receivers described in Radio Press publications. In this arrangement there is, in addition to the tuned anode coil, another coil coupled to it and connected to a condenser. I was rather surprised that Capt. Eckersley did not mention this coil, as it is an important part of the receiver. I noticed that he said he was using a set with three neutrodyne tuned anodes, a detector and two stages of note magnification.

I may be wrong, of course, but in any case it is wonderful what

you can get in *The Wireless Constructor* for sixpence!

And even if the set is not on the market we can supply blue prints for a reasonable charge! (Advt.)

* * *

I see that the American magazines are now carrying advertisements of a valve known as the "McCullough A3 Radio Tube." The illustrations in the advertisements indicate that it looks very much like an ordinary valve except that it has an additional cap at the top, which presumably connects to a socket joined to a flexible lead and then to the lighting mains. I have not seen any technical particulars yet, but I should judge that the heat for the filament is provided by a wire in the A.C. circuit which is not in electrical contact with the actual filament connected to the wireless receiver. Of course, if the filament can be lit from A.C. mains this represents a big advance in ordinary receiver construction. Possibly we shall see something of the kind over here shortly.

* * *

It is rather annoying to see that so many British valves appear to be closely modelled upon the American "tubes." Prior to the Americanising of our valves, we largely copied the French! In America practically all work is done upon UV199 or UV201a valves, the UV199 being the .06 ampere type and the UV201a the .25 dull emitting small power valve. The Peanut valve which was so much boosted last year is very little seen these days, save in the instruments of the Western Electric Co., who have standardised upon them, except for power valve work. The inverted "V" shaped filament supported at the pointed end, the grid wound as a flat spiral over two side supports, and the rectangular box-like anode, as well as the magnesium process which gives a silvered appearance to the bulb, are all features copied directly from America. The old "R" type valve with the cylindrical anode, barrel grid and horizontal filament, as well as the four-pin base—even to the actual spacing of the pins—was copied from the French *in toto*. The really distinctive British valves seem to be those of the V24 and Q.X. type (although the electrode arrangements are akin to those of the R type) and the valves with the curved filaments and hood-shaped grid and anode.

* * *

I wonder how many people really have sound ideas on loud-speaker reproduction? It might appear at first that any man with a good ear could judge a loud-speaker, but some experience in listening to other people's opinions on the subject leads me to think that the average man judges a loud-speaker against a standard of a good gramophone. It certainly is astounding how people's opinions differ, and if you have half a dozen loud-speakers of varying quality, half a dozen people will arrange them in about six different orders of merit!

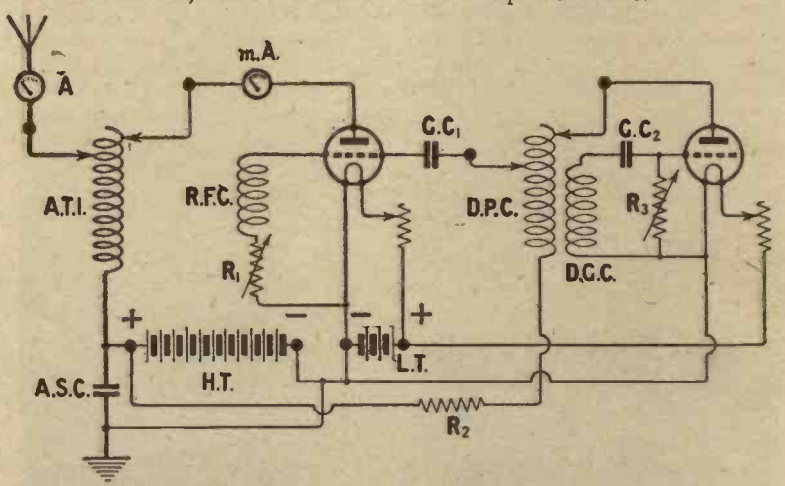
Practical C.W. Transmitting Circuits for 200 Metres

By DALLAS G. BOWER.

(Concluded from Vol. 6, No. 5, page 138.)

THE MASTER OSCILLATOR SYSTEM

This is a very satisfactory method of C.W. transmission, and it can be adapted to work with direct earth or counterpoise. The great advantage of the system is the fact that the transmission frequency is dependent upon the constants of the master or drive circuit rather than upon those of the aerial, hence the note is absolutely steady. The purpose of the resistance R2 is to proportion the correct voltage for the anode of the master oscillator. No values can be given, as this, of course, depends upon the size of the valve being used. Up to 250 watts the oscillator should be capable of supplying 0.3 watts to the main power valve.



Circuit No. 7.—The master oscillator arrangement.

TRANSMITTING CIRCUIT No. 7.

Circuit Symbol.	Instrument.	Description.
A.T.I. ..	Aerial Tuning Inductance ..	60 μH, 30 turns, 6 in. dia. former, 16 s.w.g.
A.S.C. ..	Aerial Series Condenser ..	0.0003 μF to 0.003 μF.
A.	Aerial Ammeter	Hot-wire or thermo-couple 0–2 amperes.
mA. ..	Milliammeter	0–100 ma.
R.F.C. ..	Radio-Frequency Choke ..	2 in. dia., 8⅜ in. long, 500 turns, 26 to 28 d..sc.
R_1 and R_3	Grid Resistances	5,000 to 10,000 ohms. Variable.
G.C.1 and G.C.2 ..	Grid Condensers	0.002 μF.
D.P.C.	Drive Plate Coil	See A.T.I.
D.G.C. ..	Drive Grid Coil	See A.T.I.
R_2	(See text).	

Correspondence

A NEW VALVE-CRYSTAL CIRCUIT

SIR,—I have constructed a one-valve crystal set to the circuit on page 398 of the March issue of *The Wireless Constructor,* by Mr. John Scott-Taggart, and am astounded by the results which I have so far had from it. I have received 2ZY at a little louder than good crystal strength, also Brussels and two other foreign stations whose call signs I could not distinguish. The degree of reaction when tuning the foreign stations was very critical. As I have only used the set since March 28, I have not had an opportunity to pick up other stations. London at 6½ miles comes in at loud-speaker strength, while Chelmsford is not quite so loud. When I have tested this circuit more fully I will let you know the results.

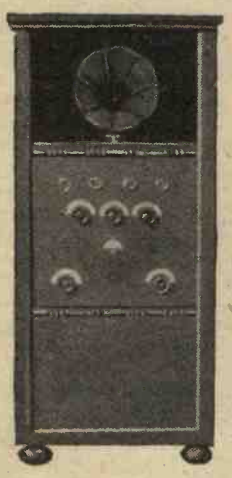
Wishing your journals every success.—Yours faithfully,

H. C. P.

Manor Park, E.

AUTO-COUPLED CIRCUITS

SIR,—Will Mr. Kendall extend his very interesting experiments to



Mr. Stanley E. Shore's Four-valve Family Receiver.

an auto-coupled circuit without a parallel condenser?

Last year I obtained permission to erect a special aerial for long-distance crystal work in the form of an inverted L 175 ft. horizontal, 40 ft. down lead, average height 40 ft., and quite unscreened. No quantitative measurements were attempted, strength being determined by the audibility in speech of various stations. The circuit which invariably gave the loudest results was an auto-coupled X coil of No. 16 d.c.c. tuned by taking the earth

Mr. E. H. Palmer, whose plans to study reception conditions in America are referred to elsewhere.

to six tappings on the bottom six turns and the aerial to five-turn tappings from the twentieth to the sixtieth turn. There were 85 turns in all and the crystal connected to the top end. Tuned entirely by the tappings, the local station (Bournemouth, 38 miles) gives volume which enables the late news to be heard at 12 ft. from a large Amplion. With Brown's A phones London and Cardiff can be heard as a duet, Manchester and Birmingham occasionally, Newcastle always, Belfast and Aberdeen occasionally, the latter on the verge of audibility in speech. Rome, Madrid and several of the German stations have also been heard occasionally.

I have never had anything like such volume when using any kind of variable condenser across the coil, hence my desire to have this kind of circuit compared quantitatively with the condenser tuned form.

Of course 38 miles is considered to be too great a range for a crystal, but if the regulations could be relaxed for crystal users way out in the country, these experiments show that with a similar long aerial (which is generally very easy to erect in such situations), really good crystal reception is quite possible up to 50 miles.

I may mention that to avoid dead ends the tappings were simple small loops bared by rubbing with emery cloth round a stick and connection was made by a wander lead soldered to an ordinary valve pin with an ebonite handle. Thus the valve leg rubbed a clean contact each time it was pushed on to the loop.

It will be appreciated that selectivity *per se* is of little practical use in crystal work while volume is paramount.—Yours faithfully,

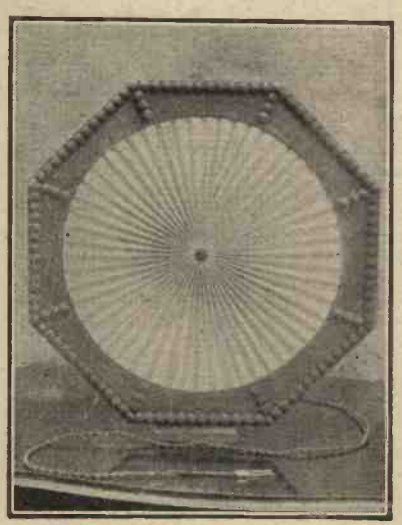
DONALD STRAKER.

Bembridge, I.O.W.

[Mr. Kendall hopes to deal with this subject in an early issue, but of course the question of obtaining maximum signal strength upon a fixed wavelength demands experiments on quite different lines from the original ones, where selectivity was the point most considered.—ED.]

A HOME-MADE LOUD-SPEAKER

SIR,—Enclosed please find photograph of a loud-speaker which I have made from instructions published in the August 6, 1924, *Wireless Weekly.* The front is my own original design, and the construction, in my opinion, is simpler than with



The loud-speaker made by Mr. L. H. Boyce.

the two wooden rings. The front is made of oak 3-ply wood and the pleated diaphragm is secured by means of a 3-ply ring. The inside opening is the same as that of the front and the diaphragm is between the two pieces of ply wood. A Brown's "A" type earpiece is used and the tone is excellent.

Wishing your valued paper every success.—Yours faithfully,

L. H. Boyce.

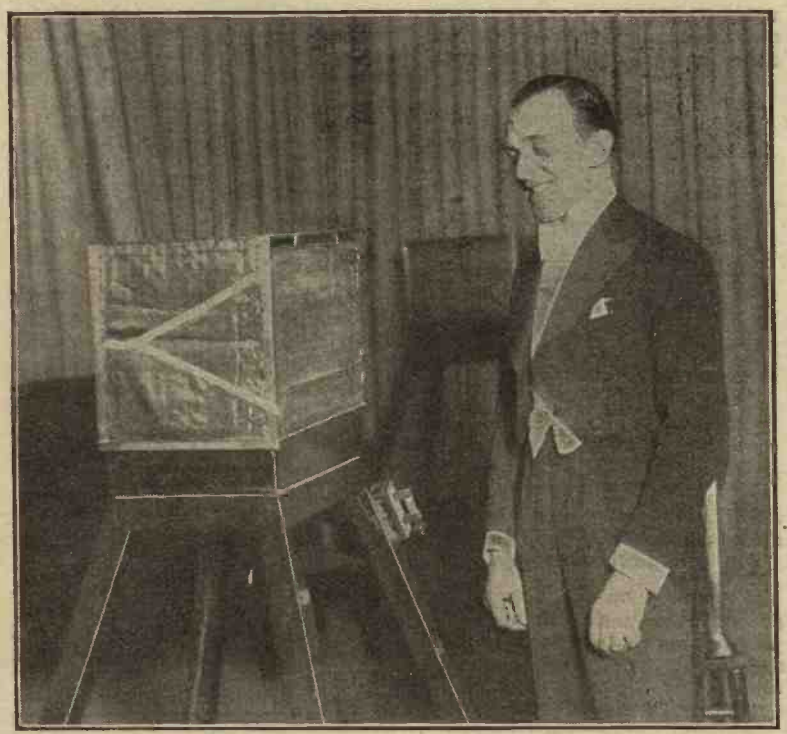
Portsea.

MR. HADDICK'S CLAIM

Sir,—In reply to Mr. Booth, I may state that on Friday night, May 1, Mr. Haddick tuned in for me on his three-valve set (aerial direct coupled) Bournemouth, Newcastle and Glasgow whilst Belfast was transmitting. Bournemouth and Newcastle were received free from any interference, and when receiving Glasgow, Belfast was only a very faint undercurrent which was only audible when Glasgow was silent.—Yours faithfully,

G. A. Lundy, Grad. I.E.E.

Belfast.



Mr. Nelson Keys broadcasting his impressions of America from the London station.

THE FOUR-VALVE FAMILY RECEIVER

Sir,—Enclosed is a snap of a four-valve receiver just built by myself. A few months ago I purchased Mr. Percy W. Harris's "Twelve Tested Wireless Sets," and made up the three-valve All-Concert Receiver, getting remarkable results—perfect loud-speaker reception from Cardiff and Bournemouth always, and on the 'phones, all English and many Continental stations. On one occasion Aberdeen was received at strong loud-speaker strength.

Being so delighted with this, I decided to build the Four-Valve Family Set, also by Mr. Harris, and the photograph shows the completed attempt. In the top section is an Amplion Junior L.S., and the batteries are enclosed in the bottom section. Taking Mr. Harris' advice, I found the cabinet work quite simple, and the one in the photograph is made from 1¼-in. battens and 3-ply, with a few feet of moulding for the top, the whole thing costing less than 10s. It is stained oak and wax polished, and it makes a nice piece of furniture. Thank you for your constant recommendation to attempt one's own cabinet work, for I have found that with patience it is quite a simple job.

You will notice I have re-arranged the panel slightly and put the valves behind. The results from this set are beyond my expectations. Cardiff, Bournemouth and Birmingham come in regularly on three valves, strong loud-speaker strength, and all English stations on four valves, loud-speaker strength. Also many Continental stations come through on the loud-speaker. Aerial 30-ft. twin, 50 ft. high.

Thank you very much for the clear instructions you give novices, and I personally have found endless instruction and amusement from your literature, and you have converted me into a wireless enthusiast.—Yours faithfully,

Stanley E. Shore.

Bath.

THE 'TWIN-VALVE' RECEIVER

Sir,—I have just completed the "Twin-Valve" Receiver as described by Mr. John Scott-Taggart in *The Wireless Constructor*, January issue, and am writing to tell you how very much I appreciate the value of your designs.

The set works exceedingly well, and after having added a single note magnifier, I can get loud-speaker results from practically all B.B.C. stations and 5XX, Radiola, etc. Instead of having a plug-in H.F. transformer, I have a two-coil holder with plug-in coils. Reaction is shorted practically all the time.

Once again thanking you for your wonderful design, and best wishes to all your journals.—Yours faithfully,

E. B. R. James.

Camborne, Cornwall.

AN IMPROVED TWO-VALVE RECEIVER

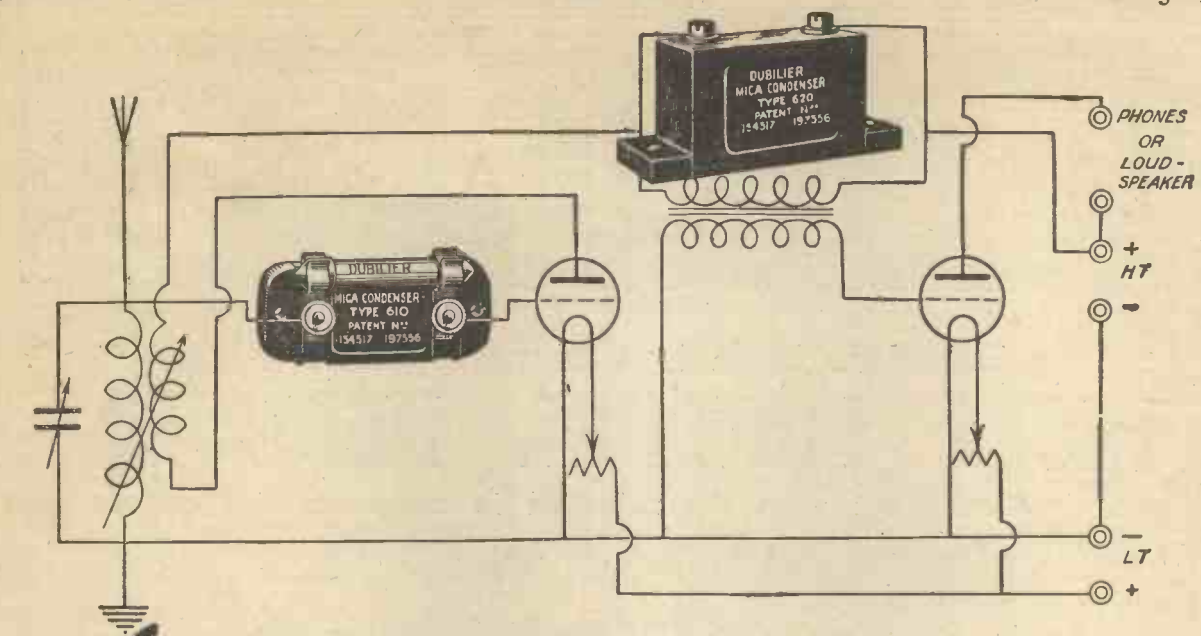
Sir,—May I offer you hearty congratulations on a very wonderful set published under the name of Stanley G. Rattee in *Modern Wireless*, January, 1925, and entitled "An Improved Two-Valve Receiver." I have built many *Modern Wireless* and *Wireless Weekly* sets, and have had good results from all of them. When I built this set it was only intended as a stand-by while making alterations to a larger set. Being in a hurry, I wired it together very roughly, and as I had only a small piece of ebonite handy, I mounted most of the components on a baseboard.

The set works a big Amplion loud-speaker with truly wonderful power from practically all the British main and Continental stations. Belfast and Birmingham, two stations which are difficult to receive here, come in regularly at fine strength. Also I have had the American stations WBZ and WGY on favourable nights. The set has given such fine results that quite a dozen more like it are being built round here. When a four-valve set at the local school broke down this set was substituted and gave great satisfaction to a large audience.

The valves used are a D.E. 5B for detector and a B.T.H. B4 for amplifier, with 80 volts on each. I have tried many sets up to six valves, but never before believed it was possible to get such volume and clarity from two valves as can be done with this set.—Yours faithfully,

Thomas Johnston.

Halstead.



Little things that matter!

It has always been difficult to pick out the little things in life that matter. It takes accountants to find the little errors in accounts; engineers those little failures in a machine that mean so much; and experts to tell what is really wrong with an inefficient wireless set.

This last is always a troublesome affair; a number of very minor defects and mal-adjustments, each insignificant in itself, may together make a good set apparently useless.

For example: condensers, which are really essential in EVERY set, can, if defective, cause rapid exhaustion of H.T. Batteries, and in a grid circuit, they can prevent the grid from reaching its maximum efficient potential, thus weakening the signal strength.

It always pays to have the best, in Wireless as in everything else. That is why, for condensers for all purposes, it is wiser to

Specify Dubilier

Type 610
For all purposes of Wireless Reception. Fitted with screw terminals & detachable Grid Leak Clips.

Type 620
Similar to Type 610 but for vertical panel mounting.

In capacities of
0·0001—0·0009 mfd. 2/-
0·001—0·009 mfd. . 3/6
0·01 mfd. 4/-
0·011—0·015 mfd. . 4/6

DUBILIER CONDENSER CO. LTD

ADVERTISEMENT OF THE DUBILIER CONDENSER CO., LTD., DUCON WORKS, NORTH ACTON, LONDON, W.3. TELEPHONE: CHISWICK 2241-2-3.

E.P.S.135

LISSENIUM.

WHAT the LISSEN 5-POINT SWITCH DOES.

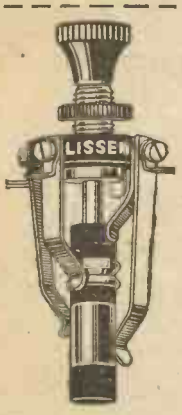
(a) Switches off one stage of L.F. without touching the filament control—a separate switch for each stage.

(b) Connects the telephones to the plate of which ever valve it is desired to use, and at the same time switches off the L.T. current from the unused valve.

(c) Cuts out a stage of H.F. in the same way as it does L.F. (we do not recommend any switching in H.F. circuits where it can be avoided, but where it is desired to use a switch, this is the switch to use).

(d) Will also disconnect both the H.T. and L.T. batteries, and short the aerial to earth so that the receiver can be left adjusted ready for switching instantly into commission next time. With diagram **4/-**

LISSEN REVERSING SWITCH



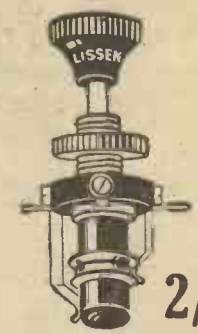
Particularly useful when the LISSEN 5-point switch is used for cutting out one stage of H.F. When a H.F. stage is cut out, and reaction is being taken off the aerial circuit, it is necessary to reverse the reaction coil connections for each H.F. stage cut out, and this new LISSEN switch conveniently does it. Can also be used anywhere when it is necessary to reverse the connections of a battery, a coil, or a condenser, for instance. VERY USEFUL FOR COMPARATIVE TESTS. With diagram **4/-**

SWITCHES with a multitude of uses

For all switching purposes there is now a LISSEN SWITCH. Each one as small as an efficient switch can possibly be—each one with negligible capacity—each one quickly fitted in an inch of space—LISSEN ONE-HOLE FIXING, OF COURSE. You just gently pull or push and you hear these little switches make with a reassuring click. The contacts do not short when changing over—they are self-cleaning—there are no neater or handier switches.

THE LATEST ADDITION to the LISSEN Family of SWITCHES — the LISSEN Double Pole, Double Throw

This is the very newest of the series, retaining all the neatness of the others, providing in a compact form the means for making all the connections required of d.p., d.t. switch. As good as the rest. LISSEN ONE-HOLE FIXING, OF COURSE. Price **4/-**



2/9

LISSEN 2-WAY SWITCH

Send for TEXT Book of LISSEN Parts— FREE to readers of "Wireless Weekly."

CHANGE OF ADDRESS

Our Works at Shepherd's Bush were quite inadequate for satisfactorily dealing with our rapidly increasing production of LISSEN PARTS. We have consequently acquired much larger and more convenient premises from which we shall be able to give even better service and immediate delivery. No wireless dealer should be without an ample stock of LISSEN PARTS and we should like any reader of this publication who experiences any difficulty in obtaining his requirements to write to us mentioning the name of his usual wireless dealer. Dealers also are asked to send for a copy of our latest TEXT BOOK. OUR NEW ADDRESS IS:—

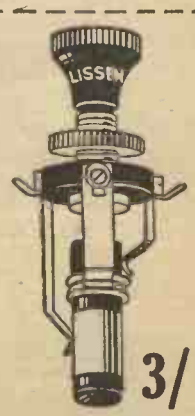
LISSEN LIMITED

LISSENIUM WORKS,

30-32, FRIARS LANE, RICHMOND, SURREY.

Telephone: Richmond 2285 (Private Exchange). Telegrams: LISSENIUM, LONDON.

BUILD WITH ALL LISSEN PARTS—THERE IS ONE FOR EVERY VITAL PLACE

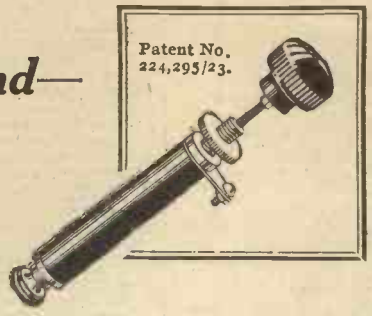


3/9

LISSEN SERIES PARALLEL SWITCH

A Silent Background—

is essential if long distance reception is desired. The usual grid leak containing carbon in some form or other is totally unsuitable. The physical properties of carbon do not allow of passing a small current without variation or interruption. The use of a grid leak containing carbon is bound to produce a noisy background. In a variable grid leak, especially, the resistance material used must be constant in use.

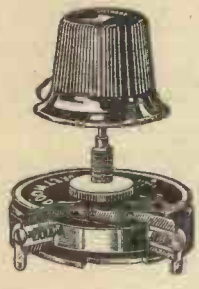


Such a variable grid leak is the

"BRETWOOD" GRID LEAK

The mastic is perfectly uniform and its action does not depend upon compression of its particles or vary with atmospheric conditions. Positive control of grid potential is ensured by its use.

Fit a "Bretwood" and improve your receiver.



The "Bretwood" Anti-Capacity Switch.

Constructors will welcome news of a further Bretwood Product, an Anti-Capacity Switch, the principal features of which include:—Absolute freedom from capacity effects—Perfect Contact—Workmanlike finish and neatness of appearance—Simple single hole fixing and Easy to make wiring connections. Special spring loaded balls in the base make the Bretwood Switch wonderfully smooth in action and ensure clean and perfect electrical contact at all times. It is confidently offered to wireless constructors as the Anti-Capacity Switch *par excellence*, and of course it carries the famous Bretwood Guarantee.

Price **5/-** *Postage 3d.*

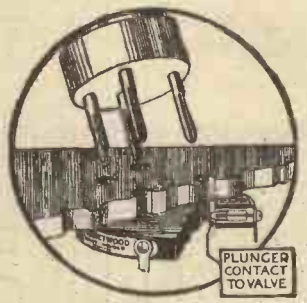
The "Bretwood" Anode Resistance.

(Patent No. 224,295/23) gives accurate readings consistently from 10,000 ohms to 100,000 ohms. This BRETWOOD Component is particularly suited for the ST100 circuit (*Modern Wireless*), the super-sensitive circuit (*Popular Wireless*), and for resistance coupling, etc.

It is constructed on the same principles that have made BRETWOOD Components famous, and, of course, it carries the BRETWOOD Guarantee.

Price **3/-** *Postage 3d.*

Designed on the same principle as the "BRETWOOD" GRID LEAK mentioned above.



The "Bretwood" Patent Valve Holder.

Fix this efficient component and get maximum results. Positively no leakage or capacity effects. Perfect contact. Can be mounted on front or back of panel.

Price **1/9** *Postage 3d.*

BRETWOOD GUARANTEED

All Bretwood specialities are obtainable from most Wireless Dealers.

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SUCCESS
COMPONENTS

Let distortion be in the other fellow's set

WITH the passing of such phases as the "itch for distance" comes the more tangible pleasure of attaining good loud-speaker reproduction.

With the provision of the scientifically and accurately designed Success Choke it would be interesting to conduct experiments to prove if any other method of audio-frequency amplification could give greater purity.

There is no secret in the performance of the Success Choke. That music and speech are faithfully reproduced, with an absolute dead silent background, that there is a complete absence of raucous penetrating mush and curious distorting noises conspicuous in many receivers, comes not by accident.

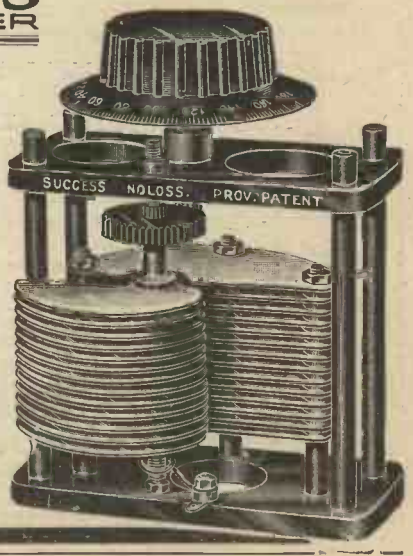
The scientific facts which have guided the design of the Success Choke in conjunction with an intense criticism that it should reproduce with greater fidelity than any component then available, indicates to some measure that in the Success Choke you have a remarkable instrument.

Price
10/6

As used in the Choke Amplifier Unit, described by John W. Barber in the April issue of the "Wireless Constructor."

SUCCESS NOLOSS CONDENSER

The Success No-Loss Condenser in addition to its electrical perfection contains certain definite mechanical improvements, the chief of which is the 4-1 geared motion. This, besides rendering a vernier unnecessary, removes the greatest obstacle to long distance work—hand capacity. This is effected by constructing the master gear of hard fibre. The hand therefore has no electrical connection with the centre spindle.



AERIAL CONDENSER

Approx. Max. Cap., .0005. Black ebonite, 27/6 (with knob and dial 1/6 extra). Mahoganite, 30/-.

ANODE CONDENSER

Approx. Max. Cap., .0003. Black ebonite, 25/- (with knob and dial, 1/6 extra). Mahoganite, 27/6.

As used in "The 3-Valve Tuned Anode Set" described in the June "Wireless Constructor."

BEARD & FITCH, LTD.,

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Wireless Weekly Small Advertisements.

RADIO PRESS INFORMATION DEPT.

2/6 QUERY COUPON

WIRELESS WEEKLY.

Vol. 6. No. 6, May 13, 1925.

(This coupon must be accompanied by a postal order of 2/6 for each question, and a stamped addressed envelope.)

Huge Price Reductions in Ediswan Valves!

EVERY listener-in will welcome the new Ediswan "Spring-surprise" reductions made operative from May 6th. These represent substantial savings on all the famous series.

The Reductions

TYPE	OLD PRICES	NEW PRICES
A.R.	11/-	8/-
R.	11/-	8/-
A.R. D.E.	18/-	14/-
A.R. 06	21/-	16/6
P.V.1	35/-	22/6
P.V.2	35/-	22/6
P.V.3	22/6	22/6
P.V.5 D.E.	30/-	22/6
P.V.6 D.E.	22/6	18/6
P.V.8 D.E.	30/-	22/6

These price reductions bring Ediswan Valves within the reach of all. Ask your dealer for particulars, or write:—

EDISWAN VALVES

The First Made and Still the Finest

THE EDISON SWAN ELECTRIC CO., LTD.
123, QUEEN VICTORIA STREET, LONDON, E.C.4.

SILVERVOX

The Silvertown "Silvervox" Loud Speaker will reproduce both speech and music without the loss of its original tone and quality. Coils wound to either 120 or 2,000 ohms. The tone arm is a heavy aluminium casting. Total height 20 ins. Size of trumpet 12½ ins. diameter.

PRICE £3 10 0 each

Silvertown Window-Pane Insulators

Regd. No. 705625.
(Patent Applied for.)

Made of best quality enamel-coated ebonite, these insulators take advantage of the excellent insulating properties of glass, and at the same time avoid losses by keeping the lead-in well away from walls. Rubber rings form a watertight joint against the pane. The cone keeps a portion of the insulator dry in wet weather.

PRICE 4/- each A special drill with instructions for making hole in glass supplied with each insulator.

Silvertown Cone Lead-in Insulators

Regd. No. 705625. *(Patent Applied for.)*

Another effective form of insulation, using the cone insulators in conjunction with an ebonite tube passing through a window frame or wall. Electrical efficiency assured.

PRICES from 4/6 each

MAKERS:

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SILVERTOWN AD I COMPONENTS

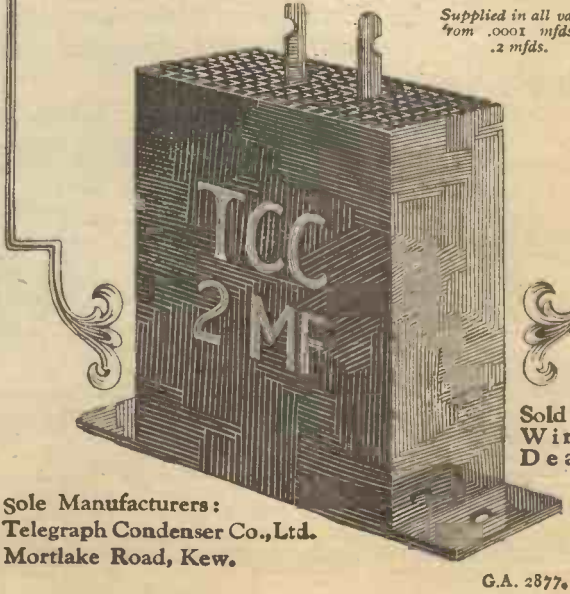
20 Years ago

TWENTY years spent in the manufacture and development of one particular product is a long time. Yet this is just how long we have been making T.C.C. Condensers. Obviously we must have grown exceedingly wise in this business of condenser manufacturing—in fact, there are not many difficulties that we have not come up against and successfully surmounted.

Even a simple little component like a wireless condenser plays a most important part in the working of your Set. It may be badly insulated—its value may be incorrectly stated—it may not stand up to high voltages—these are but three of the many requirements. If you choose a T.C.C. Condenser you'll know that it will have passed a complete series of the most rigorous tests that it is possible to devise. You'll know, too, that it is as near perfection as any fixed condenser can be. So next time you want a genuine Mansbridge Condenser be sure to ask for a T.C.C. in a green metal case.

None genuine without the mark T.C.C.

Supplied in all values from .0001 mfds. to .2 mfds.



Sold by all Wireless Dealers.

Sole Manufacturers:
Telegraph Condenser Co., Ltd.
Mortlake Road, Kew.

G.A. 2877.

Reduction in Prices

of all types of

B.T.H. RADIO VALVES

Effective May 6th, 1925

THERE are no better valves in all the world than B.T.H. Valves—and few (if any) as good. The substantial reduction in prices noted below will make the advantage of using B.T.H. Valves even more evident than it was before. They are made in the Mazda Lamp Works, Rugby.

TYPE	CHARACTERISTICS	OLD PRICES	NEW PRICES*
GENERAL PURPOSE TYPES			
R	Filament Voltage ..... 4 Volts Filament Current ..... 0.7 Amp Max. Plate Voltage ..... 100 Volts	s. d. 11 0	s. d. 8 0
B 3	Filament Voltage ..... 1.8 Volts Filament Current ..... 0.35 Amp Max. Plate Voltage ..... 80 Volts	18 0	14 0
B 5	Filament Voltage ..... 3 Volts Filament Current ..... 0.06 Amp Max. Plate Voltage ..... 80 Volts	21 0	16 6
POWER AMPLIFYING TYPES			
B 4	Filament Voltage ..... 6 Volts Filament Current ..... 0.25 Amp Max. Plate Voltage ..... 120 Volts	30 0	22 6
B 6	Filament Voltage ..... 3 Volts Filament Current ..... 0.12 Amp Max. Plate Voltage ..... 120 Volts	30 0	22 6
B 7	Filament Voltage ..... 6 Volts Filament Current ..... 0.06 Amp Max. Plate Voltage ..... 120 Volts	32 0	24 6

***The prices of Radiola Wireless Receivers and B.T.H. Amplifiers sold complete with valves are also reduced by corresponding amounts.**

Advertisement of The British Thomson-Houston Co. Ltd.

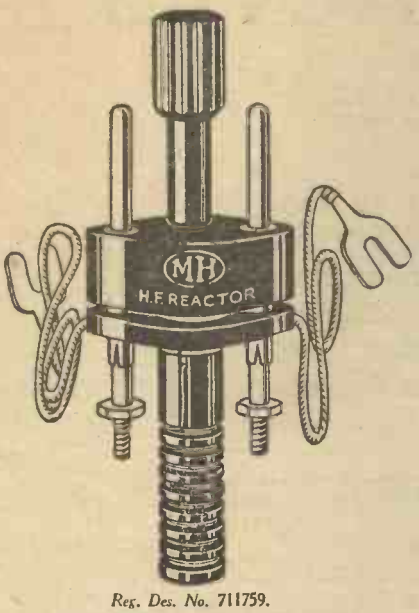
2338

PROGRESS

TWO NEW

COMPONENTS

The public will welcome the introduction of the (MH) H.F. Reactor and (MH) H.F. Damper. The same careful forethought and research that has resulted in the (MH) H.F. Transformer being aptly termed "The transformer that made H.F. Amplification popular," guarantees the reliability and efficiency of these two new products.



Reg. Des. No. 711759.

The (MH) H.F. Reactor Unit.

(MH) H.F. REACTOR.

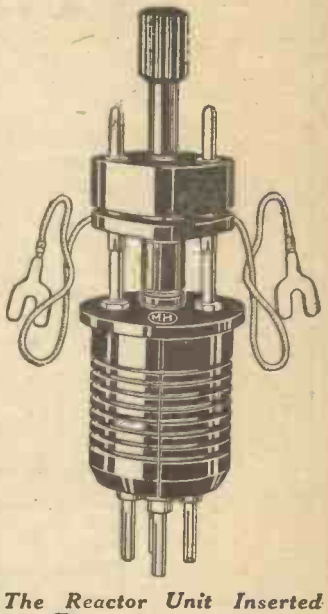
The application of reaction to any receiving circuit increases receptability and selectivity.

The indiscriminate use of reaction is the bugbear of broadcasting. By using the (MH) H.F. Reactor in conjunction with one or more stages of H.F. amplification vastly increased receptability and selectivity are obtained, whilst practically eliminating any possibility of that annoyance, OSCILLATION.

(MH) H.F. Reactor complete in handsome dustproof case with 8 guide pins and three interchangeable barrels covering all wavelengths. PRICE 15/-

Pat. No. 228834.

The Damper in Position in (MH) H.F. Transformer.



The Reactor Unit Inserted in (MH) H.F. Transformer.

(MH) H.F. DAMPER.

The control of self-oscillation, when using one or more stages of H.F. amplification, is often difficult. A potentiometer is in most cases resorted to, which whilst effective, is not such an efficient method of control as that of using the (MH) H.F. Damper.

This device operates in the (patented) air core of (MH) H.F. Transformers. There are no electrical connections to make.

(MH) H.F. Damper, PRICE 2/-

OBTAINABLE FROM ALL DEALERS.

Head Office—
HASTINGS HOUSE
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LONDON, W.C.2.

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Manufacturers of Wireless and Scientific Apparatus.

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SOME INFORMATION

on the

NEW (MH) H.F. REACTOR AND (MH) H.F. DAMPER.

(MH) H.F. REACTOR.

This patented device has for its object the application of reaction to the H.F. amplifying system. It renders unnecessary the use of the conventional second coil coupling to the aerial coil and has the marked advantage of obviating disturbances to nearby listeners.

It consists of (1) the vernier carriage; (2) the interchangeable reactor barrels; and (3) eight guide pins and nuts. A glance at the illustration on the page facing will make it clear that it is attached to a standard (MH) H.F. transformer by removing the two screws from the top plate and substituting two of the special guide pins with nuts provided. The vernier carriage then slides up and down these pins and acts as a guide for its operation, the vernier adjustment being supplied by the fluted control knob. The application of the (MH) H.F. reactor to a receiving set incorporating one or more stages of H.F. amplification is a simple matter, the reactor having been attached to the H.F. transformer as indicated, the two leads coming from the reactor should be connected in place of the conventional reaction coil, the maroon lead must go to the anode.

Three reactor barrels are supplied covering normal wavelength requirements, the number of turns is engraved on each, the one marked 30 is suitable for wavelengths from approximately 275 metres to 1,500 metres, the other two being for ranges above and below these wavelengths. They are rapidly interchangeable, a few turns being all that is necessary to replace them. The diagram with its explanatory particulars shows one of the many uses of the reactor. To those experimentally inclined many other adaptations will suggest themselves amongst which are the supersonic or super-heterodyne system which is rapidly coming to the front of the English minds.

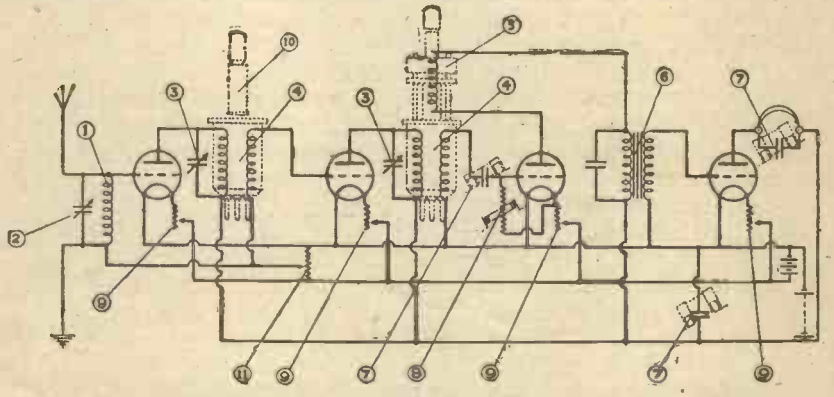

Diagram of a Conventional 2 Stage H.F. 4 Valve Set. *Showing use of (MH) H.F. Reactor and (MH) H.F. Damper. In a stable set the Reactor (5) shown should be used to give Reaction. Sets of this description, however, tend to oscillate of their own accord, in which case the (MH) H.F. Damper (10) should be used to give micrometer control, thus dispensing with the conventional potentiometer shown at (11).*

INDEX.

(1) Duolateral Coil.
(2) (MH) Variable Condenser 0.0007 μF to 0·001 μF Max.
(3) (MH) Variable Condenser 0.0003 μF Max.
(4) (MH) H.F. Transformer.
(5) (MH) Reactor.
(6) (MH) L.F. Transformer.
(7) Fixed Condenser and Clips.
(8) (MH) Grid Leak.
(9) (MH) Rheostats BE, DE, or Dual.
(10) (MH) Damper.
(11) (MH) Potentiometer.

ALL (MH) COMPONENTS SHOWN CAN BE PURCHASED FROM YOUR LOCAL DEALER.

(MH) H.F. DAMPER.

The use of the (MH) H.F. Damper will be readily appreciated by those using H.F. amplification. Where more than one stage is in use the stability is often a very difficult matter, and although the potentiometer forms the generally-accepted method of control, it is comparatively inefficient. As is well-known, self-oscillation is brought about mainly by a high degree of electrical efficiency in the circuit. By the simple expedient of inserting the (MH) H.F. Damper into the air core of the transformer and adjusting the depth to which it enters, the right degree of losses are introduced into the circuit to render it stable. This damper, trifling in cost, is invaluable in the hands of every user of a receiver incorporating two or more stages of H.F. amplification.

WRITE FOR FULL DESCRIPTIVE AND EXPLANATORY LEAFLET.

London Showrooms—
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SLOUGH, BUCKS

L. McMICHAEL LTD

Manufacturers of Wireless and Scientific Apparatus.

Head Office—
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STRAND,
LONDON, W.C.2.

The angelus!

YOU must have heard the melody of the old church bells wafted in the breezes . . . . . never a discord—never a harsh note, but such music as will linger in your memory for many a day. And so it is with any Receiving Set equipped with Eureka Transformers. Such tone purity and volume that wireless enthusiasts are everywhere saying that the Eureka truly sets a new and higher standard for Loud Speaker reproduction.

EUREKA

Advertisement of Portable Utilities Co., Ltd., Fisher Street, W.C.1. G.A. 2864.

Performance counts most

JUDGE a Loud Speaker by its performance. If you compare this Brown *H.2 Loud Speaker by size alone, its 12 inches may deceive you into thinking that it cannot give sufficient volume for the average room. But hear it on actual test and you'll agree that in volume and tone it is far superior to many competitors twice the size and double the price.*

Size is no criterion with a Brown*—its construction employs the supersensitive principles of design which have made the* Brown *A Type Headphones the world's standard for quality and performance.*

Prices

H.2 12 inches high.
120 ohms £2 : 5 : 0
2000 ohms £2 : 8 : 0
4000 ohms £2 : 10 : 0

S. G. BROWN LIMITED
Victoria Road, N. Acton, W.3
Showrooms:
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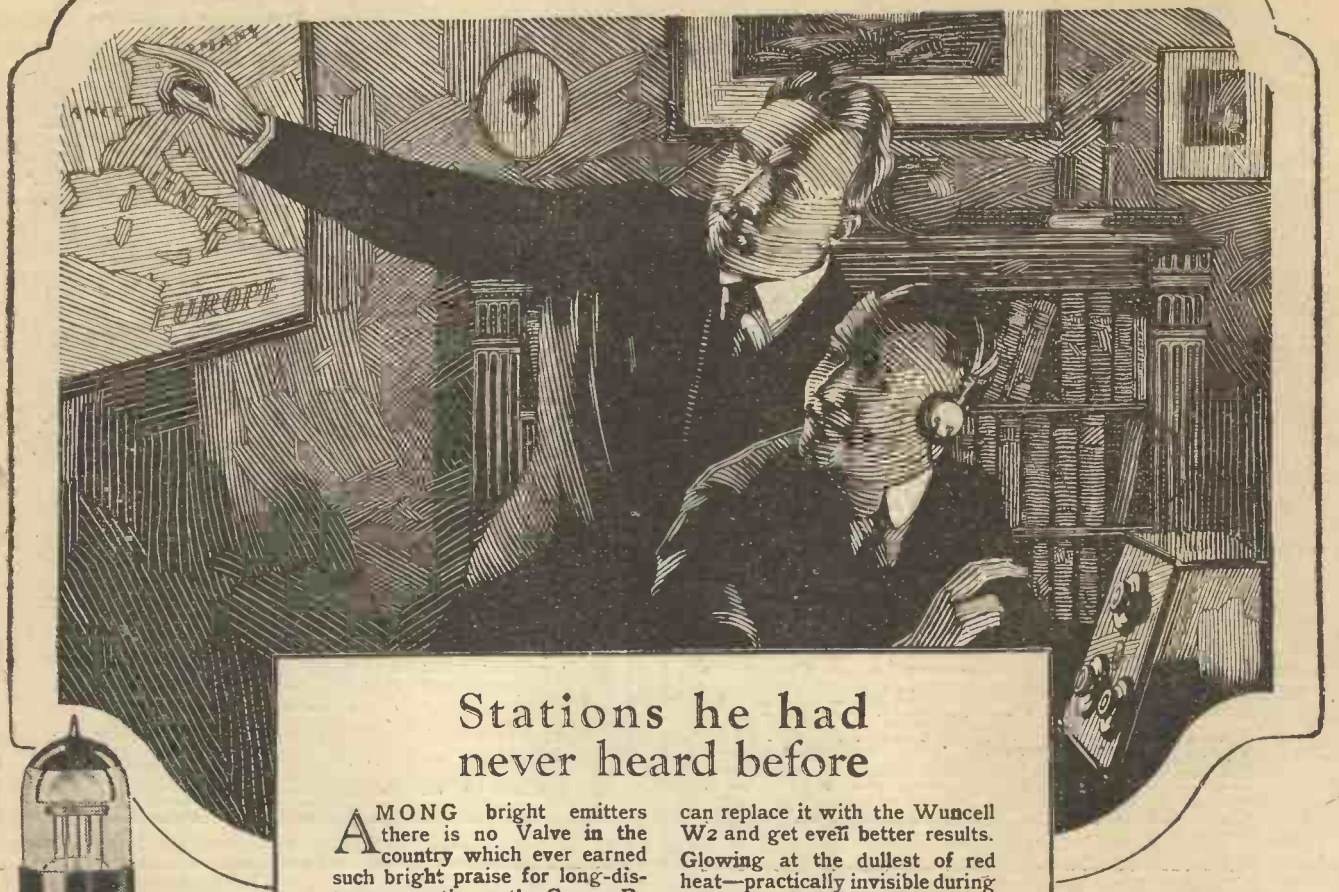
15 MOORFIELDS, LIVERPOOL
67 HIGH ST., SOUTHAMPTON

Brown
Wireless Apparatus

G.A. 2860.



Stations he had never heard before

AMONG bright emitters there is no Valve in the country which ever earned such bright praise for long-distance reception as the Cossor P2—the valve with the red top. Indeed it can be said—without fear of contradiction—that this Valve exerted tremendous influence in popularising long-distance reception. Before its introduction the reception of distant Continental Broadcasting Stations was a matter of luck. If conditions were favourable—if your aerial was efficient—if your Set was good, then you might reasonably hope to pick up Stations six or seven hundred miles away. But when the Cossor P2 was placed on the market long-distance reception became a matter of habit.

And now the same measure of popularity is being extended to the Wuncell Dull Emitter W2—also the valve with the red top. This valve is identical in characteristics with the famous P2. Wherever you have used a P2 with such excellent effect you can replace it with the Wuncell W2 and get even better results.

Glowing at the dullest of red heat—practically invisible during daylight—the Wuncell consumes only .3 amps at 1.8 volts. With Wuncells your accumulators will last six times as long—in less than three months the Wuncells will have saved their extra cost in accumulator recharging alone. Unlike many other Dull Emitters there is nothing fragile about the Wuncell. Its filament—the only vulnerable part of any valve—is quite as stout as that used even in a Bright Emitter. As a result the Wuncell is becoming known as the *long life* Dull Emitter—the valve that should easily outlast several bright emitters.

Before buying any more valves think carefully how much you will save by choosing Wuncells—you save money on accumulator charging, you get a valve with almost indefinite life, and you get a valve with a reputation for pure tone, sensitiveness and volume which has never been equalled by any other Dull Emitter.

A. C. Cossor Ltd., Highbury Grove, N.5

Wuncell Dull Emitters

Types W1, W2 & W3

W1 is the Detector Valve, W2 (with red top) is the H.F. amplifier specially designed for long-distance use. W3 is the new Cossor Loud Speaker Valve. All function at 1.8 volts.

Types WR1 & WR2

To enable users of multi-valve Sets to try out Wuncells along with their existing bright emitter valves from a 4- or 6-volt accumulator, we are also supplying them with a resistance incorporated within the base. In all other respects the WR1 and WR2 correspond exactly to the W1 and W2. When not required, the resistances can be short-circuited and the valves operated at their normal voltage of 1.8 volts.

Important Reduction in Prices of all Cossor Valves

Bright Emitters:

	Old price	New price
P1	11/-	8/-
P2	11/-	8/-

Wuncell Dull Emitters:

W1	18/-	14/-
W2	18/-	14/-
WR1	20/-	16/-
WR2	20/-	16/-

Loud Speaker Valve:

W3	22/6	18/6

¶ These prices come into force at once.

Cossor Wuncell — the long life Dull Emitter

Gilbert Ad. 2854.

FURTHER BIG REDUCTION

in the prices of

"COSMOS"

RADIO VALVES

THE enormous demand for "Cosmos" Valves resulting from the recent reduction in prices for the summer season (as announced in this journal last week) leads us to anticipate still larger demands in the future, and in consequence we have determined to pursue the policy still further and to give the public without delay the benefit of—

A FURTHER REDUCTION IN PRICES

Obtain them from your dealer at the prices shown below.

METRO-VICK SUPPLIES, LTD.

(Proprietors - - - - - METROPOLITAN-VICKERS ELEC. CO., LTD.,
4, CENTRAL BUILDINGS, WESTMINSTER, S.W.1.

"COSMOS" VALVES ARE ALL-BRITISH

D.E. 11

A 45

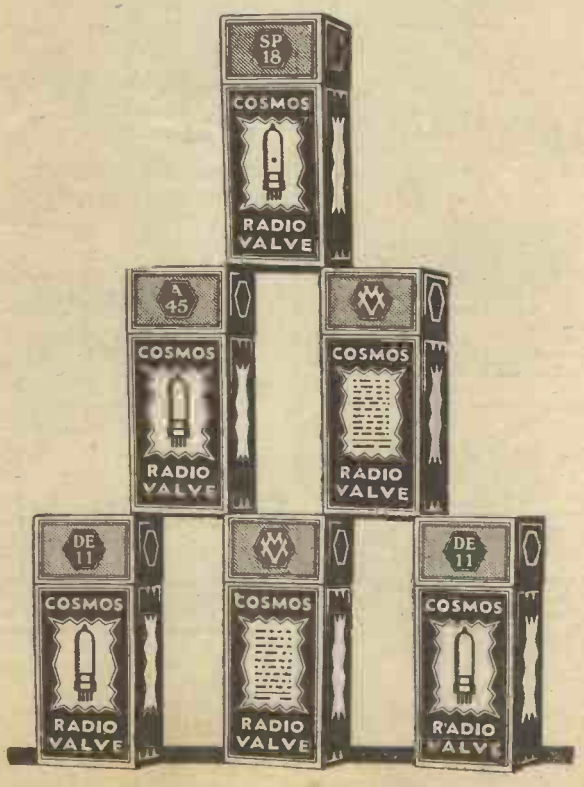
The "Cosmos" DULL EMITTER "DRY CELL" VALVE Type D.E.11

is now well known as a highly efficient valve suitable for H.F. or L.F. Amplification and for Loud-Speaker work.

Filament - 1.1 Volts,
,, - 0.25 Amps.
Anode 20 to 100 Volts.

PRICE:
reduced from 21/-
to :—

12/6



The "Cosmos" BRIGHT FILAMENT VALVE Type A.45

is remarkably efficient for Detection, H.F. and for L.F. Amplification.

Filament - 4.5 Volts.
,, - 0.65 Amps.
Anode 30 to 120 Volts.

PRICE:
reduced from 11/-
to :—

7/6

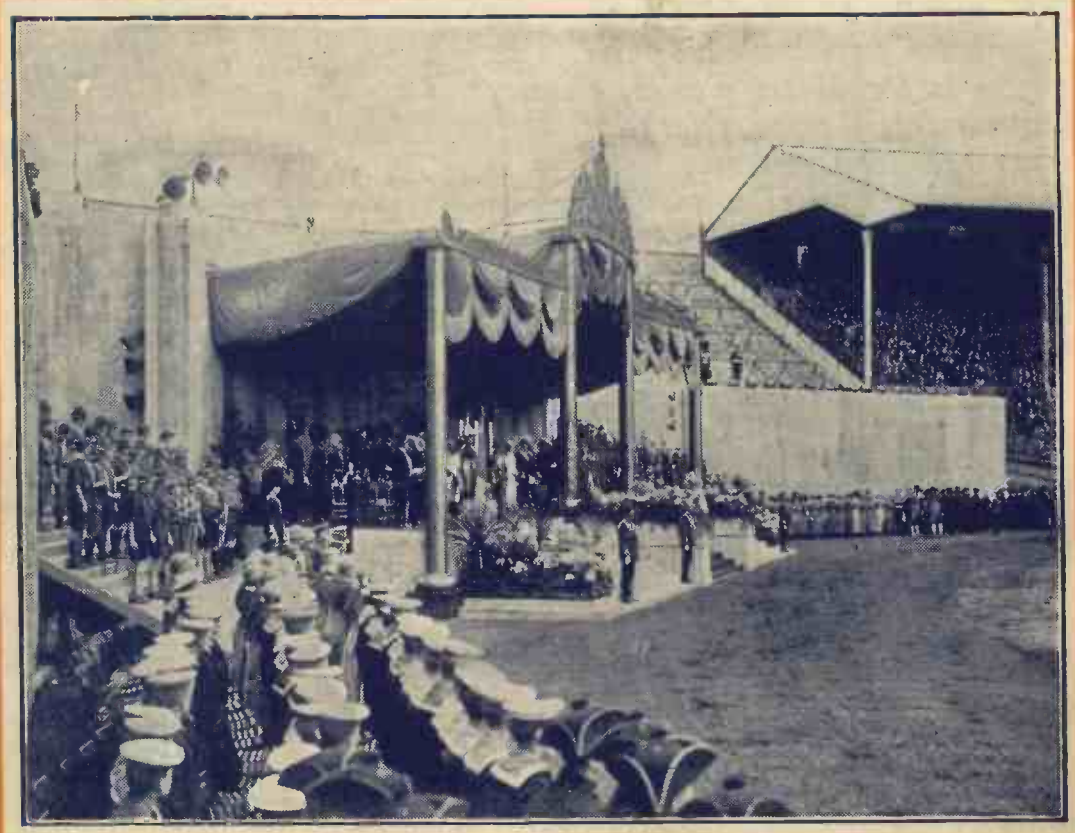
"COSMOS" S.P.18 DULL EMITTER IS ALSO REDUCED FROM **18/-** TO **12/6**.

Printed for the Proprietors, RADIO PRESS, LTD., Bush House, Aldwych, W.C.2., by THE AVENUE PRESS (L. Upcott Gill & Son, Ltd.), 55-57, Drury Lane, London W.C.2. Published on Wednesday of each week at 3, Bolt Court, Fleet Street, London, E.C.4 Address for Subscriptions and Editorial Communications:—Bush House, Strand, London, W.C. Advertisement Managers:—BARCLAYS ADVERTISING LTD., Bush House, Strand, London, W.C.2 Registered as a newspaper and for transmission by Canadian Magazine Post. Subscription rates:—32/6 per annum, 16/3 for six months post free. Sole Agents for Australasia:—GORDON & GOTCH (Australasia), LTD. For Canada:—IMPERIAL NEWS LTD. For South Africa:—CENTRAL NEWS AGENCY, LTD For Japan:—SALE & FRAZAR, LTD.

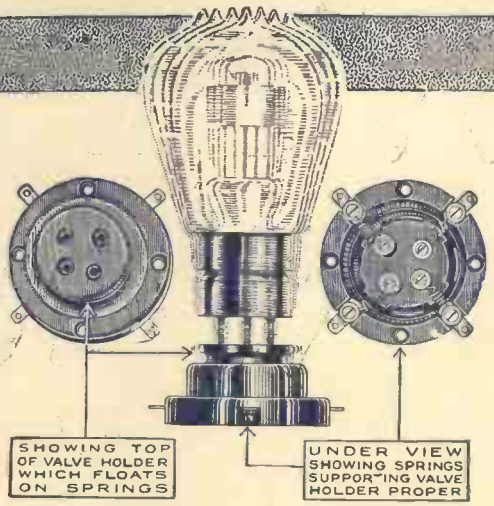
Wireless Weekly, 6d. Net. Wednesday May 20th, 1925

Wireless Weekly

Vol. 6. No. 7.



Safeguard the Valves in your Portable Set with Burndept Anti-Phonic Valve Holders



WITH the coming of fine weather every "summer radio" enthusiast carefully overhauls his portable set in readiness for future picnics, country motor tours, or, perhaps, river trips.

On the other hand you may be contemplating the building of a really efficient portable set. Whichever may be the case, you will be wise to fit Anti-Phonic Valve Holders, which, besides eliminating microphonic noises, will protect your valves against damage.

By using Burndept Components in your portable set you can be sure of good results.

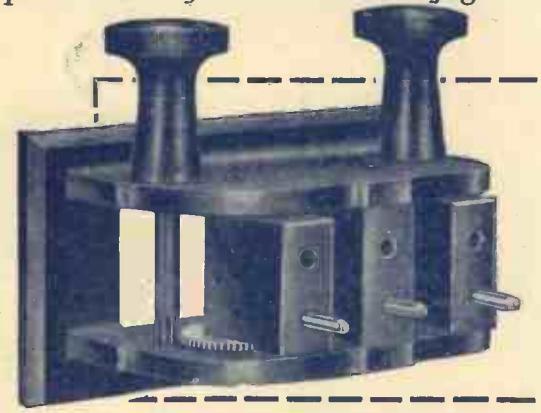
The Burndept Anti-Phonic Valve Holder

This novel device is an ideal protection for any valve. When dull-emitter valves are used in a set microphonic noises caused by mechanical shocks or vibration can be completely eliminated by the use of the Burndept Anti-Phonic Valve Holder.

This Valve Holder consists of an inner portion which forms the valve holder proper, and an insulated shell which carries soldering tags. The inner and outer portions are connected by means of four spiral springs concealed within the base. The valves can be inserted and withdrawn without straining the springs. The risk of short-circuits is eliminated as the valve sockets are countersunk. This valve holder is made of highly polished bakelite, and is suitable for mounting direct on an ebonite or wooden base.

The famous Ethophone V. receiver is fitted with Burndept Anti-Phonic Valve Holders.

No. 401. Burndept Anti-Phonic Valve Holder, in carton, with screws ... ... **5s.**



Two and Three Coil Holders

Burndept Coil Holders are undoubtedly in a class of their own. They are moulded in solid black bakelite, highly polished, beautifully finished. A notable feature is that the moving coil holders are operated by five to one gears; thus the action is smooth and vernier adjustment can be obtained with ease.

Owing to increased sales it has become possible to reduce the prices of these coil holders.

No. 133. Burndept Two-Coil Holder ... ... **15s.**
No. 135. Burndept Three-Coil Holder ... **£1 0s. 0d.**

HEAD OFFICE: Aldine House, Bedford Street, Strand, London, W.C.2.

BRANCHES at *Manchester, Leeds, Cardiff, Birmingham, Northampton and Newcastle.*

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EDITED BY JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

The New Laboratories

TWO announcements regarding the new Radio Press laboratories at Elstree appeared last week, which every reader must have perceived heralded a new development of considerable moment to every member of the great public served by Radio Press publications, but we doubt seriously whether many can have possessed sufficient imagination to realise their deeper import. In sober fact, this new enterprise is one which will inevitably have the most profound and far-reaching effect upon the future development of radio from the point of view of the private user and experimenter. In brief, the existence of these laboratories will place our readers in the very much envied position occupied by the great wireless companies which possess their own research departments, in that there will be a great organisation carrying out research work of every kind, development of new circuits, investigations into the design of apparatus, measurement and testing, to mention just a few of its activities, largely from the point of view of furthering the interests of our readers.

Those who possess any knowledge of the conditions under which the research organisations of commercial undertakings generally work will be aware that they are, as a rule, considerably hampered in their investigations by a feeling that a commercial return must be quickly shown for their work, and therefore it is no uncommon thing to find that only such work is undertaken as may be depended upon to show speedy results the value of which can be immediately appreciated. Apart from the fact that work will be conducted with the very different viewpoint of benefiting the private user and experimenter in wireless, the Radio Press laboratories will possess an entirely different outlook, being able to institute researches into subjects which only promise a return in the course of long periods of work.

It is only possible at this stage to indicate in general outline the nature of the work which will be carried out at these laboratories, but an idea of its great scope can be obtained from the fact that land to the extent of seven acres has been purchased upon which they are to be built, and an estimate of £20,000 has been made of the cost of the preliminary erection and organisation, while a period of three years has been allotted for the completion of the scheme. The actual work is commencing immediately, and it is intended that sections of the laboratories shall be completed as rapidly as possible, so that the technical staff may be installed and begin their labours at a very early date.

Once the scheme is in operation, it cannot fail to produce a great stimulation of progress and development in all the branches of radio to which it applies, and it is believed that the benefit to our readers will be inestimable.

CONTENTS.

HOME CHARGING OF HIGH-TENSION ACCUMULATORS

By L. F. FOGARTY, A.M.I.E.E.

An Exide 24-volt H.T. accumulator complete.

SO great is the convenience of high - tension accumulator batteries in small compact sizes that large numbers of wireless listeners are replacing their H.T. dry batteries by the more efficient and reliable accumulator.

Dry batteries are doubtlessly useful in many cases where first cost is of primary importance, or when portability, without fear of splashing, is essential; for this reason they can never be entirely eliminated.

Accumulator Cells

On the other hand, there is no doubt that once both methods have been tried, the user of the larger or multi-valve set will adopt the accumulator, because of its long life, greater output,

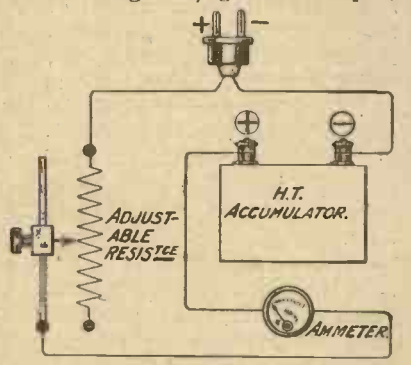


Fig. 1.—Showing the apparatus and connections necessary for charging H.T. accumulators from D.C. mains when a variable resistance is used.

and the freedom from battery noises which it confers.

H.T. accumulators, comprising a number of small cells, neatly assembled in a suitable containing case, are available in units of 24, 48, 60 volts and upwards. Should any single cell become defective, it can easily be replaced at small cost without sacrificing the others. With care an H.T. accumulator will last many years.

The Charging Problem

Lack of knowledge as to the means available, and the correct procedure for charging are the principal reasons why H.T. accumulators have not as yet been used to the extent which they deserve.

In the present article it is not proposed to give particulars as to the most suitable charging current, or the correct specific gravity of the electrolyte for any particular make of accumulator, because each manufacturer has expended much labour and thought in arriving at the best density of acid and current strength for his particular type of plate. It is, therefore, essential to adhere strictly to the maker's instructions when filling the accumulator and putting it under charge on the first and successive occasions.

Direct Current

Where direct, or as it is sometimes called continuous, current is available the first and subsequent charging of an H.T. accumulator is a comparatively simple matter. It is only necessary to connect a suitable resistance and low - reading ampere-meter in series with the accumulator and the mains. Place the resistance at the " all-in " position and ascertain the correct polarity of connections to the accumulator; it then only remains to switch on the supply and to adjust the resistance until the current specified by the maker is indicated by the ampere-meter—a diagram of connections is shown in Fig. 1. A few additional precautions are, however, advisable. If the main supply is at 200-250 volts, it is possible to receive a severe and unpleasant shock if any of the " live " parts are touched whilst charging is in progress. It is, therefore, preferable to arrange the resistance and the connections to the ampere-meter inside a suitable, ventilated box. Similarly, all the connections should be made of substantially insulated cables, and even then no attempt should be made to touch the terminals of the accumulator whilst it is under charge, unless the person is standing on dry

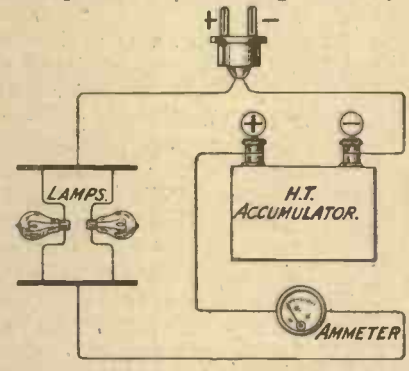


Fig. 2.—Charging H.T. accumulators from D.C. mains is also possible by using lamps in the circuit instead of the variable resistance shown in Fig. 1.

wood or other insulating floor covering.

Neglect of these simple precautions has sometimes resulted in " shock," which at the best is unpleasant, and at the worst involuntary movement may result in the tilting over and causing the destruction of the accumulator or other expensive apparatus.

Voltage

From the data given by the accumulator maker, it is easy to compute the approximate ohmic value of the resistance required in circuit on any given direct-current supply. For example, each accumulator cell will need slightly more than 2 volts to drive a charging current through it, so that with a 12-cell accumulator a minimum of 28 volts is necessary for charging.

The charging difficulties presented debar many people from using high-tension accumulators, and with the increasing popularity of multi-valve sets, both commercial and home-constructed, the problem of H.T. supply has become acute. Mr. Fogarty, who is a well-known authority in these matters, explains in this contribution how such batteries may be charged at home from the house-mains.

The Exide H.T. accumulator with the lid removed to show how the cells are joined together.

If the supply is 100 volts, and the current through the accumulator is to be 0.1 ampere, it can easily be seen that a resistance is needed across which the voltage drop is 72 volts when passing 0.1 ampere—thus :— ;

$$\frac{\text{Excess Voltage}}{\text{Charging Current}} = R \text{ or } \frac{72}{0.1} = 720 \text{ ohms}$$

If the accumulator contains 36 cells requiring 82 volts, and if the supply remains at 100 volts and the charging current 0.1 ampere, then it should be clear that the voltage drop has to be 18 volts, and as the current is 0.1

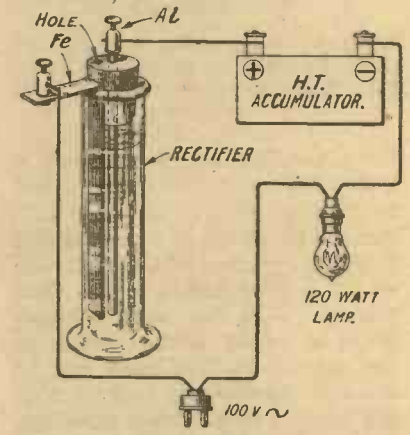


Fig. 3.—The simplest arrangement for charging H.T. accumulators up to 60 volts from 100v. A.C. mains. An ammeter in series with the battery is advisable in this and in the other circuits given.

ampere, the resistance in ohms will be $\frac{18}{0.1} = 180$ ohms.

Cost of Charging

The above examples also serve to show that the maximum efficiency and minimum cost of charging is attained when the total voltage of the accumulators is close to, but somewhat less, than the voltage of the mains, because then the resistance need have a minimum ohmic value, and the energy wasted in it will obviously be a minimum also. In any case, the charging current required for this kind of H.T. accumulator is so small that very high efficiency is relatively unimportant.

A current of 0.1 ampere at 200 volts represents 20 watts, or 1-50th of a Board of Trade unit, under which circumstances a complete charge of 10 hours will cost less than 1½d. with current at 7d. per unit.

When the same H.T. accumulator is invariably charged from the same supply mains, the resistance may conveniently take the form of lamps, in which case, as the "live" parts are protected, there is no need to provide additional protection against "shock."

The Use of Lamps

It is a comparatively simple matter to fix and wire up two or three batten lamp-holders on a wooden panel, recessed at the rear to give space for the wiring, arranged so that the lamps are in parallel; this makes it possible to obtain some regulation of the charging current by inserting one or more lamps as occasion arises (Fig. 2).

A 10-watt, 100-volt lamp will pass 0.1 ampere on 100-volt circuits or on 200 volts two 10-watt, 200-volt lamps in parallel may be required. These indications refer to metal filament lamps.

When it is desired to make provision for charging a variety of sizes and numbers of cells, it is best to utilise a resistance with a sliding adjustment (Fig. 1), as it provides a much greater range of voltage and current control.

Charging from Alternating Current Mains

Where alternating current only is available the necessary arrangements for charging become a little more complicated, since it is necessary to introduce some device which will change or rectify the alternating into a series of uni-directional impulses.

Although a large number of such rectifiers exist, they have, for the most part, been designed to charge filament accumulators requiring currents of the order of 2 to 10 amperes, for which reason their output, whilst considerable, is at too low a voltage for the purpose now considered.

Some types of H.T. accumulators have the connections between cells so arranged that they can, for charging purposes, be altered to split the whole into several parallel groups, which can then be charged from a rectifier of comparatively low voltage.

Parallel Groups

This subterfuge cannot usually be recommended, as it involves complication in the connections, and a bad contact in any one may prevent a portion of the battery from being charged. Such splitting up of a complete accumulator for charging purposes can only be recommended when

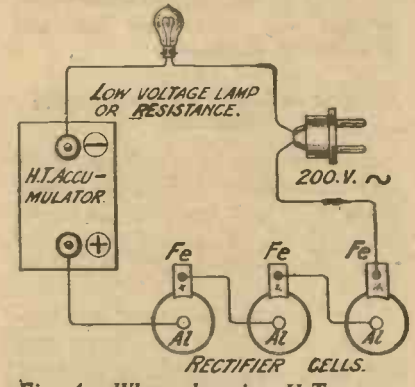


Fig. 4.—When charging H.T. accumulators up to 100 volts from 200v. A.C. mains, three rectifier cells are required.

a separate ampere-meter is used in each parallel group.

It is not possible within the scope of this article to describe all the various types of rectifiers which can be used for the purpose in view, and for this reason a type has been chosen for description which can be easily made by the home constructor.

Electrolytic Rectifiers

It is well known that current only flows readily in one direction through a cell consisting of one pure aluminium anode, and a lead, or iron, electrode immersed in certain solutions, provided that the voltage applied to each such cell does not exceed a limiting

A C.A.V. test tube accumulator cell for making up H.T. batteries.

value. If, therefore, one or more such cells are placed in series with the H.T. accumulator and alternating current is applied to the circuit, a current will flow consisting of a series of unidirectional impulses quite suitable for accumulator charging.

Connections

It is important to arrange the connections so that the current impulses pass in the right direction through the accumulator; otherwise, instead of charging, we may discharge it. The possibility of wrong connections will be eliminated if the constructor will keep clearly in mind the fact that current can only flow from the lead or iron plate to the aluminium anode, and not *vice versa;* consequently the positive terminal of the accumulator must always be connected to the aluminium electrode.

Construction of an Electrolytic Rectifier

For materials, procure from any laboratory furnishers three plain gas jars about 6 in. high and 1½ in. diameter, together with three substantial corks to fit.

Gas jars are preferable to test tubes, because they have flat bottoms, and do not require a stand to keep them upright.

About 16 in. of pure aluminium wire of 18 to 20 gauge is required. The actual gauge is unimportant. The wire should be cut into three equal lengths, care being taken to keep the surface smooth and bright. Each piece should be bent into a small loop at one end, and rounded off smoothly at the other, the size of the loop being made to accommodate any kind of threaded terminal which may be available.

Vent Holes

The three corks, which should be quite clean and dry, should have a hole pierced through the centre, a tight fit for the wire, and another hole at the side to allow the escape of gases generated when the rectifier is in use. After the holes have been made the corks should be steeped in molten wax, so as to render them impervious to moisture (better insulators). The greasy surface also prevents "creeping" of the electrolyte.

Next cut three small narrow strips of thin black sheet iron, about 6 in. long, and drill a hole at one end to suit any convenient terminal. The strip is then bent over at the hole end, so as to hang over the side, into the jar, the lower end reaching to within 1½ in. of the bottom. It is important that the iron strip should be scoured clean, and kept in this condition.

Electrolyte

The gas jar must be filled to 1½ in. from the top with a nearly

A cell taken from an Oldham H.T. accumulator battery.

concentrated solution of bicarbonate of soda in distilled water, after which the aluminium electrode may be pushed through the hole in the cork, so that when the latter is in position the aluminium electrode is immersed to the depth of 3½ in. to 4 in.

Satisfactory operation from the beginning is facilitated if, after passing the electrodes through

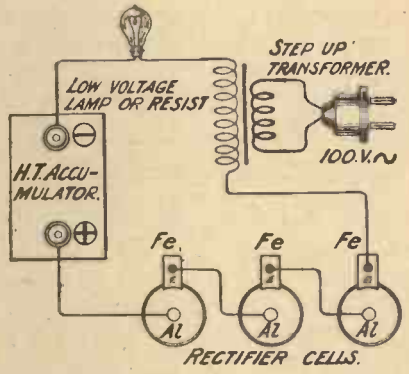


Fig. 5.—The apparatus and connections necessary for charging a 100v. H.T. accumulator from 100v. A.C. mains.

the corks, the aluminium wire is immersed for a minute in a hot solution of soda; this serves to remove all traces of wax and dirt from that portion of the electrode which will be active in the electrolyte. The hot soda solution gives a bright frosted finish to the aluminium, but must not be allowed to come into contact with the waxed cork. After cleaning, the electrodes may be rinsed in clean cold water.

Connections

The three cells thus prepared are now connected in series by joining the aluminium of one cell to the iron of the next one, and may now be arranged on a shelf, or in an open box; they must not be completely enclosed, as ample ventilation is necessary.

The diagram in Fig. 4 shows the general appearance and circuit, so that the constructor will have no difficulty in making the correct connections to the accumulator and the mains. The use of a low-reading ampere-meter (preferably the moving coil type) is strongly recommended, as it enables the charging current to be accurately regulated in accordance with the accumulator maker's instructions.

It should be noted that only a moving coil instrument gives correct readings under these circumstances, and that if the moving iron or hot wire type is used the error may be serious, because these latter may read approximately 75 per cent. too high on half-wave rectification.

Periodicity

A three-cell half-wave rectifier, as above described (Fig. 4) operates on any standard periodicity, and would be quite suitable for charging any size of H.T. accumulator up to 100 volts from a 200-volt supply with currents of 0.1 ampere, but one rectifying cell would suffice for charging any H.T. accumulator up to 60 volts with the same current from a 100-volt main supply (Fig. 3).

Transformers

If it is desired to charge a 100-volt accumulator from a 100-volt supply, a step-up transformer will be required (Fig. 5).

No difficulty should be experienced in specifying or choosing a suitable transformer, if it is remembered that each cell of an H.T. accumulator requires at least 2.3 volts, and that the three-cell rectifier will absorb 40 or 50 volts on account of its internal resistance.

Some Uses for Aerial Ribbon

THERE are many uses for aerial ribbon besides that for which it was primarily designed. In the first place, it can be employed for making a very simple form of counterpoise. Readers who have not experimented with the aerial-counterpoise form of collector may quite possibly find that they can get much better results than are obtainable with an earth in the following way: Suspend immediately under the aerial two well-insulated strips of copper ribbon, which must be at least as long as the aerial wires. It is better to take them rather beyond the wires, if possible, at either end. The ribbons should be not less than six feet apart in the case of a single-wire aerial, and where a double-wire aerial is used the distance between them should be about four feet greater than that between the aerial wires. The counterpoise should be suspended eight or nine feet above the ground, and it should be quite clear of all buildings, walls, trees and so on.

Clips

Odd pieces of copper tape can be put to a variety of uses in the workshop. From them one can make neat soldering tags of various kinds. If the tape is fairly stiff, two pieces each about an inch in length with suitable holes drilled in them will make an excellent pair of clips for a grid-leak or an anode resistance.

Switch Arms

I have also used copper tape successfully for making both condenser clips and holders for valves of the V24 type. Laminated contact arms for rheostats, potentiometers or selector switches can be made from two or three thicknesses of tape held together by a rivet.

R. W. H.

For the reception of the King's Speech on the occasion of the opening of the Wembley Exhibition, Burndept Wireless, Ltd., secured the Central Hall, Westminster. Our photograph shows Mr. F. Phillips, the chief engineer of the Company, operating the apparatus. Note the H.T. accumulators.

The Oscillation Problem

The vexed question of oscillation in connection with broadcasting and how to prevent it was discussed at a meeting of the executive of the Radio Association, held in the House of Commons on May 12. It was stated that the executive had received information that, owing to the increase of oscillation, the Post Office had in view drastic steps with regard to the use of reaction in wireless sets, and it was urged that a strong campaign against the oscillation nuisance should be instituted without delay.

The executive decided that a deputation should be appointed to wait on the Postmaster-General and discuss the whole question of interference.

RUGBY

The Postmaster-General announced recently that the great wireless transmitting station at Rugby should be completed by November. We understand that eight of the twelve 820-ft. masts have now been erected.

Reception Conditions Week by Week

By W. K. ALFORD (2 DX).

Review of reception for week ended May 10.

CONDITIONS for reception continue to become worse and worse. Throughout the past week the prevalence of thunderstorms in most parts of the country has given rise to the ear-splitting crashes which, however, interfere less with reception than the very loud "sizzles" which accompany the prevalent heavy hail storms. These hail storms seem to induce in the aerial a much greater potential than a heavy thunderstorm in the close vicinity, possibly owing to the electrification of the aerial by the friction of the highly-charged and rapidly-moving particles of ice. The potentials appear very much higher when a counterpoise or earth screen is used instead of a direct earth connection.

Short Waves

The interest of the "experimental" listener is still directed strongly to the ultra-short wavelengths of 25 metres and less.

□ □ □

A tentative arrangement has been made between the B.B.C. and associations of theatrical managers for the broadcasting of plays. An agreement between the bodies concerned has been drafted, but has not yet been signed.

There are to be 26 performances broadcast yearly, but not necessarily at regular intervals, and each period will be limited to 35 minutes. Special precautions will be taken to ensure that the success of plays which have been produced originally in London shall not be jeopardised when they are sent on tour. "First-night" performances will not be broadcast. It is understood that an agreed statement in the matter will be issued as soon as final details have been arranged.

* * *

The Duke of Sutherland has been appointed President of the Radio Association, of the Committee of which Lieut.-Commander the Hon. J. M. Kenworthy, M.P., is the Chairman.

* * *

Work has been going on rapidly on the new station at Konigswusterhausen, Germany, and it is expected that it will be put into active service by the end of May. Everything is waiting now for the completion of the huge tower which will bear the aerial.

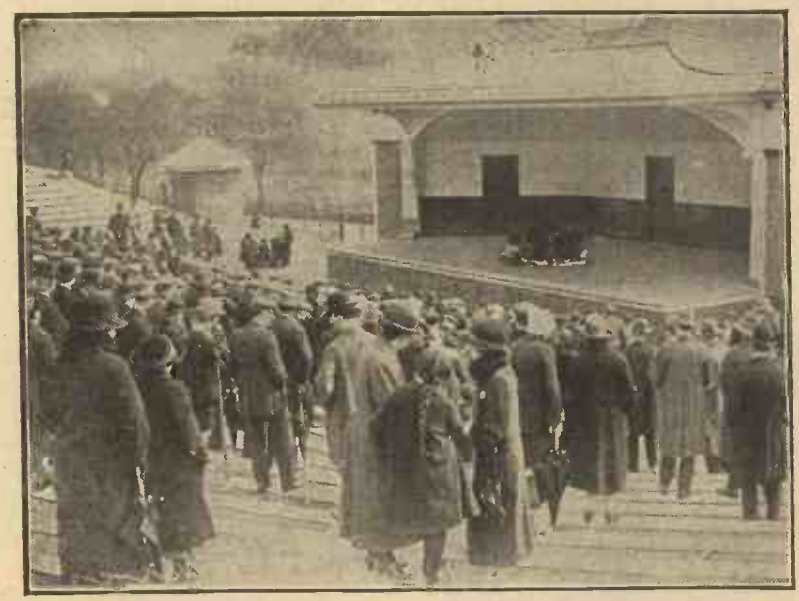
The station has been built for the special purpose of broadcasting to Germans in foreign lands, although this is, of course, only incidental to the main object of providing Germany with a super-power station.

A definite wavelength has not been decided upon, but it will, we understand, lie between 1,200 and 1,300 metres.

* * *

Important developments in the field of German broadcasting may be expected in the near future, according to the latest reports from that country. The station at Munster is expected to raise its power in order to serve the listeners more adequately. When this has been accomplished, the programmes broadcast will be relayed by stations at Dortmund and at Elberfield.

The German broadcasting system is progressing faster than that in any other country at the present time.



Our photograph shows the crowd gathered in one of the Glasgow parks to hear the King's speech at the opening of the Wembley Exhibition, broadcast from the Glasgow Station.

The number of American amateur stations on this wave increases day by day, and the strength of their signals is uncanny. A friend of mine who gets remarkable reception of these short waves tells me that he received intelligible telephony from an American amateur in California the other day in daylight, which must easily constitute a record, the distance being over 7,000 miles.

With these things going on one hardly knows what to expect next in the direction of a wireless Elysium!

RADIO NOTES AND NEWS

Jottings by the way

An Infant Enthusiast

WE were sitting chatting the other day in the Professor's study whilst the youngest of the Goops, still in the crawling stage, was making his way about the room from place to place examining everything with that queer goggly glare that infants have at times. You know what I mean. They generally put it on just before they fling your best gold watch—if you are lucky enough to have one—violently on to the floor. The youngest Goop is, I believe, an engaging child; at least, his mother says so, and she ought to be an authority upon the subject,

. . . *Licking the polish off my footwear* . . .

for she knows him much better than I do. Personally, I was only too glad to see him depart into the corner behind a chair, for he had for some time been insisting on licking the blacking off my shoes, and if there is one thing that I do like it is to have a high polish on my footwear. Anyhow, he had disappeared for a moment, and we were chatting, when there came from the quarter to which he had betaken himself a curious gurgling noise. Mrs. Goop dashed across and picked him up. She appeared to ram her arm several feet down the child's throat, and on withdrawing it brandished triumphantly a small power valve. "Isn't he clever, the darling?" she cried. "That's the fourth he's swallowed to-day, and yesterday I was just in time to rescue a transformer."

A Serious Problem

Why the human child should prefer, above all things, a diet of safety pins, curtain rings, door knobs and other indigestible (and, so far as one can see, quite flavourless) objects I have never been able to discover. It is, however, a well-recognised fact that an infant of tender years will swallow a chunk of coal with as much gusto and apparent ease as you or I put down an oyster.

Education

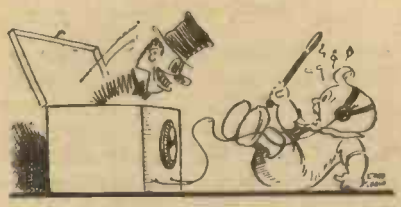
Until recent years this did not matter very much, for these things were cheap and easily replaceable, but to-day the complexion of affairs is entirely changed, for if one's young family indulge their hearty appetites with rheostats, coils, condensers, and so on, it becomes a very costly business to supply the demand. In the bad old days we should simply have spanked the child and spared the component; but we know better now, for it is universally accepted that no infant must ever be prevented from doing what he wants to do. This is known as Education.

An Omission

As I turned over these points in my mind a sudden inspiration came to me, which I communicated at once to the Professor. We have had, I told him, an enormous number of sets made for special uses. Nearly every taste and requirement has been catered for. Portable sets, drawing-room sets, sets for invalids, sets for poor men, sets for millionaires, sets for experts, sets for beginners, yachting sets, camping sets, motoring sets, sets for explorers, sets (with dual control) for the cross-eyed, sets in matchboxes, razor cases, tea caddies, flowerpots, grandfather clocks and cigarette cases—we have had all of these, but we have *never* had a design for a baby's set. I proposed forthwith that he and I should put our heads together and evolve something entirely suitable to meet this obviously felt want.

Some Considerations

There are, as we have discovered on talking matters over, a great many points to be taken into consideration. The set must obviously be large enough to be



. . . *The Goop-Wayfarer Googoophone* . . .

unswallowable. It must be strong, for it will undoubtedly be hurled to the floor at frequent intervals. It must be pleasing to the eye, for this is essential to cultivate the æsthetic sense from the very early days. Should it be provided with telephones or with a loud-speaker? The loud-speaker may be extremely useful at times for drowning the noise made by the infant, but to produce a sufficient volume for this purpose would require several valves, and valves that will stand the nursery treatment are difficult to find. On the whole, we decided that 'phones were to be preferred, and it must not be forgotten that their use from infancy produces with cer-

tainty those beautifully flattened ears so valuable in after life, since they are the hallmark of the really keen wireless man. These and many other points we thought over before finally designing the Goop-Wayfarer Googoophone, which should find a place in every nursery. Not only does it keep the young quiet, but it is also most useful as an aid to taking those beautiful family snapshots in which either the baby or the bulldog is seen wearing the headphones and a smile of contentment.

The Googoophone

The design which we have found exceedingly satisfactory in our own nurseries is that seen in the drawing. The cabinet, which is best made by the toiler beneath your local spreading chestnut tree, is forged from 5/16-inch iron, so as to give the necessary strength. Should you be without a blacksmith, harmonious or otherwise, in the neighbourhood, a fairly satisfactory cabinet can be put together from inch teak by a joiner, but you must not expect to obtain the same wear from a set constructed in this rather flimsy way. The circuit, which is a perfectly simple crystal one, is safely tucked away in the bottom of the cabinet, and above it is mounted a Jack-in-the-box of particularly hideous and terrifying aspect. When the recipient of the set proceeds, with the aid of the poker, to have a look at the works, the Jack-in-the-box emerges with a squeak, spreading such alarm and despondency that the attack is seldom renewed. The single dial seen upon the outside of the cabinet is not attached, as you might think, to the spindle of a variable condenser. The child, having watched its father at play, will no doubt desire to emulate him by twiddling at least one knob incessantly. We have therefore provided the desired knob, which operates a common or garden musical box housed within the cabinet.

. . . *Those beautiful family snapshots* . . .

P.F.T.

The first feature of the circuit which calls for remark is that it embodies the Goop-Wayfarer P.F.T. system. These letters stand for Permanently Fixed Tuning. When the proud papa makes up this set he tunes it with the aid of its variable condenser to the nearest broadcasting station and then clamps the moving plates securely down. The infant is thus able to go through all the motions of tuning by twiddling the dial without disarranging anything. Otherwise, there is really nothing very much to mention except that we have adopted the hedghog-bristle instead of the catwhisker contact for the crystal. We felt that the catwhisker would soon be shaken out of position, and experiments with Masters Goop, Poddleby and Snaggsby confirmed this fear. We have therefore adopted this rather novel form of contact, which may be of interest not only to those who construct the Googoophone, but also to those who in moments of exasperation are in the habit of flinging their sets into the fireplace, the dustbin or the garden.

The operating room of the s.s. "Aoranji," which is fitted with R.C.C. apparatus.

The Hedgehog Bristle

This particular form of multi-contact is made by driving tin tacks, spaced a quarter of an inch apart, through a piece of copper foil measuring 6 inches by 2. The foil is then rolled into a cylinder with the business ends of the tacks inside; end flanges, also well tin-tacked, are then soldered on. The crystal, instead of being fixed as in the ordinary set, is loose. It is mounted by drilling in it a hole, through which is passed the bared end of a piece of flex, which is afterwards twisted up and soldered. This piece of flex passes through a hole in one of the end flanges. It will be seen at once that no matter what happens to the set the crystal will always be sitting on several tin tacks, so that good contact is assured. A further point is that if at any time the infant owner should show signs of dissolving into tears, the set, on being shaken, will produce a rattling noise guaranteed to charm them away.

. . . *My well-earned rest* . . .

A Good Thing

It is not too much to say that the Googoophone is the greatest advance yet made in specialised wireless set designs. Every father should make one up without delay. He will find that it works wonders with the little ones. I introduced it into my own nursery with instant success. Until recently I had been suffering from sleepless afternoons owing to what playwrights call noises off. Now, thanks to the Googoophone, I can settle down after lunch, or, indeed, at any other time, feeling fully assured that my well-earned rest will not be disturbed.

WIRELESS WAYFARER.

Eliminating the Local Station

By A. D. COWPER, M.Sc., Staff Editor.

Mr. Cowper's earlier work on selective tuning is widely known amongst experimenters, and the circuits which he gives in this contribution will be found of great value, marking as they do a notable advance towards attaining freedom from interference by the local station at quite short distances.

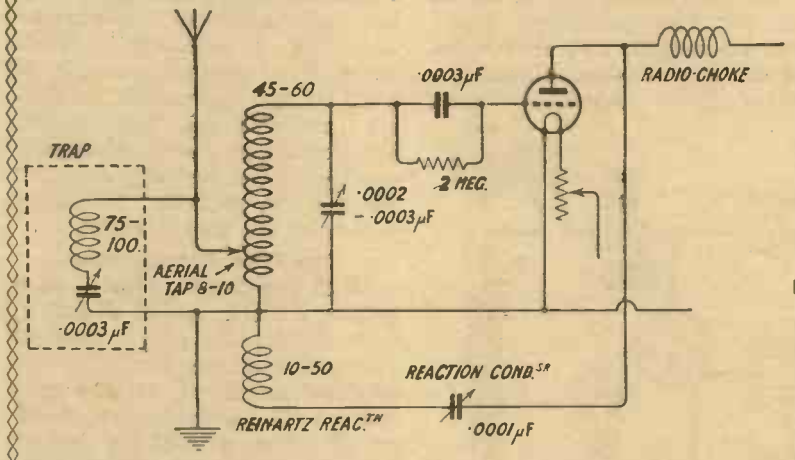


Fig. 1.—The tuning arrangements, together with values for use upon the 300-600 metres wavelength band.

WHILST we in England are hardly likely ever to come to that stage which, as the Chief Engineer of the B.B.C. informs us, the radio fans on the other side of the Atlantic have reached, where their chief interest in the local broadcasting station is confined to the design of filter-circuits to cut it out altogether, yet with the rapid growth in the number of stations, and with the possibility of obtaining alternative programmes from stations which are within easy reach of moderate equipment, the problem of eliminating a powerful local station in an easy and effective way has become very pressing.

The Problem

The problem is rather different from that of general selectivity for genuine long-distance reception, since the station to be eliminated has a fixed wavelength, a limited spread, and in general is likely to be fairly remote in wavelength from the alternative station required. Also, for enjoyable daily reception, it is unlikely that more than one or two alternative stations will be desired, on account of geographical position and of the general tuning difficulties when more are sought.

Wave-traps

Accordingly, for the most part an effective filter-circuit or wave-trap set for the local station alone will suffice, together with a reasonable degree of general selectivity. An *extreme* degree of selectivity is only to be obtained by hair's-breadth tuning in skilful hands, unless the equipment of the supersonic heterodyne receiver be acquired. The writer has from time to time described receivers and tuning devices, with or without sharply-tuned stages of H.F. amplification, which will give this hair's-breadth tuning, and which provide the necessary degree of general selectivity for cutting out any but the particular station wanted, even through loud local interference. For reading, say, Bournemouth through 2LO in a London suburb (a fair test of selectivity) a "Really Selective Tuner" (*Wireless Weekly*, Vol. 3, No. 4, January 2, 1924) and "Tuning Inductances for Selective Reception" (*Wireless Weekly*, Vol. 3, No. 20, April 23, 1924) provide methods which do not even involve an H.F. stage, whilst tuning over the usual broadcast belt (in the first article the stator size should have been 5 in. to cover this) by adopting the principle of extreme loose coupling. The first would give Manchester in London on a single valve. With the addition of an H.F. stage, which gives a loose-coupled effect without the usual loss, actually a slight gain per stage if well designed, but less than 70 per cent., and facilitates the smooth application of reaction; the "C.Q." receiver with two series-tuned-anodes; a two-valve receiver with two filter stages; a series-tuned-anode circuit with one filter-stage (*Wireless Weekly*, Vol. 3, Nos. 5, 11 and 17); and the "neutral grid" method of H.F. amplification (*Wireless Weekly*, Vol. 5, No. 2, October 29, 1924) all make possible the effective tuning-out of

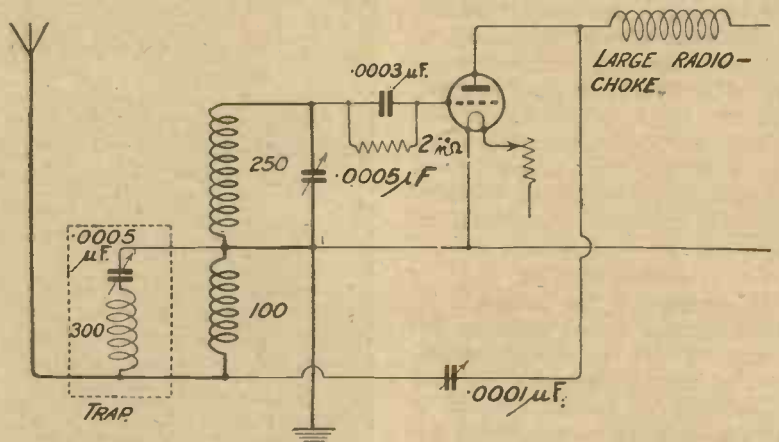


Fig. 2.—The trap applied to an ordinary Reinartz tuner, using plug-in coils, permits the successful reception of Radio Paris without interference from 5XX.

local interference, and give all the selectivity necessary for enjoyable broadcast reception over reasonable distances. The tuned-anode modification of the original Hazeltine neutrodyne circuit described by the writer in *Wireless Weekly*, Vol. 2, No. 8, September 5, 1923, and revived in practical forms in several recent constructional articles, makes possible low-resistance and sharply-tuning anode circuits in ordinary tuned-anode H.F. amplification, so that similar selectivity is readily obtained. A number of selective receivers involving the use of three-coil-tuners and loose-coupling have been described from time to time by other writers.

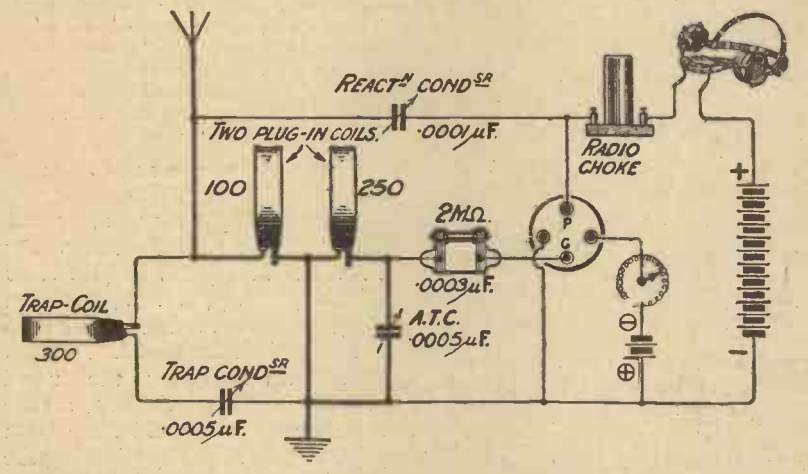


Fig. 3.—A semi-pictorial representation of the Fig. 2 arrangement.

The Local Station

For the *simpler* case, where it is only desired to cut out a single local station, and to receive one or two definite stations on wavelengths fairly remote, but which are normally quite drowned out by the local station, the requisite selectivity can be obtained generally by some type of wave-trap. A number of these instruments have been described from time to time, and Mr. G. P. Kendall has designed one (Radio Press Envelope No. 6) which has attained considerable popularity, in connection with conventional types of receivers.

A Combination

By combining the principle of semi-aperiodic aerial coupling by means of an aerial-tap auto-transformer arrangement in the grid-circuit (as exemplified in a number of circuits suggested by the writer, and in the recently-issued Lissen X Coils), with a series-acceptor type of wave-trap, I have found that a remarkably effective circuit is obtained for the complete elimination of the local station on a large outside aerial, both on the shorter waves and for the long-wave high-powered station, and that without either hair's-breadth tuning, several H.F. stages, or more valves than those strictly necessary to give the audio-frequency amplification up to good loud-speaking standard. The trap is the more effective, as it operates at the most sensitive spot in an already fairly selective arrangement; the principle is, of course, that for *one particular frequency* it is theoretically impossible to build up an oscillating E.M.F. across a circuit of zero resistance consisting of an inductance and capacity in series, the completeness of the effect depending on the H.F. resistance of the coil and condenser, being less the higher the resistance. By putting this (low resistance) circuit across the few "aperiodic" aerial turns, it is made impossible to build up any appreciable oscillating potential on these turns, therefore no serious signal-voltage can be imposed on the grid-circuit for the one particular frequency for which the trap is tuned.

The First Arrangement

With the circuit, Fig. 1, on a double P.M.G. aerial about 13 miles from 2LO, with a low-loss tuning inductance and with two efficient stages of transformer-coupled L.F. amplification, using power valves, *without* the trap (or with its condenser set at zero) London blasted badly with 250 volts H.T. and 20 volts negative grid-bias on the last valve, when tuned, and gave loud signals on three loud-speakers in parallel when detuned 50 metres either way. With aerial removed good loud-speaking still obtained on the three loud-speakers. *With* the trap, Bournemouth was obtained at full L.S. strength on the three loud-speakers, and there was no whisper of London on the headphones during an interval. Manchester and Cardiff, usually at good loud-speaker strength on this receiver, were too near London to tune with any comfort.

MR. RAMSAY MACDONALD AT 2LO.

The ex-Premier, Mr. Ramsay MacDonald, M.P., who recently broadcast from 2LO upon the subject of "Open Diplomacy."

Reaction

The reaction requirement increased materially with the trap in operation. Using a Lissen X No. 60 coil on a high three-wire aerial (40 ft. high by 70 ft. sausage type) adjacent to the first, London could be tuned out so that Bournemouth came in during daylight comfortably on the one R valve, without any interference from London; Manchester was just readable with a slight background of 2LO, but again too tricky for any but a long-distance enthusiast to trouble with. A Lissen No. 75 or 100 coil was used in the trap circuit.

Advantages

Evidently, for any reasonable purposes, this arrangement will give the desired elimination of local interference; the great advantage of the device is that it can be applied externally to the receiver without any structural alterations; can be left connected up without causing any appreciable loss (when set to zero), and can be brought into action at a moment's notice by swinging the condenser to the reading found on a previous occasion.

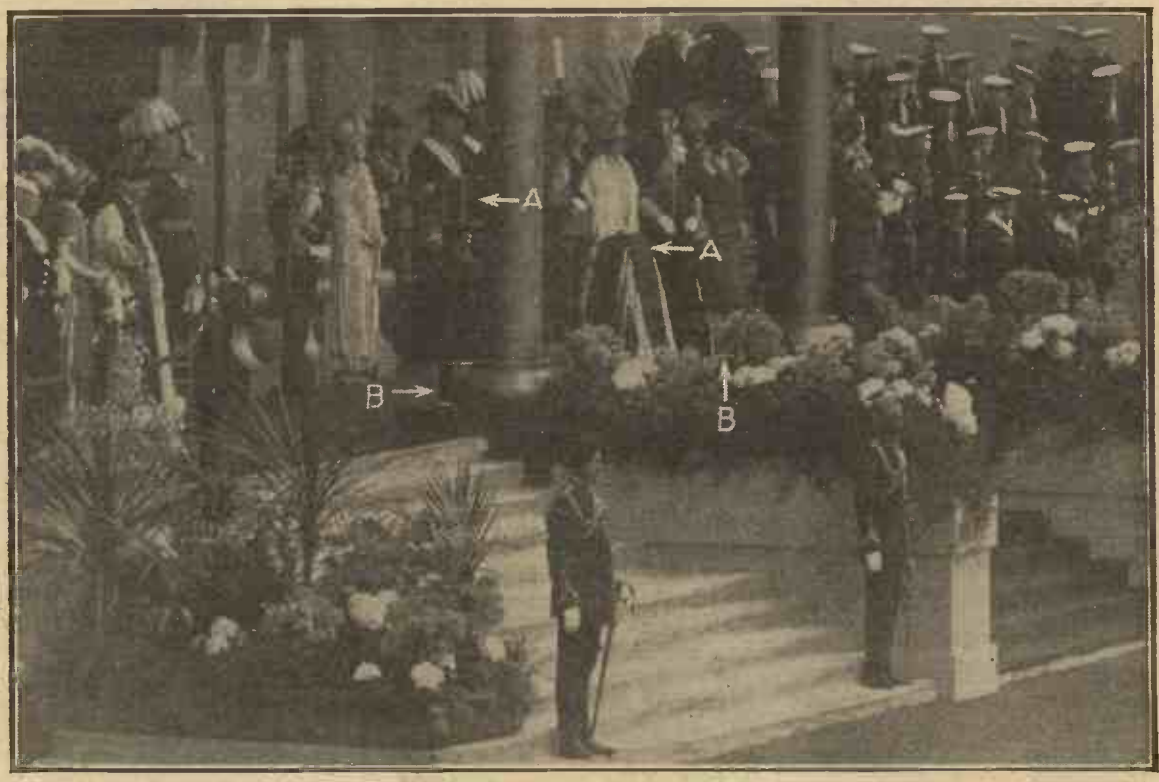
Operation

The *modus operandi* is simply to tune to the desired station through the local interference; then turn the trap condenser slowly until the local station is simply tuned out; then re-tune slightly on the desired station, and adjust reaction. The setting only varies slightly with the grid-tuning, and affects the latter but slightly.

Long Waves

Fig. 2 gives the trap applied to an ordinary version of the Reinartz circuit suitable for longer waves, e.g., for 5XX and Radio Paris. With it, and using ordinary plug-in inductances, Chelmsford can be eliminated totally at 35 miles on 1,750 metres, so as to receive Radio Paris. In Fig. 3, for the benefit of those who find difficulty in reading circuit diagrams and are not familiar with practical Reinartz circuits, the same arrangement is shown, in semi-pictorial form, as a complete receiver with two coils for use with a two-coil holder and a separate single coil holder, away from the others, for the trap coil. Without the trap (or with the trap condenser at zero) this is a fairly selective circuit, which oscillates with great ease; with the trap the selectivity is remarkable. The radio-choke can be either a specially-wound one (such as the new cylindrical Lissen choke), or a very large plug-in coil.

THE WEMBLEY EXHIBITION



The dais in the Stadium from which the opening speeches at the Exhibition at Wembley were broadcast on May 9. The positions of the microphones are indicated by arrows. A, A show the microphones which were used in connection with the public address system at the Exhibition, while B, B indicate the microphones used by the B.B.C. for broadcasting the speeches.

AN EASILY MADE ANTI-CAPACITY VALVE HOLDER

A short constructional article describing how anti-capacity valve holders may be made from odd pieces of ebonite and soldering tags.

IT has been amply demonstrated that valves with the ordinary four-pin mounting can be used quite satisfactorily for reception upon wavelengths of 100 metres and below provided that a little care is taken with the holders in which they are inserted. Valve holders consisting of four stout brass legs embedded in ebonite or moulded composition from ½ in. to ¾ in. in thickness are undoubtedly responsible for inter-electrode capacities at least as great as those due to the pinch of the valve or to the insulating compound used within the cap. Matters are improved by

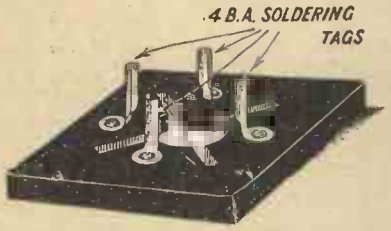


Fig. 1.—A simple anti-capacity valve holder made with soldering tags.

using separate thin legs tapped into the panel and not secured by nuts. We can still further reduce capacity by drilling a 5/16 in. hole at the centre of the circle upon whose circumference the legs stand and making file cuts between each pair. Even so, however, there remains a certain amount of undesirable inter-electrode capacity whose ill effects are more and more felt as we endeavour to go lower down in the wavelength scale.

A Simple Holder

The writer has been using with very satisfactory results a simple little holder which costs almost nothing to make, and which gives rise to a very low minimum of capacity. Fig. 1 shows the finished holder, which consists, as will be seen, of four 4 B.A. soldering tags (obtainable from any wireless shop) with their ends bent at right angles fixed by means of screws to a small piece of *guaranteed* ebonite. The screws by which the tags are attached to the ebonite are on the circumference of a 1¼ in. circle, and a circle of 1 in. in diameter is cut right out of the ebonite. File cuts, which may be as much as ¼ in. in diameter, are made between each pair of legs. It will be seen at once that the capacities in such a holder are very low indeed, for owing to the distance separating the legs, the large central hole and the file cuts, the ideal, but of course unattainable, condition is very nearly approached.

Construction

In Fig. 2 is given a drilling layout of one of the holders. Diagonal lines are scribed upon a piece of ¼ in. ebonite 2 in. square and at the point where they cross a punch mark is made. With this as centre a circle 1¼ in. in diameter is scribed. A diameter of this circle is also marked, the points at which it cuts the circumference being punch marked for the grid and plate legs. Separate the points of a pair of dividers 13/16 in., place one of them in the grid leg punch mark, and with the other mark the circumference of the circle on both sides of the diameter line. The intersections will give the positions of the filament legs. Very accurate marking out is not essential, since the tags are easily bent into position if they are not quite correctly spaced in the first instance. Now drill the holes for the four screws with a 4 B.A. clearance drill.

Cutting the Space Hole

The next process is to cut a 1-in. hole in the panel. This can be done with an ordinary wood bit, a pilot hole being made at the centre and the cut being made

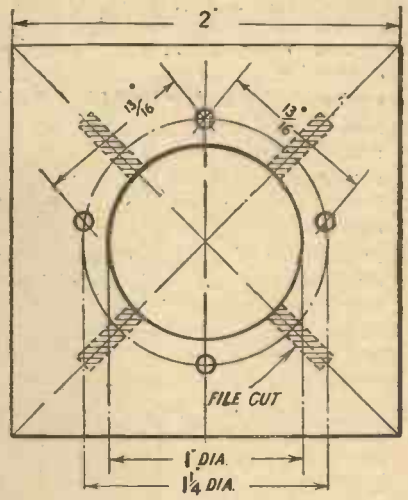


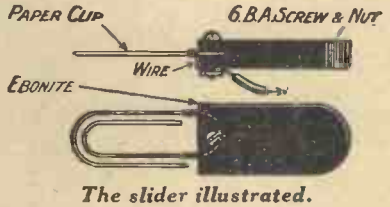
Fig. 2.—A drilling layout of the holder illustrated in Fig. 1.

half way through from either side. To make the cuts between the pairs of legs drill one or two large holes with their centres upon the diagonal lines and run them together with a small file.

R. W. H.

A Simple Slider

A SIMPLE slider for use with bare wire inductances or frame aerials may be made as shown in the accompanying diagram. An ordinary paper-clip is secured in an ebonite holder in the manner indicated, connection being made from the paper-clip to the securing screw, the nut of which acts as a point of connection for a flexible lead. The clip in use will be found to make a firm running contact on the bare wire.



The slider illustrated.

An Ordinary Meeting of the R.S.G.B. will be held at the Institution of Electrical Engineers, Savoy Place, W.C.2., on May 27, at 6 p.m., when Mr. F. M. Colebrook, B.Sc., will deliver a Lecture entitled: "The Rectification of Small Radio-Frequency Potential Differences."

The FOREIGN RADIO TIMES

Edited by Captain L. F. PLUGGE, B.Sc., F.R.Ae.S., F.R.Met.S. MAY 20, 1925.

NOTE :—All Hours of Transmission are in British Summer Time.

WEDNESDAY, MAY 20th

FRANCE.

PARIS.—*Station :* Eiffel Tower—FL.
Wavelength : 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists : M. Maurice Gouineau, Mlles. Richard-Waldy, Bonnet and Louise Carmel (Vocalists), Mlle. Marguerite Papin (Pianist), M. Marc David and Jean Hasart.

1. Scientific Talk. M. Maurice Gouineau.
2. Harlequin (Marcel-Bernheim). Mlle. Marguerite Papin.
3. Tarantelle (Faure). Mlles. Bonnet and Richard-Waldy.
4. Evening (Marc David). M. Jean Hasart.
5. Melodies (Marc David). M. Jean Hasart.
6. (a) The Procession (Franck), (b) When You Pray (Marcel-Bernheim). Mlle. Louise Carmel.
7. Melodies (Marc David). M. Jean Hasart.
8. The Barber of Seville (Rossini). Mlle. Richard-Waldy.
9. The Fishes (Debussy). Mlle. M. Papin.

7.10 p.m.—News Bulletins and Close Down.

8.0 p.m.—Weather Forecast.

8.30 p.m.—Concert on 2,200 metres and 2½ kw.

10.0 p.m.—Close Down.

PARIS (Clichy).—*Station :* Radio-Paris—SFR.
Wavelength : 1,780 metres—8 kw.

12.30 p.m.—Concert.

1. Caballeros—March (F. Popy).
2. Moonlight on Alster—Valse (O. Petras).
3. Romance (Dancla).
4. Arietta (P. Sudessi).
5. Song (G. Marcucci)
6. Gavotte (Couperin).
7. Mirage—Oriental Foxtrot (Borel-Clerc).
8. Zanetta-Czardas (G. Michiels).
9. The Adorable Cantilene (Spencer).
10. In the Still Night (G. Bohm).
11. La Morena (A. Zurfluch).
12. Christmas—Melody Foxtrot (V. Aston).
13. Expansion (G. Pierne).
14. Serenade (Schubert-Salabert).
15. Antar (G. Dupont).

1.45 p.m.—News Bulletin.

2.15 p.m.—End of transmission.

4.30 p.m.—News Bulletin and Close Down.

8.45 p.m.—Concert, organised by the Comite Franco-Bresilien of Paris.

10.0 p.m.—News and Close Down.

SWITZERLAND.

ZURICH.—*Station :* Radio Genossenschaft.
Wavelength : 515 metres—500 watts.

5.0 p.m.—Concert by the Orchestra of Hotel Baur-au-Lac.

6.15 p.m.—Children's Hour.

8.15 p.m.—English Lesson. Dr. F. Gschwind.

8.30 p.m.—Programme of English Music.

1. Orpheus With His Lute (Sullivan). Frau Zwingli-Hesse and Max Siegrist.
2. Selections by the Orchestra.
3. (a) My Mother Bids Me Bind My Hair (Haydn), (b) May-Dew (Bennett). Frau Hesse and M. Siegrist.
4. Selections by the Orchestra.
5. Kathleen (Cronch). Frau Hesse and M. Siegrist.
6. I Love the Moon (Rubins). The Station Orchestra.

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station :* Unione Radiofonica Italiana.
Wavelength : 425 metres—4 kw.

5.15 p.m.—Orchestral Selections from Albergo di Russia.

5.45 p.m.—Jazz Band.

6.15 p.m.—Close Down.

7.30 p.m.—News Bulletin.

8.30 p.m.—Concert.

1. Overture (Glinka). The Station Orchestra.
2. (a) Near to Thee (Bach), (b) Song (Schubert). Signora Enza Messina.
3. Moonlight Sonate (Beethoven). Lina Liviabella.
4. (a) The Song of Folco from "Isabella" (Mascagni), (b) Romance (Reyer). Fernando Bertini (Tenor).
5. (a) Canzonetta (Betti), (b) Selection (Zucca). Federigo Filippi (Elocutionist).
6. Symphony of the New World (Dvorak). The Station Orchestra.
7. (a) The Damnation of Faust (Berlioz), (b) The Marriage of the Roses (Franck). Enza Messina.
8. (a) Nocturne (Liviabella), (b) Sonate (Grieg). Lina Liviabella.
9. (a) Song (Halevy), (b) The Duke of Alba (Donizetti). F. Bertini.
10. Siberia—Fantasy (Giodano). The Station Orchestra.

10.15 p.m.—News Bulletin.

10.30 p.m.—Dance Music by Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station :* Radio-Wien.
Wavelength : 530 metres—1 kw.

4.10 p.m.—Concert.

1. Three English Dances (German).
2. Scandanavia (Fredericksen).
3. Oriental Suite (Popy).
4. Italian Songs (Carasio).
5. Russian Folk Music (Bernards).
6. South American Songs (Lampe).
7. Hungarian Songs (Pazeller).
8. Spanish Dance (Moszkowsky).

6.20 p.m.—German Poetry on Spring. Dora Miklosich and Paul Horn.

7.45 p.m.—English Lesson.

8.30 p.m.—German Ballads in Verse and Song.

Artists : Gustav Fukar (Vocalist), Berta Jahn-Beer (Pianist), and Ady Halm (Elocutionist).

1. Ballads (C. Lowe). Gustav Fukar.
2. Ballads (J. Brahms). Berta Jahn-Beer.
3. Selections from "Baron Munchhausen" (Borries). Ady Halm.
4. (a) Belshazar (Schumann), (b) The Elfin King (Schubert). Gustav Fukar.
5. Ballad in A (Chopin). Berta Jahn-Beer.

10.0 p.m.—Light Music and Close Down.

GERMANY.

HAMBURG.—*Station :* Nordische Rundfunk.
Wavelength : 395 metres—1.5 kw.

6.0 p.m.—Horticulture Talks : "The Tulip" (Hans Bodenstadt).

8.0 p.m.—Comic Opera in Five Scenes, by Franz Grillparzer. Music by Franz Schubert.

PERSONÆ.

Gregor (Karl Pundter), Atalus (Paul Ellmar), Leon (Hermann Bayer), Kattwald (Karl Eppens), Edrita (Edith Scholz).

10.30 p.m.—News Bulletin given Partly in English

Dance Music and Close Down.

NOTE.—This Station is relayed by Hanover on 296 metres and Bremen on 330 metres.

THURSDAY, MAY 21st

FRANCE.

PARIS.—*Station :* Eiffel Tower—FL.
Wavelength : 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists : M. J. Quinet, Mmes. Moret (Vocalist), d'Estainville (Pianist), Mlles. Geranne, Colombier and Magdeleine de Campoenia (Violoncellist).

1. Selection (Ronchini). Mlle. de Campoenia.
2. Diana (Gluck). M. Gravel.
3. Where am I (Schubert). Mme. Moret.
4. Gavotte (Van Goens) Mlle. de Campoenia.
5. Poems (de Vaulx). Mlle. Geranne.
6. (a) The Golden Wheat (Rachmaninov) (b) Fantoches (Debussy). Mme. Moret.
7. Elegiac Song (Baton). Mlle. de Campoenia.
8. Duet from "Hamlet" (Thomas). M. Moret and M. Gravel.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

PARIS (Clichy).—*Station :* Radio-Paris—SFR.
Wavelength : 1,780 metres—8 kw.

12.45 p.m.—Concert.

1. Roumanian March (L. Ganne).
2. Illusion—Valse (Waldteufel).
3. Chanson Louis XIII and Pavane (Couperin-Kreisler).
4. The Letters of Manon (E. Gillet).
5. Reverences (F. Fourdrain).
6. Romance (Gresse).
7. The Song of the Muleteer (H. Pesse).
8. The Lovers' Serenade (Filipucci).
9. Suleika—Oriental Dance (Langlois-Weyts).
10. Hungarian Poem (J. Hubay).
11. A Song of Love (E. Toselli).
12. Cossack Horseman (Fourdrain).
13. A Napoli (Ronchini).
14. Minuet of Springtime (A. Capri).
15. Manon Lescaut—Fantasy (Puccini-Tavan).

1.45 p.m.—News Bulletin and Close Down.

8.45 p.m.—Concert by Messieurs Neago and Lazarowski, with the Orchestra.

10.30 p.m.—News Bulletin and Close Down.

PARIS.—*Station :* Petit Parisien.
Wavelength : 345 metres—500 watts.

9.30 p.m.—Concert.

1. Overture to "The Painted Lady" (Weber).
2. Maud—Waltz (Romagnano).
3. Romance—Violin (Saint-Saens).
4. Mme. Roland (Fourdrain).
5. Breton Romance (Filippucci).
6. Andantino (Martini-Kreisler).
7. Ballet (Messager).
8. Melody (Huguet).
9. Dance (Brahms).
10. Dream Song (Pesse).
11. Ronde of Love (Chaminade).

SWITZERLAND.

ZURICH.—*Station :* Radio - Genossenschaft.
Wavelength : 515 metres—500 watts.

5.0 p.m.—Concert by the Station Hotel Baur-au-Lac.

8.15 p.m.—Musical Programme.

1. Cantate (Bach). Hans Lavater.
2. Selections by the Station Orchestra.

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station :* Unione Radiofonica Italiana.
Wavelength : 425 metres—4 kw.

5.15 p.m.—Orchestral Selections by Albergo di Russia.

5.45 p.m.—Jazz Band.

6.15 p.m.—Close Down.

7.30 p.m.—News Bulletin.

8.30 p.m.—Opera "La Boheme" (Puccini).

PERSONÆ.

Mimi (Syra Banchelli, Soprano); Musetta (Margherita Corelli, Soprano); Rodolfo (Balduino Bernabei, Tenor); Marcello (Ung Donarelli, Baritone); Colline (Salvatore Vasquez, Bass).

Act I. (a) Selections by the Orchestra; (b) Terzetto, Rodolfo, Marcello, and Colline; (c) Duet, Mimi and Rodolfo.

Act II. (a) Presentation of Mimi, Rodolfo; (b) Waltz, Musetta; (c) Selections by the Orchestra.

Act III. (a) Scene; (b) Duet, Mimi and Marcello; (c) Terzetto, Mimi, Rodolfo and Marcello; (d) Duet, Mimi and Rodolfo; (e) Quartette, Mimi, Rodolfo, Musetta and Marcello.

Act IV. (a) Duet, Rodolfo and Marcello; (b) Scene, Entrata of Mimi; (c) Song, Colline; (d) Finale.

10.15 p.m.—News Bulletin.

10.30 p.m.—Dance Music by Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station :* Radio-Wien.
Wavelength : 530 metres—1 kw.

11.0 p.m.—Orchestral Concert.

4.10 p.m.—Concert by the Station Orchestra.

1. The Barber of Seville (Rossini).
2. Dream Ideal (Fucik).
3. Intermezzo (Leoncavallo).
4. The Hour of Roses (Lindsay).
5. Ballet Scene (Luigini).
6. Regeriana (Becce).
7. Chopinana (Urbach).
8. Viennese Bonbons (Strauss).
9. Pearl of Granada (Silving).

6.30 p.m.—Address. Eng. Josef Lowy.

7.30 p.m.—Opera, "Tannhauser" (Wagner).

PERSONÆ.

Hermann (Nicola Zec), Tannhauser (Laurenz Hofer), Wolfram v. Eschenbach (Geza Brand), Elisabeth (Josephine Reich), Venus (Clotilde Wenger).

Soloists, Choir and Orchestra of the Station.

Musical Director, Dr. Ludwig Kaiser.

GERMANY.

HAMBURG.—*Station :* Nordische Rundfunk.
Wavelength : 395 metres—1.5 kw.

6.0 p.m.—Concert.

1. Andante Symphony (Schubert).
2. (a) Gomorrah (Kurt Kuchler), (b) The Figure of Galilee (Kurt Kuchler).
3. Cavatine (Raff).
4. Selection (Kuchler).
5. Andante from the First Symphony (Brahms).

7.15 p.m.—Spanish Lesson.
Hans Bredow School.

8.0 p.m.—Musical Selections from Operas.

Artists : Alice Fliegel-Bodenstadt, Erna Kroll-Lange, and Adolf Secker.

1. (a) Selection, (b) Overture from "Leonora" (Beethoven). The Station Orchestra.
2. Recitation. Alice Fliegel-Bodenstadt.
3. Selections from "La Traviata" (Verdi). The Station Orchestra.
4. Song of Madame Butterfly (Puccini). Erna Kroll-Lange.
5. Selection from "Madame Butterfly" The Station Orchestra.
6. The Young Mother (Droste-Hulshoff). Alice Fliegel-Bodenstadt.
7. Selections from "Lohengrin" (Wagner). The Station Orchestra.
8. Song of Elizabeth from "Tann hauser" (Wagner). Erna Kroll-Lange.
9. Song of Isolde from "Tristan and Isolde" (Wagner). Erna Kroll-Lange.
10. Song from "Aida" (Verdi). Erna Kroll-Lange.
11. Selection (d'Albert). The Station Orchestra.

10.0 p.m.—News Bulletin given partly in English.

Dance Music and Close Down.

FRIDAY, MAY 22nd

FRANCE.

PARIS.—*Station :* Eiffel Tower—FL.
Wavelength : 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists : M. Paul Dermee, Mme. d'Olvet (Vocalist), Mme. Mercier (Pianist) and M. Georges Vincens (Violinist).

1. Literary Talk. M. Paul Dermee.
2. Minuet (Calensin). M. Georges Vincens.
3. Song from "Il Trovatore" (Verdi). Mme. d'Olvet.
4. The Maiden (Raff). Mme. Mercier.
5. The Vain Woman (Couperin). M. Vincens.
6. Song from "The Queen of Sheba" (Gounod). Mme. d'Olvet.
7. Sicilienne and Rigaudon (Kreisler). M. Georges Vincens.
8. (a) Concert Waltz (Godard), (b) Song of "The Pardon of Ploermel" (Meyerbeer). Mme. d'Olvet.
9. Romance for Violin (Tchaikowsky). M. Vincens.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

9.0 p.m.—Concert from Ecole Superieure relayed by this Station on 2,600 metres—5 kw.

PARIS (Clichy).—*Station:* Radio-Paris.—SFR.
Wavelength : **1,780 metres—8 kw,**

12.30 p.m.—Concert.

1. The Baderillos—Spanish March (F. Volpatti).
2. Solitude—Valse (Waldteufel).
3. Prelude and Allegro (Pugnani-Kreisler).
4. Passepied (Toulmouche).
5. Javanese Serenade (Snoeck).
6. Dolly (G. Faure).
7. Fantasy Poudre (Chillemont).
8. La Chauve Souris (J. Strauss-Tavan).
9. To Awaken Pierrette (L. Ancel).
10. Reverie (C. Dancla).
11. Spanish Dance (R. Berger).
12. Pretty Lady (Codini).
13. Romance (R. Jullien).
14. Scherzo—Valse (G. Brun).
15. Fedora (Giordano).

1.45 p.m.—News Bulletin.

2.15 p.m.—Close Down.

8.30 p.m.—News Bulletin.

8.40 p.m.—Concert : Selections from the Opera "La Boheme" (Puccini).

10.0 p.m.—Close Down.

PARIS.—*Station :* Petit Parisien.
Wavelength : 345 metres—500 watts.

9.30 p.m.—Dance Music by the Jazz Orchestra of Petit Parisien.

SWITZERLAND.

ZURICH.—*Station :* Radio-Genossenschaft.
Wavelength : 515 metres—500 watts.

8.15 p.m.—Address "Men and Stars" Dr. P. Stuker.

8.30 p.m.—Orchestral Concert.

1. Overture from "The Marksman" (Weber).
2. Serenade (Widor).
3. Selection (Lanner).
4. Suite from "Coppelia" (Delibes).
5. The Dream of Flowers (Translator).
6. Melody (Siede).
7. Potpourri from "The Gypsy Baron" (Strauss).

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station :* Unione Radiofonica Italiana.
Wavelength : 425 metres—4 kw.

5.15 p.m.—Orchestral Selections by Albergo di Russia.

5.45 p.m.—Jazz Band.

6.15 p.m.—Close Down.

7.30 p.m.—News Bulletin.

8.30 p.m.—Concert.

1. Suite from Arlesienne (Bizet). The Station Orchestra.
2. (a) Sleep Beautiful One (Bassani), (b) Song (Strozzi). Alfredo Sernicolli (Tenor).
3. Fashion Review.
4. Two Songs. Isetta Bilancioni (Soprano).
5. Waltz (Dvorak). The Station Orchestra.
6. (a) Dramatic Fragment (Mozart), (b) The Pearl Fisher (Bizet). Alfredo Sernicolli (Tenor).
7. Concerto in A (Sinding). Francesco Buzzoni (Violinist).
8. The Forge of Destiny (Verdi). Isotta Bilamcioni.
9. Handel and Gretel (Humperdinck). The Station Orchestra.

10.15 p.m.—News Bulletin.

10.30 p.m.—Dance Music by Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station :* Radio-Wien.
Wavelength : 530 metres—1 kw.

4.10 p.m.—Concert.

1. Dream Waltz (Strauss).
2. Song and Dance from "Cleopatra" (Strauss).
3. Potpourri from "The Last Waltz" (Strauss).
4. Selection (Eysler).
5. The Faithful Fiddler (Eysler).
6. The Blue Paradise (Eysler).
7. The Happy Husband (Eysler).
8. The Divorced Wife (Fall).
9. Boston and Dance Song (Fall).
10. Potpourri from "Madame Pompadour" (Fall).

7.45 p.m.—English Lesson.

8.30 p.m.—Programme of the Works of Beethoven. Buxbaum Quartet and Anton Tausche (Vocalist).

1. String Quartet in C. The Buxbaum Quartet.
2. Song. Anton Tausche.
3. String Quartet in B.

GERMANY.

HAMBURG.—*Station :* Nordische Rundfunk.
Wavelength : 395 metres—1.5 kw.

6.0 p.m.—Series of Talks on "Beautiful German Cities" : "Buxtehude." Kurt Siemers.

7.0 p.m.—English Lesson. Hans Bredow School.

8.0 p.m.—Selections from German Operas.

Artists : Erna Kroll-Lange (Vocalist), Eva Schlee (Elocutionist), Clara Voss (Vocalist), and the Station Orchestra.

1. Overture (Weber). The Station Orchestra.
2. Song from "Hans Heiling" (Marschner). Clara Voss.
3. Song from "Undine" (Lortzing) Erna Kroll-Lange.
4. Reading from "Hansel and Gretel" (Humperdinck). Eva Schlee.
5. Selection from "Hansel and Gretel" (Humperdinck). The Station Orchestra.
6. Song from "Hansel and Gretel" (Humperdinck). Erna Kroll-Lange.
7. Ballad from "The Flying Dutchman" (Wagner). Eva Schlee.
8. Intermezzo (David). The Station Orchestra.
9. Song of the Mermaid from "Oberon" (Weber). Erna Kroll-Lange.
10. Selection from "Oberon" (Weber). The Station Orchestra.

10.0 p.m.—News Bulletin given partly in English.

Dance Music and Close Down.

SATURDAY, MAY 23rd

FRANCE.

PARIS.—*Station :* Eiffel Tower.—F.L.
Wavelength : 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists : Mlle. Suzanne Tessier : Mmes. Foret (Pianist), Gianina Veriti (Violinist), and Marie-Louise Cornuau (Vocalist).

1. Fashion Talk. Mlle. Tessier.
2. Italian Concerto (Bach). Mme. Foret.
3. The Butterfly (Campra). Mlle. Cornuau.
4. Prelude and Allegro (Pugnani). Mme. Gianina Veriti.
5. Song of Venus (Lully). Mme. Cornuau.
6. The Call of the Birds (Rameau). Mlle. Foret.
7. Concerto for Violin (Vivaldi). Mme. Veriti.
8. Selection (Andriani) Mlle. Cornuau.
9. Sonate for Piano (Mozart). Mme. Foret.
10. (a) Song of Isabelle (Gretry), (b) Sonate (Corelli). Mme. Veriti.

7.15 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

PARIS (Clichy).—*Station:* Radio-Paris.—SFR.
Wavelength : 1,780 metres—8 kw.

12.30 p.m.—Concert.

1. March (G. Bernard).
2. Vision—Valse (Waldteufel).
3. Prelude to the Deluge (Saint-Saens).
4. The Spaniard of Montmatre (V. Dyck).
5. The Country of the Steps (Chillemont).
6. Invocation (X. Leroux).
7. Pizzicatti (Fourdrain).
8. Prelude (G. Beaume).
9. Pavane (J. Porret).
10. Meditation of Thais (Massenet).
11. Appassionate (Filipucci).

12. Two Selections from the Operette "Ciboulette" (R. Hahn).
13. Arioso (Bach-Ronchini).
14. Will-'o-the Wisp (P. Fauchey).
15. The Joyous Life (F. Lehar).

1.45 p.m.—News Bulletin.

2.15 p.m.—Close Down.

8.15 p.m.—News Bulletin.

8.45 p.m.—Special Gala Concert by "Le Matin."

SWITZERLAND.

ZURICH. — *Station:* Radio-Genossenschaft.
Wavelength: 515 metres—500 watts.

5.0 p.m.—Concert by the Orchestra of Hotel Baur-au-Lac.

6.15 p.m.—Children's Hour.

8.15 p.m.—Address. "The Song of the Birds." Armin Stierlin.

8.30 p.m.—Concert.

Artists: Mary Bernhardsgrutter (Vocalist), Ernst Huber (Baritone), Milly Schweizer (Elocutionist), and the Station Orchestra.

1. (a) The Underworld, (b) The Song of the Cuckoo. M. Bernhardsgrutter.
2. (a) Tom the Rhymster (Lowe), (b) The Fiddler's Song (Hofmann). E. Huber and M. Siegrist.
3. Two Songs. Milly Schweizer.
4. (a) Three Wanderers (Hermann), (b) Song (Obermayer). E. Huber and M. Siegrist.
5. Selections. M. Bernhardsgrutter.
6. Two Songs. Milly Schweizer.
7. Songs. E. Huber and M. Siegrist.
8. Selections by the Station Orchestra.

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station:* Unione Radiofonica Italiana.

Wavelength: 425 metres—4 kw.

5.15 p.m.—Orchestral Selections by Albergo di Russia.

5.45 p.m.—Jazz Band.

6.15 p.m.—Close Down.

7.30 p.m.—News Bulletin.

8.30 p.m.—Concert.

1. Overture from "Eleonora" (Beethoven). The Station Orchestra.
2. (a) Selection (Schumann), (b) The Princess (Grieg). Enza Messina (Soprano).
3. Sonate Pathetic (Beethoven). Lina Liviabella.
4. (a) Romance from "Mignon" (Thomas), (b) The Master Singers (Wagner). Fernando Bertini (Tenor).
5. (a) Selection (da Verona), (b) Serenata (Garatti). Federigo Filippi (Elocutionist).
6. (a) Symphony Jupiter (Mozart), (b) Dance (Mascagni). The Station Orchestra.
7. (a) Melody (Chopin), (b) Ballet (Gasco). Enza Messina.
8. (a) Nocturne (Liviabella), (b) Marcia (Grieg). Lina Liviabella.
9. (a) Ballet (Mascagni), (b) Othello (Verdi). F. Bertini.
10. Fantasy from "Werther" (Massenet). The Station Orchestra.

10.15 p.m.—News Bulletin.

10.30 p.m.—Dance Music from Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station:* Radio-Wien.
Wavelength: 530 metres—1 kw.

11.0 p.m.—Concert.

4.10 p.m.—Concert.

1. End of the Era (Waldteufel).
2. Selection (Gade).
3. Legend of Love (Becce).
4. March of the Tin Soldier (Jessel).
5. The Judin (Halevey).
6. Song of Elizabeth (Wagner).
7. Remembrance (Fetras).
8. Young Love (Fiebrich).
9. Kentucky (Little).

5.10 p.m.—Address "The Fable in World Literature." Æsop, Lafontaine, Lessing, Gellert, Andersen, Anton Amon.

8.0 p.m.—Operette in Three Acts, by R. Bodansky. "Round About Love."

PERSONÆ.

Florian Bachmayer (Oscar Sachs); Steffi, his daughter (Lilly Schwartz); Count Balduin (Josef Sichra); Countess Anastasia (Paula Fiedler-Seitz); Stella (Lia Bayer); Hans v. Ottinghausen (Victor Fleming); Vinzenz (Ernst Arnold); Baron Mucki v. Stillehen (Hans Stilp); Edi v. Stierbing (Oscar Oldingen).

10.0 p.m.—Light Music and Close Down.

SUNDAY, MAY 24th

FRANCE.

PARIS.—*Station:* Eiffel Tower.—FL.

Wavelength: 2,650 metres—5 kw.

6.15.—Concert.

Artists: Dr. Piere Vachet; Mmes. Madeleine Girard (Vocalist), Verdevoy-Menolin (Pianist), Alice Andrieu and M. Rene Devaux (Violinist).

1. Medical Talk. Dr. Pierre Vachet.
2. Impromptu for Piano (Rey-Andreu). Mme. Verdevoy-Menolin.
3. Ave Maria (Rey-Andrieu). Mme. Madeleine Girard.
4. Havannaise (Saint-Saens). M. Rene Devaux and Mlle. Alice Andrieu.
5. Selection for Piano (Rey-Andrieu). Mme. Verdevoy-Menolin.
6. The Song of Petit Cheval (Severac). Mme. Madeleine Girard.
7. Water Spout (Schuman). M. Rene Devaux.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

8.30 p.m.—Concert on 2,200 metres and 2.5 kw.

10.0 p.m.—Close Down.

PARIS (Clichy).—*Station:* Radio-Paris.—SFR.

Wavelength: 1,780 metres—8 kw.

12.45 p.m.—Concert.

1. March (Aldaba).
2. Anguish of Love (Benatzi).
3. Chinese Tambourin (Kreisler).
4. Interlude of Louis XI (G. Grecourt).
5. Song by M. Roland Lenoir.
6. Hungarian Dances (Brahms).
7. Scherzo (Mendelssohn).
8. Adoration (Filipucci).
9. Song by M. Roland Lenoir.
10. Intermezzo (E. Lalo).
11. Herodiade (Massenet-Alder).

1.45 p.m.—News Bulletin and Close Down.

8.15 p.m.—Esperanto Lesson by Dr. Corret.

8.45 p.m.—Music by Mario Cazes and the Orchestra of Chateau Caucasien

10.30 p.m.—Close Down.

SWITZERLAND.

ZURICH. — *Station:* Radio-Genossenschaft.
Wavelength: 515 metres—500 watts.

5.0 p.m.—Concert by the Orchestra of Hotel Baur-au-Lac.

8.15 p.m.—Opera "The Bat" (Strauss). In Two Acts, from the Zurich City Theatre. Musical Selections by the Station Orchestra.

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station:* Unione Radiofonica Italiana.
Wavelength: 425 metres—4 kw.

5.15 p.m.—Orchestral Selections by Albergo di Russia.

6.40 p.m.—Close Down.

8.30 p.m.—News Bulletin.

8.45 p.m.—Opera "Carmen" (Bizet).

PERSONÆ.

Carmen (Maria Lazzari Gabrielli, Soprano); Micaela (Maria Cattani, Soprano); Don Jose (Franco Caselli, Tenor); Escamillo (Ugo Donarelli, Baritone).

Act. I. (a) Prelude by the Station Orchestra; (b) Habanera (Carmen); (c) Duet (Micaela and Don Jose); (d) Seguiailla (Carmen).

Act II. (a) Intermezzo by the Station Orchestra; (b) Entrance of the Toreador (Escamillo); (c) Song (Don Jose); (d) Song (Don Jose); (e) Duet (Carmen and Don Jose).

Act III. (a) Song (Carmen); (b) Song (Micaela); (c) Duet (Escamillo and Don Jose).

Act IV. (a) Prelude by the Station Orchestra; (b) Duet (Escamillo and Carmen); (c) Duet (Carmen and Don Jose).

10.15 p.m.—News Bulletin.

10.30 p.m.—Jazz Band.

11.0 p.m.—Close Down.

The Litzendraht Myth

By G. P. KENDALL, B.Sc., Staff Editor.

In the following article Mr. Kendall gives some further useful measurements dealing with coil design, at the same time explaining why the winding of coils with Litzendraht fails to give the expected increase in efficiency.

FROM correspondence which I receive on the subject of coils, it would appear that what has been described as the Litzendraht Myth is as yet by no means extinct. Since it is possible to waste a considerable amount of money and time in the use of Litzendraht and obtain no reward in the shape of improved signals, it would seem that some account of the efficiency or otherwise of this material is called for.

Litzendraht

Litzendraht, it will be remembered, is the name given to a form of conductor employed for winding inductances which consists of a large number of fine and separately insulated strands, made up into a single cable by some process of twisting. The object of constructing a conductor in this manner is, of course, to increase the surface area of the finished cable, upon the assumption that as high-frequency currents travel upon the surface the high-frequency resistance will be therefore reduced.

Losses

It was early discovered that there were several very serious drawbacks attendant upon the use of such wire, one of the most important being that if a single strand was left disconnected at either end, very considerable losses were set up in the conductor, and it was recognised that it was a matter of very considerable mechanical skill to use such wire successfully. Most elaborate pains had to be taken to ensure that every strand was properly soldered into the circuit, and hence it was often said that Litzendraht was a material for the expert alone.

The Bureau of Standards

Notwithstanding the difficulty attendant upon the use of Litzendraht, however, it was for a considerable period believed to be a great aid to efficiency in the winding of tuning inductances, and one of the first serious blows it received came when the American Bureau of Standards carried out some work upon its high-frequency resistance upon the ordinary broadcast wavelengths, where conditions might be expected to be somewhat different from those obtaining upon the longer wavelengths, for which Litzendraht was originally introduced.

H.F. Resistance

The Bureau's report showed that the actual method of laying up the fine strands in the Litzendraht had a considerable bearing upon the high-frequency resistance of the finished cable, but that no method gave the expected reduction in high - frequency resistance when compared with a conductor of equivalent diameter composed of a single strand. Furthermore, they showed that in many cases Litzendraht was definitely worse than a single-strand conductor of quite modest diameter. These figures have usually been explained on the basis of the dielectric losses set up in the insulating material between the strands of the conductor, and upon the extremely unequal distribution of the current in obedience to the tendency known as " skin effects."

Experiments

The work of the Bureau of Standards was itself extremely convincing, but it does not appear to have become at all widely known among the general body of experimenters in this country, and therefore it seems that a brief account of some simple experiments, conducted with a view to determining the actual signal strength obtained with coils of Litzendraht as compared with ordinary wire, may be of interest to readers of *Wireless Weekly*.

The subject of the experiments was a coil out of the well-known Army crystal set known as the Mark III*. This coil consists of a single layer of Litzendraht upon

This former provided the support for the various windings upon which the author carried out his tests.

an ebonite tube, in which a thread has been cut in order that the turns may be spaced evenly. The Litzendraht consists of a large number of very fine strands of silk-covered wire, moderately impregnated with shellac, and apparently baked at a fairly high temperature.

Signal Strength

I obtained two of these coils, and measured the signal strength given by 2LO by the Moullin voltmeter method, obtaining within small limits the same figure for each coil, viz., 6.1. One of these coils was then stripped, the resulting blank former being shown in the photograph at the head of this article. The former was now wound with the same number of turns as before and in the same groove, but of No. 24 enamelled wire and the signal strength again measured, the second Litzendraht coil being preserved as a standard for comparison. The enamelled wire coil was found to give a signal strength of 6.3 as against 6.1 for the Litzendraht winding, the increase in signal strength being accompanied by a considerable increase in the necessary condenser reading for a given

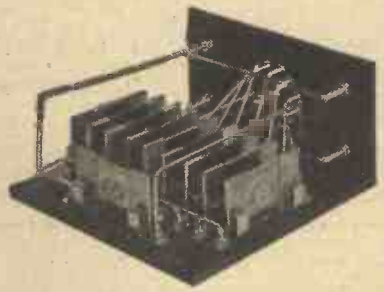
(*Concluded on page* 201.)

The complete unit is quite compact and neat in appearance.

How to Make a Loud-Speaker Shunting Unit

By A. S. CLARK.

An easily constructed unit which every user of a Loud-Speaker will appreciate.



The fixed condensers are mounted on a second ebonite panel.

THE unit described in this article provides a quick and convenient method of placing a condenser of any desired value across a loud-speaker. All who have worked with loud-speakers will appreciate the fact that a shunting condenser of some value is invariably necessary, and that its value varies considerably with different loud-speakers. It is also often a benefit to be able to change the value of the shunting condenser as the items of transmissions are changed, especially in the case of band music and speech.

Switching

The illustration above shows the unit, by means of which it is possible to shunt the loud-speaker with a fixed condenser of .001 μF to .01 μF in steps of .001 μF. The desired value is quickly picked out by merely turning the switch arm over the contact studs. The shape and size of the unit make it very convenient for use as a stand for the loud-speaker, or if this is not desired, it may be placed on the top of the wireless cabinet where it will be out of the way and at the same time easily accessible for control.

Components

The components required to construct the unit are few and not very expensive. They are given in the list which follows, the names in brackets being the names of the manufacturers of the components actually used. These need not, however, be strictly adhered to.

10 fixed condensers. These range in value from .001 μF to .01 μF, varying in steps of .001 μF (L. McMichael, Ltd.).

1 set of parts for 10 contact stud switch (Bowyer-Lowe Co.).

1 ebonite panel 3 in. × 6 in. × ¼ in. (Paragon).

1 ebonite panel 6 in. × 6 in. × ¼ in. (Paragon).

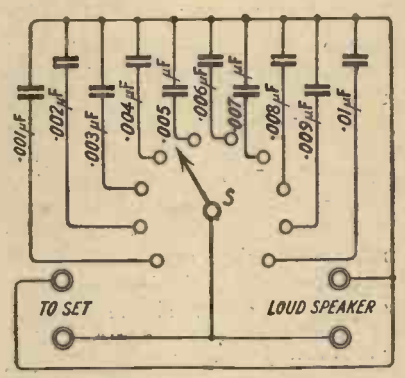


Fig. 1.—Shows the theoretical connections of the unit.

4 terminals.

2 dozen countersunk 4 B.A. ½-in. nuts and bolts.

1 cabinet to take panel as shown, 3 in. × 6 in. × 6¼ in. inside measurements (Camco).

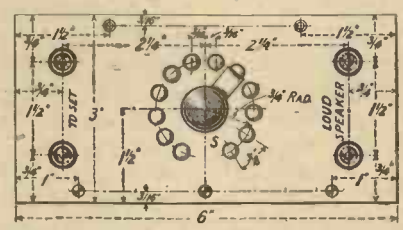


Fig. 2. Gives full dimensions for marking out the vertical panel.

1 packet Radio Press panel transfers.

Quantity of square-section tinned copper wire.

Any other make of reliable fixed condensers are suitable providing the complete range may be obtained; the McMichael clip-in type was found satisfactory in size, the method of mounting being convenient, and gave good results.

Drilling the Panels

Having obtained all the necessary parts, construction may now be commenced and will be found quite simple. Figs. 2 and 3 show the layout and necessary holes to be drilled. Those along the bottom of the smaller panel are clearance holes for 4 B.A. screws and must be countersunk. As screws for the purpose of joining the two panels together pass through these, it will be seen that three holes at corresponding positions must be drilled in the edge of the larger panel. Drill these with a drill too small to allow a 4 B.A. bolt to slip into the resulting holes, and tap a 4 B.A. thread in them by forcing in a 4 B.A. bolt.

A Drilling Template

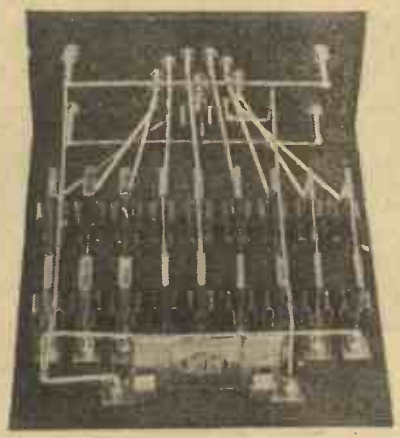
These holes should be about ⅜ in. deep. A drilling template for the Bowyer-Lowe switch will be found on the side of the box which contains the parts.

The holes in the larger panel, which are for securing fixing screws for the condensers, must be deeply countersunk on the underside of the panel. These condensers are held in place by means of 4 B.A. screws and nuts, and the deep countersinking of the holes prevents the screw heads coming into contact with the wood of the cabinet.

Mounting the Components

Before the two panels are fixed together, all the components should be secured in position. When fixing the condensers, make sure that none of the clips touches its neighbour. The condenser at the back of the panel is the smallest, namely, .001 μF, and they then follow on in order

from the left to the right of the panel. The .01 μF condenser will be therefore at the right-hand end of the panel. It is very desirable that the switch should work easily, but at the same time



This general view of the back of the instrument shows the connections to the switch.

make good contact; this, therefore, should be carefully adjusted.

Soldering

Having reached this stage, wiring can be started. First file bright and tin all points to which connection is to be made. Now join the bottom two terminals on the front panel together, and also to the switch arm. The wire joining one side of all the condensers may also be fixed in place. Care should be taken in soldering this wire to see that contact is made to all the condensers, and if the constructor is not very good at soldering, a piece of round tinned copper wire, which will bend easily, should be used in place of the square wire.

The panels are best joined in the cabinet, so place them in their respective positions in the containing box and screw home the three 4 B.A. bolts. The two panels should now slide out easily. Leave the connection which joins the two top terminals to the common side of the bank of condensers until last. The condensers should be connected in the order in which their values increase, starting with that of .001 μF.

Completion

Having completed the wiring, affix the necessary panel transfers and slide the unit into its cabinet, fixing it in by means of two screws at the top of the front panel if desired. The unit is now complete, and when the two left-hand terminals are connected to the output terminals of the set and the two right-hand terminals to the loud-speaker, all that is required to work the unit is to turn the switch arm round from left to right until the right value of condenser is across the loud-speaker.

It is very easy to ascertain which value of condenser is in use by counting up which stud the switch arm is on. Thus if it is on the fifth stud, then .005 μF

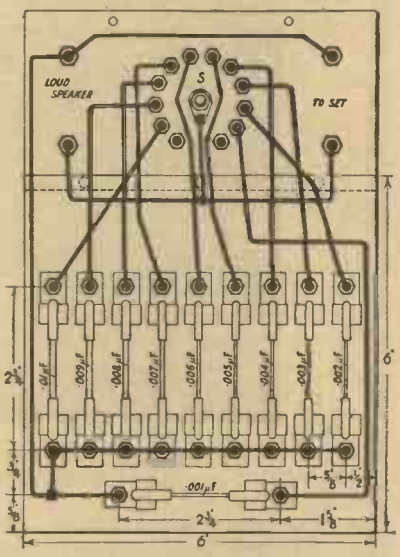


Fig. 3.—In this wiring diagram dimensions are also given for marking out the horizontal panel.

is shunted across the loud-speaker.

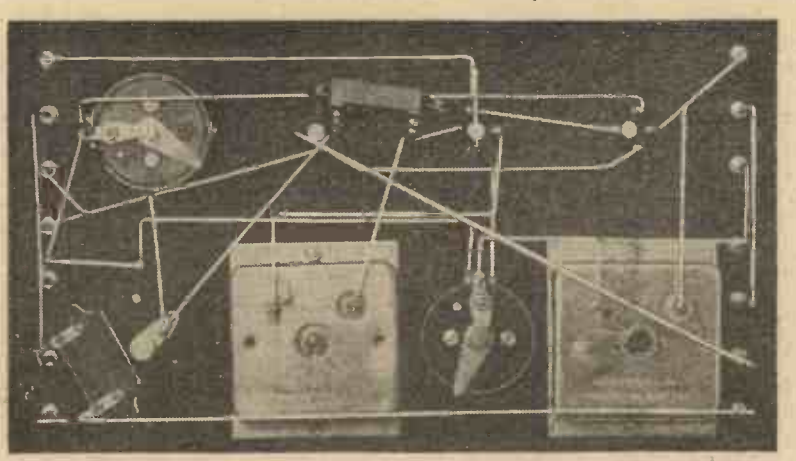
The Litzendraht Myth

(*Continued from page* 199)

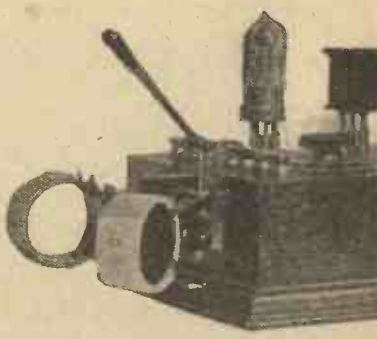
wavelength, indicating that the inductance and capacity of the coil had been diminished somewhat by the substitution. This was, of course, a consequence of the increased spacing between turns which resulted from the use of a more slender conductor.

To make the test a thoroughly fair one, of course, it would have been desirable to substitute for the Litzendraht such a gauge of wire that the spacing between turns remained the same—that is to say, that the diameters of the two conductors were identical. This was impossible for practical reasons, however, the necessary extremely thick gauge of wire proving impossible to wind at all evenly on this particular former. The test, as conducted, none the less, does show that the Litzendraht has no advantage over even so small a gauge of wire as No. 24. The effect of the spacing apart of the turns of the No. 24 wire has been separately investigated, and found to produce only a very slight increase in signal strength, so that the figure obtained can be taken as a fair guide.

Our photograph shows the light railway in course of erection for transporting the various materials necessary for the building of the high-powered B.B.C. Station at Daventry.



The wiring beneath the panel is extremely simple, the points for soldering being easily accessible.



This photograph of the receiver sh with coils, valves, etc., ready mo adds considerably

DISTANCE WITH

By C. P.

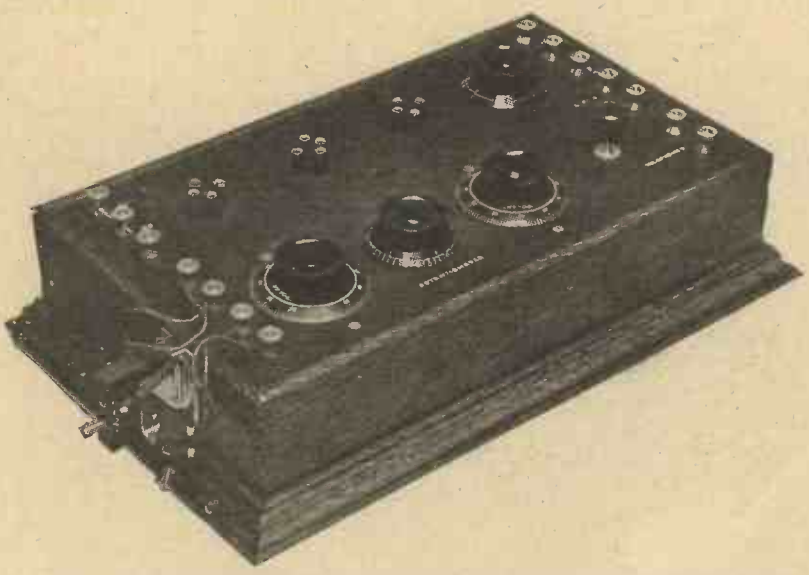
In this contribution will be found full constructional which possesses a fine control of reaction combined

THERE are, no doubt, many experimenters who have relied on the single-valve receiver employing reaction on the aerial for their long-distance work. Though it is certainly amazing what distances *can* be covered with such a set, there are many reasons why for consistent reception of distant stations it is advisable to use a high-frequency valve.

When receiving a very weak transmission with a single valve the receiver has to be adjusted so that it is on the very verge of oscillation, and unless the amateur is fairly experienced it may actually be oscillating gently without his being aware of the fact.

H.F. Amplification

Now the amplification obtainable from a high-frequency valve allows far-off stations to be tuned in without such critical reaction setting being required, and there is therefore far less risk of interfering with listeners in the vicinity. It may possibly seem to readers that this point of interference from an oscillating receiver is not quite so serious as it is made out to be, but I can assure them that on occasion the "chirps" from even a single-valve receiver can be heard for quite extraordinary distances,



The well-balanced arrangement of the panel is clearly shown in this photograph. Note the connections to the coil-holder.

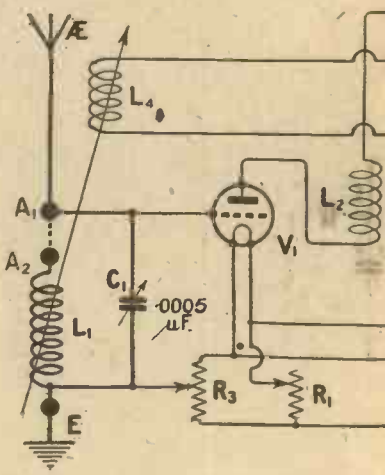
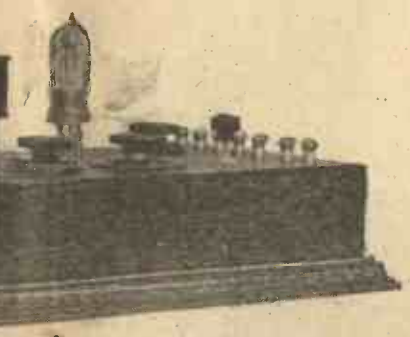
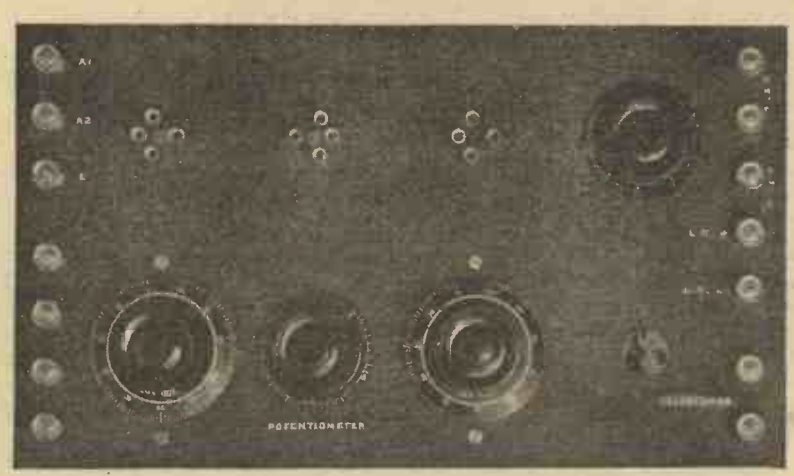


Fig. 1.—The theoretic



hows the appearance of the instrument ounted. Note the shallow box, which y to the neat design.



A plan view of the front of the panel, indicating the layout.

H TWO VALVES

ALLINSON.

details for the building of a simple two-valve receiver with the ability to receive over considerable distances.

completely spoiling reception for perhaps hundreds of listeners.

Summer Conditions

Now that the summer is approaching, conditions are getting worse for long-distance work every day, for not only are the daylight hours lengthening, but trees and shrubs are putting out their leaves, screening aerials and absorbing power.

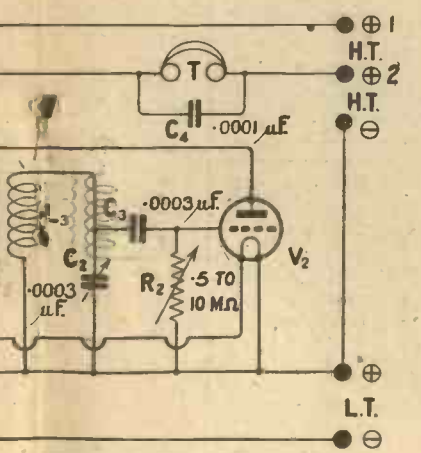
There are various forms of H.F. amplification that may be used, and it is sometimes a difficult matter to decide just which scheme to employ.

The newcomer to H.F. amplification may usually be advised to start first with transformer coupling, for not only is this method slightly more stable than tuned-anode, but it is also not quite so critical to tune, and is therefore somewhat easier to handle for the unexperienced amateur; tuned-anode coupling, if efficient, is again very prone to self-oscillation that may be almost uncontrollable in some cases.

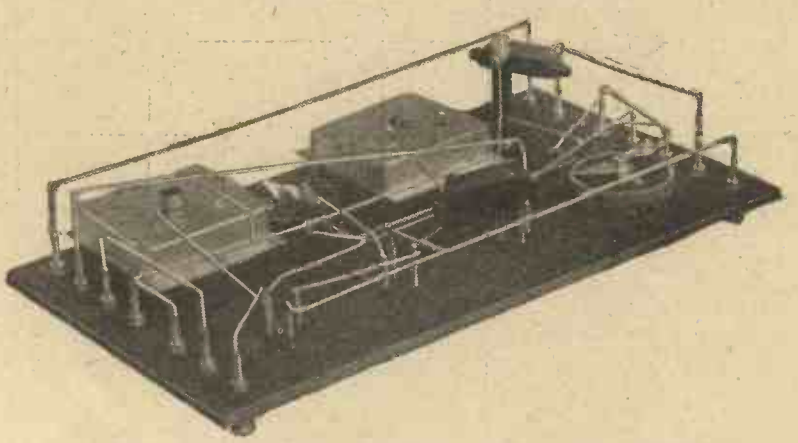
Appearance

The two-valve receiver about to be described uses H.F. transformer coupling, and is therefore to be recommended to those who have had no experience as yet of H.F. amplification.

An examination of the photographs of the completed receiver will show that a very symmetrical layout has been arrived at, while the tuning condensers used allow the whole receiver to be accommodated in a tray only 3 in. deep. The set has therefore a distinctive appearance that strikes a new note, and though, of course, efficiency is the main consideration when building a set, the



al circuit of the receiver.



This illustration shows the shallowness of the receiver, permitting thereby the use of a containing box only three inches deep.

question of appearance generally carries a certain amount of weight.

Layout

The photographs of the receiver also show that a two-coil holder is fixed to the side of the containing case, the leads from which go to four terminals, allowing the winding of either coil to be easily reversed if desired. The three terminals to be seen in the back left-hand corner allow this receiver to be used either with an outside or a frame aerial, and interesting experiments may be carried out.

The knob and dial in front on the left of the panel are those of the tuning condenser C1; next to this is the potentiometer R3; then comes the tuning condenser C2, and finally the knob controlling the variable grid-leak R2. Just behind the last is the filament resistance which controls the filaments of both the valves. This resistance is of the dual type, so that the receiver may be used either with dull or bright emitter valves.

Valves

Valves of the same voltage should be used, and also those which take the same current: for example, two .06 valves may be used together, or two D.E.3, or two of the Wuncell type, or two 4-volt bright emitters, and so on. The constructor has therefore a wide choice, and can try out different valves to see which give him the best results.

The circuit employed is shown in the theoretical diagram in Fig. 1. This shows that when

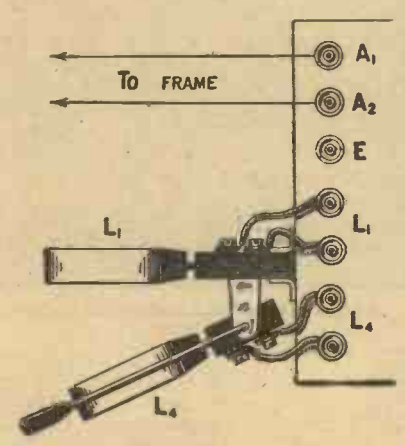


Fig. 1a.—The connections when using the frame aerial.

used with an outside aerial, terminals A1 and A2 are joined together. When a frame aerial is employed it is placed in series with L1 by connecting it to the above two terminals. Reaction may then be applied by means of L4 in the usual way. This was found necessary to make the set oscillate, as even with a frame aerial it was found to be perfectly stable unless a fairly high plate-voltage was used. Another point that also probably conduces to stability is the fact that the secondary and not the primary of the H.F. transformer is tuned.

Potentiometer

It may be asked, seeing that reaction is required to make the set oscillate, why is a potentiometer fitted to the set?

This has been done so as to provide an alternative control for reaction. Reaction may therefore be varied either by a coil in the plate-circuit of the detector valve coupled magnetically to the aerial coil, or by means of the potentiometer. This latter further gives a finer adjustment than is sometimes possible with ordinary magnetic reaction.

Components

The following components will be needed to construct this set, and if it is desired to get the best results from components which may be substituted in preference to those specified, the values, where given, should be similar to those shown below.

One ebonite panel, 14 in. x 8 in. x ¼ in. (Paragon).

One oak or mahogany tray for same, 3 in. deep (W. H. Agar).

One variable condenser, .0005 μF (Polar).

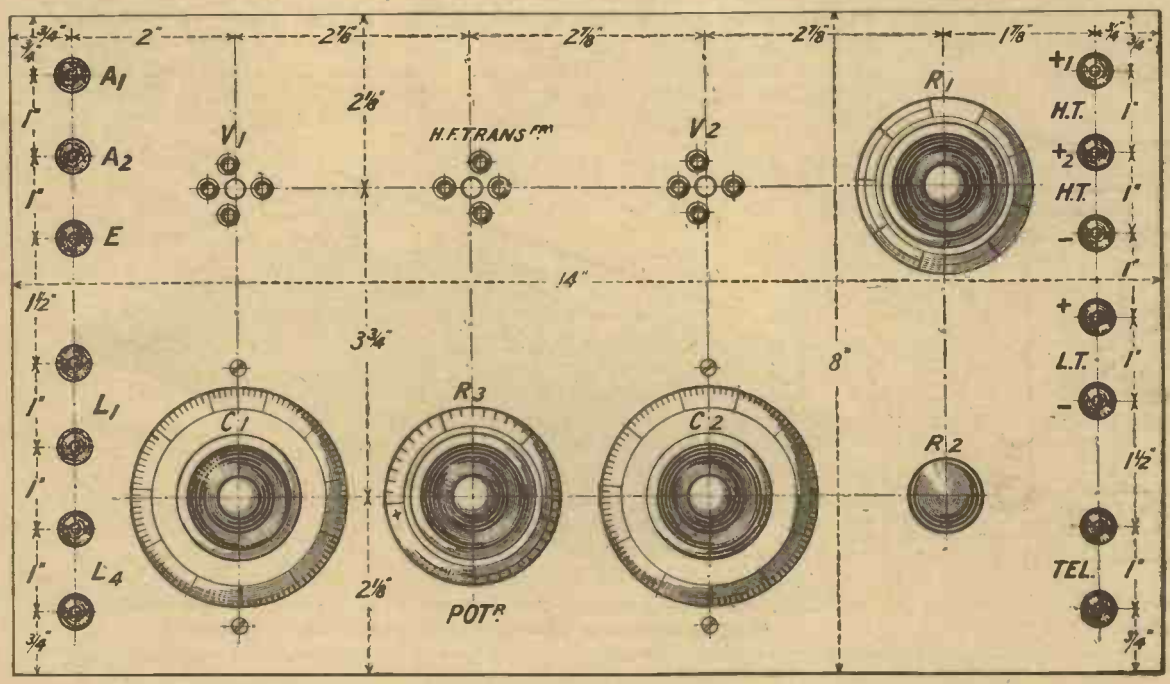


Fig. 2.—A practical drilling diagram and panel layout giving all necessary dimensions.

One variable condenser, .0003 μF (Polar).

One potentiometer (L. McMichael and Co., Ltd.).

One dual filament resistance (L. McMichael and Co., Ltd.).

One two-coil holder, type L (Burne-Jones and Co., Ltd.).

One fixed condenser, .0003 μF (Dubilier).

One fixed condenser, .0001 μF (Dubilier).

One variable grid-leak (Bretwood).

Two H.F. transformers, 300-600 and 1,100 to 3,000 metres (Burne-Jones and Co., Ltd.).

Twelve nickel valve socket pins (Burne-Jones and Co., Ltd.).

Fourteen nickel terminals, W.O. type (Burne-Jones and Co., Ltd.).

One set Radio Press panel transfers.

Tinned copper wire and flex for connections.

Ebonite

It is an easy matter to obtain guaranteed ebonite, as most wireless stores now stock it; if, however, you are using a piece of material the quality of which is doubtful, you should first rub down both sides with sand-paper so as to remove the surface and its attendant risk of leakage.

When treating the upper side rub in one direction only, using No. 0 sand-paper, applying less pressure towards the end of the process, so as to obtain a smooth and even finish. Lastly, go over it again with a fresh piece of sand-paper, using a little turpentine, and then wipe the panel clean.

Preparing the Panel

Next drill the panel in accordance with the layout shown in Fig. 2, drilling all the holes of one size at a time, irrespective of their positions. This will save time that otherwise might needlessly be lost in changing the drill several times. The valve socket pins in the receiver here described were tapped into the panel, but those who do not possess the necessary taps or are not quite sure that they will drill and tap the holes quite true can, of course, drill the usual clearance holes and fasten the pins by means of nuts and washers. Now fix the panel transfers in the positions indicated, and then, if the panel has been rubbed down or sandblasted, treat lightly with an oily rag, finishing off with a soft, dry piece of cloth, and a pleasing matt finish should result.

The components may now be mounted and the connections made. If the wiring diagram shown in Fig. 3 is followed, no difficulty should be experienced in wiring up the receiver, but care should be taken to space out all leads well. It will be noticed that the grid-condenser C_3 is held by its tags, only one of which goes direct to the grid leg of the valve socket pin. It should be noted that the connections shown to the transformer socket are those that were found satisfactory in actual working with the particular transformer used. This, however, is directly interchangeable with McMichael, Peto-Scott, Bowyer-Lowe, and one or two other makes. If any doubt is felt as to the correctness of the connections with regard to the transformer in use, you can always try the result of reversing the leads going to either or both of the windings, so as to see which gives the best results.

Testing

Having checked over the connections and made sure that none is loose, the set may be tested out.

Connect the L.T. terminals to the low-tension battery in accordance with the markings given in Fig. 2, and with the filament rheostat in the "off" position, insert two valves of the same type in the two outside sockets. Into the middle socket plug an H.F. transformer covering the wavelength desired, and insert

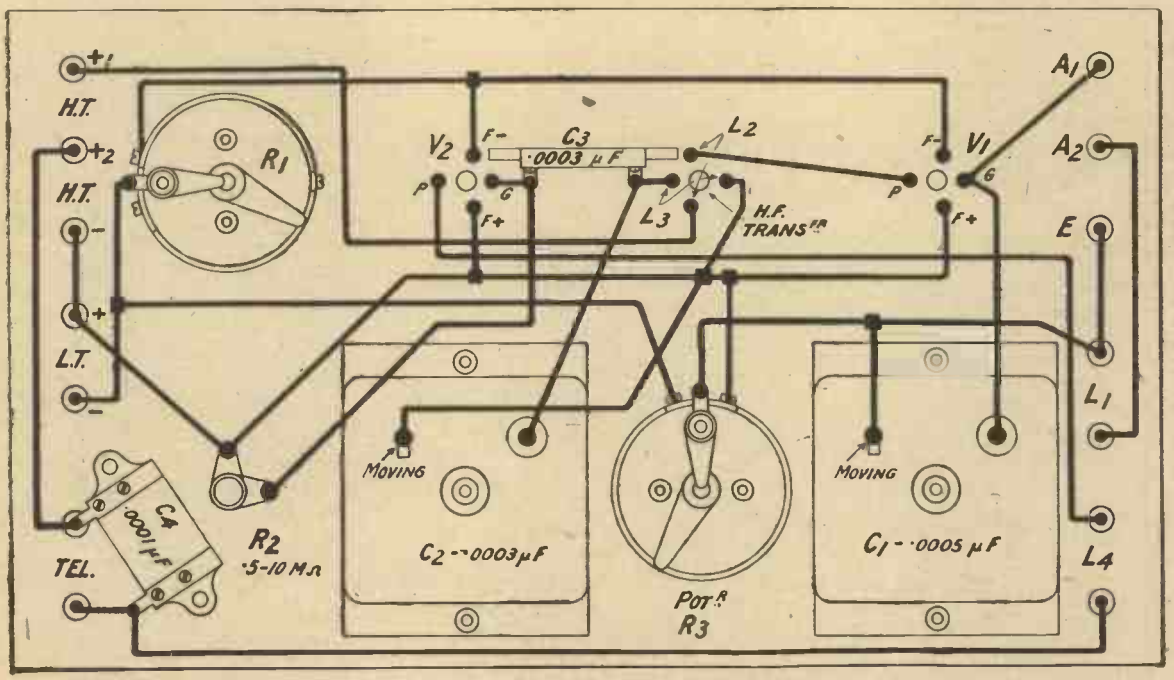


Fig. 3.—This practical back of panel wiring diagram may be used in conjunction with the photographs.

two suitable coils in the two coil-holders fixed to the side of the case. L1 is the fixed coil and L4 the moving coil, the flexible leads to their sockets being connected as shown in Fig. 3.

Coils

The aerial coil L1 will be a No. 25, 35, or 50 if the wavelength of the desired station is between 300 and 500 metres, while L4 may be a No. 50 coil, though other sizes might be tried with advantage. The Chelmsford Station, 5XX, requires a No. 150 coil in the aerial socket with a No. 150 or 200 for reaction. Another H.F. transformer should also be used to cover the 1,600-metre wavelength.

Now switch on the valves and see that the filament resistance. give correct control, and, everything being in order, connect the high-tension battery and phones to their respective terminals. H.T. + 1 supplies the H.F. valve and H.T. + 2 the detector. Suitable values of H.T. will be found upon the wrappers of the valves chosen, and should be followed accordingly. With L4 at right-angles to L1, and the potentiometer approximately in its central position, slowly move C2 simultaneously with C1, rotating the latter somewhat faster than C2 till the local station is heard. Adjust C2 till signals are loudest, and then slowly tighten the coupling between L4 and L1, at the same time retuning with C1. Signals should become louder as the coupling is tightened. If this effect is not produced, the leads to one of the coils should be reversed. It should now be possible to bring the receiver to a point just short of oscillation, and at this point is in its most sensitive condition. It will now be found that oscillation can be controlled very conveniently by means of the potentiometer alone. For best results the coil coupling should be so adjusted that the potentiometer slider is operated near the negative end of the resistance. The variable grid - leak may be adjusted occasionally, but its value will not be found critical.

If it is desired to use a frame aerial, the connections to be employed are shown in Fig. 1a, the strap between terminals A1 and A2 being removed of course.

With a frame aerial 2 ft. square wound with 12 turns of 18 S.W.G. spaced ⅜ in. apart, a suitable size for L1 was found to be a No. 25, while a No. 35 for L4 gave a smooth reaction control over the whole wavelength range covered by C1. Should the receiver be found to oscillate strongly on the frame aerial, even when the reaction coil is at right angles to L1, the frame may be connected across A2 and E, A1 and A2 being joined together and L1 removed altogether. Reaction control will then be given by the potentiometer.

Results

Tested on an aerial about six miles N.W. of 2LO, this station was too loud for comfort on the phones. No difficulty was experienced in picking up other transmissions, though a great deal of interference was experienced from the local broadcast without the inclusion of a wave-trap.

In the course of a thorough test ten to twelve stations were tuned in, and this was in a neighbourhood that is not noted for good reception conditions. Birmingham and Newcastle in particular came in at good strength, while other B.B.C. and Continental transmissions were heard.

On a frame aerial 2LO was still uncomfortably loud in the phones, and in the course of a short daylight test speech from Bournemouth was intelligible while at least one other station was clear and audible.

The giant Brown loud-speaker which was used on Ealing Common on the occasion of the broadcasting of the opening speeches at the Wembley Exhibition.

Random Technicalities

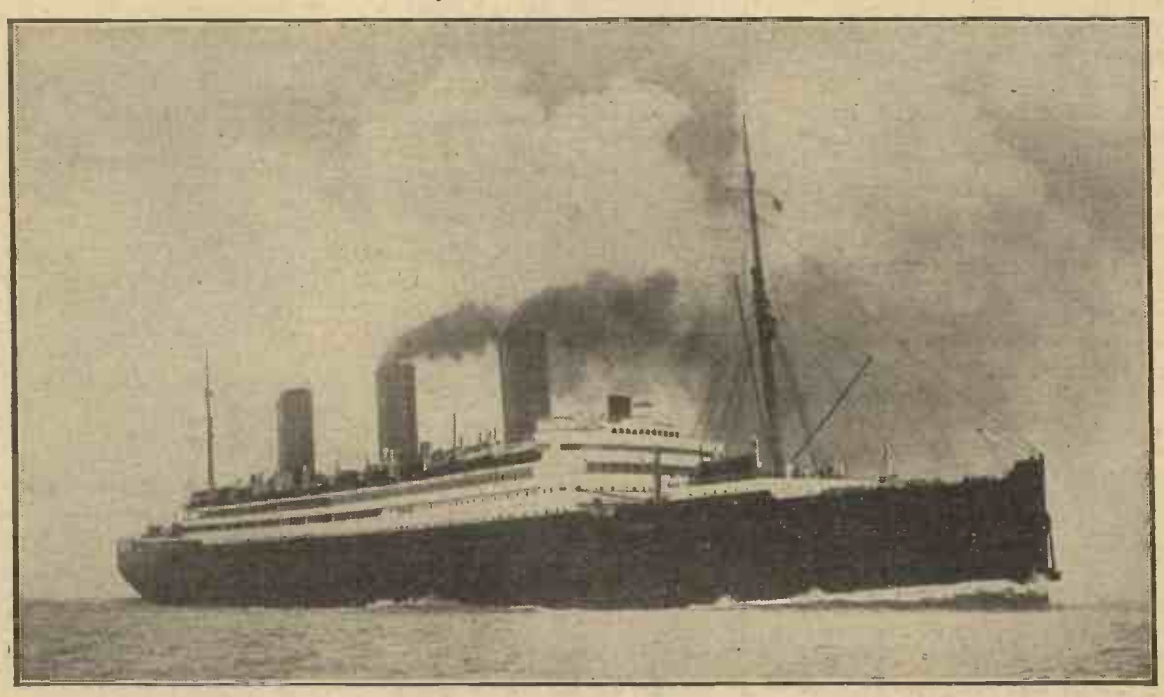
By PERCY W. HARRIS, M.I.R.E.
Assistant Editor.

I AM writing these notes two or three days before sailing for the United States on the R.M.S. *Berengaria*. It is fourteen years since I was last in New York, and I have an idea that there will be some slight changes in the radio situation since that time. Although it is so long ago (as we count time in wireless), it is interesting to recall that a wireless exhibition was held at the time, and, so far as I remember, a demonstration of a crude form of wireless telephone, in which an arc was used as a generator of the (alleged) continuous oscillations. Young America in those days showed great keenness in amateur wireless, although, of course, the interest was not so widespread as it is to-day. In the neighbourhood of New York there existed a number of transmitting amateurs, using as much as five kilowatts input, plain open non-rotating spark gaps being the rule. It was part of the game to make as much noise as possible, for the blazing spark and deafening crash which accompanied it were both evidences of the power of your station!

* * *

In these days, when we are greatly troubled with the problem of selectivity, we are apt to think that what we have done in the reduction of interference is of comparatively recent origin. In point of fact, selectivity has been developed to a very high degree by quite a few people, although the general run of apparatus was the reverse of selective. To give you an example of what could be done, I remember testing out in a private wireless station owned by the *New York Herald* and operated on the Battery, New York, a device known as the Fessenden "I.P.," or Interference Preventer, containing a pair of tuned circuits connected to one aerial. There were two leads from the leading-in insulator, and a tuned circuit was placed in each of these leads. Coupled to both tuned circuits was a third circuit containing the detector—a very nicely-made Perikon device. The method of operation (it sounds rather simple, but in practice it was a tedious job to make the preliminary tuning) was to tune one "leg" of the device exactly to the wavelength of the station we desired to receive, and to arrange the other leg to be not quite in tune with this signal. In these circumstances, one leg being accurately tuned to the signal we wished to get and the other somewhat detuned, the desired signal

R.M.S. "BERENGARIA"



The great liner on which Mr. Percy W. Harris sailed to America last Saturday. As explained in our last issue, he will investigate Radio conditions in America and will embody his impressions in a series of articles in "Wireless Weekly."

would pass strongly down one side and weakly, if at all, down the other. Interfering signals, so long as they were not on the same wavelength, being out of tune with both circuits, would pass about equally down both legs.

* * *

Now the third circuit was coupled to both of these legs in such a way that equal effects in both the legs balanced out—that is to say, if signals of equal strength from an interfering station passed down both windings then the effect on the third circuit would be equal and opposite. The signal it was desired to receive, as it passed down one leg only, was not balanced out by anything, and would affect the detector. Many variations of this method have been invented and patented from time to time, and few of them have worked with any degree of success, but this particular specimen was quite good, for it enabled us to tune out the station "NY," owned by the de Forest Wireless Telegraph Company, and situated on the top of a building in Broadway; and to receive, at night, signals from ships hundreds of miles away down south. The degree of selectivity will be realised when I tell you that the station "NY" was *actually in sight* of the *New York Herald* station on the Battery.

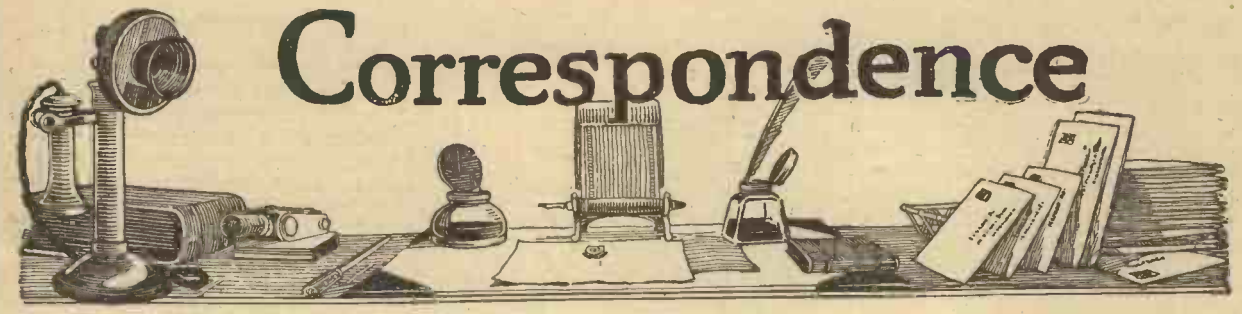
* * *

I have recently been reminded of the Fessenden "I.P." by a reader bringing to my attention a device which he thought he had originated as a new form of tuner. As a matter of fact, it was identical in electrical principles with the particular tuners used in the Fessenden "I.P." These consisted of two drums, so far as I remember, about 5 in. diameter, and about 10 in. or 12 in. long. Both of these drums had cut in them a continuous groove or thread. One drum was made of copper and the other of hard rubber or some other insulating material. The drums were arranged side by side, so that by turning a handle on the insulated drum it was possible to wind on to it from the copper drum a flexible wire. When the whole of the wire had been wound from the copper drum on to the insulated drum it could be wound back again by turning the handle on the copper drum. Naturally, every turn on the copper drum was short circuited, so that one could get a continuous variable adjustment from one end of the drum to the other. The variable condensers were also well made, and the device would quite well compete with many tuners which now claim to be "low-loss." I believe a great deal of the success of this particular "I.P." was due to its sound electrical construction, perfect variation of tuning, the ability to make the proportion of capacity to inductance anything desired within wide limits, and the very efficient method of varying the coupling between the different coils.

* * *

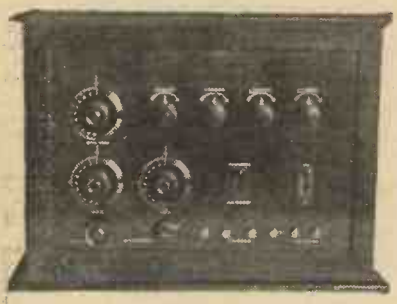
I am afraid we have not paid sufficient attention to the importance of the ratio of capacity to inductance in tuned circuits used for wave-traps. I have not time myself just now to experiment in this direction, but I think it will be worth while for some reader to make up a wave-trap consisting of the two drums, as described, and a variable condenser. He can then experiment with various ratios of capacity to inductance, and might find something really useful to us all.

The D.F. apparatus aboard the S.S. "Aoranji." A photograph of the receiving apparatus of this vessel is given on another page.



A STABLE 3-VALVE RECEIVER

SIR,—I should like to inform you that I have recently made up "A Stable Three-Valve Receiver," by C. P. Allinson, December 31 issue, adding a resistance capacity-coupled L.F. valve. The only other



A front of panel view of Mr. Hohs' receiver.

alterations in the circuit as illustrated are that no telephone jack is used and only one two-coil holder, as the aerial coil L1 is wound over the secondary coil L2 honeycomb fashion and mounted on a four-pin valve plug. The wave trap coil is of the "low-loss" type, and Cossor D.E. valves are used throughout.

On first trying this set out at Chelsea it gave excellent loud-speaker results from 2LO, without an aerial or earth being connected; with aerial and earth connected the volume was too great for an average-sized room. The first valve was turned out, and it was found that excellent results could still be obtained in this fashion.

Only one test was made for distant reception whilst 2LO was working, when the overture "Light Cavalry" was picked up at moderate loud-speaker strength. When the wave trap was brought into use no sign of London could be detected. This station was afterwards identified by *The Foreign Radio Times* as Vienna, which I think speaks remarkably well for the circuit, and I tender my congratulations to Mr. Allinson. It is indeed *a very stable receiver*, as reaction has to be pushed to the extreme before it would oscillate, and picking up distance stations without oscillating is quite a simple matter.

Wishing your paper every success.—Yours faithfully,

F. C. HOHS.

London, S.W.1.

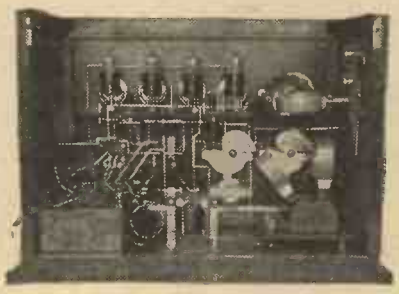
SHORT WAVE RADIO TRANSMISSION

SIR,—The Metropolitan-Vickers Electrical Co., Ltd., have just succeeded in encompassing the globe with a radio transmission on 21 metres. The transmissions were made from the experimental station G2AC at the Metropolitan-Vickers Research Department, Trafford Park, and the signals were picked up by Mr. Ralph Slade (Z4AG), of Dunedin, New Zealand. An interesting point is that the signals were received at noon, New Zealand time, so that by whatever route they travelled they must have covered half the distance in daylight.

Mr. Bevan's arrangement of the "All Concert" receiver. The batteries are kept in the cupboard below.

It is believed that this constitutes a record in that reception was carried out at the greatest number of wavelengths distance from the transmitter yet achieved.

The power input to the transmitter was 1.25 kilowatts, and no reflector was employed during the test. It



This back of panel view of Mr. Hohs' receiver shows the careful wiring.

is proposed to continue the experiments with increased power and with the use of reflector aerials.

The co-operation of amateurs and others who receive the signals would be welcomed; reports on reception should be addressed to Mr. A. P. M. Fleming, Manager, Research Department, Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, England.

This short-wave transmission work is being carried out as a natural development following the original 100-metre and 60-metre transmissions from the broadcasting station KDKA which the Westinghouse Co. have found so successful in America.—Yours faithfully,

METROPOLITAN-VICKERS ELECTRICAL CO., LTD.

ENVELOPE No. 4

SIR,—The enclosed photograph shows my receiver. The cabinet was a single writing desk and only the envelope shelves had to be removed. The accumulator and dry battery are in the bottom cupboard and the front closes up, only the loud-speaker being visible. The circuit used is Mr. Harris's famous "All Concert," which is most efficient.—Yours faithfully,

E. BEVAN.

Westcott, Nr. Dorking.

A READER'S VIEWS

SIR,—As a regular reader of your journals I think it is time I thanked you for the efficient course you have given me, the cheapest and most efficient course possible, if only *every* member of the wireless public would realise it. At the time No. 1 of *Modern Wireless* was published I was just the possessor of a humble crystal set, then *Modern Wireless* lit a fire of enthusiasm in me, and you only need look at the photograph enclosed for the result. It is a fact in most cases that enthusiasm dies with disappointment, but *Modern Wireless* has never let me down once, which accounts for my enthusiasm being stronger than ever. You will notice the design of the set is not to the pattern of any set published in any of your periodicals, nor is the circuit, but *Modern Wireless* is really the brains behind it, for it may rightly be called another Omni Receiver. I can get *every* Radio Press circuit (excepting complicated "supers" such as Armstrong, Flewelling, etc.), and the circuits range from a crystal up to three types of 2 H.F., D. and 1 L.F. The maximum time taken for changing over from *any* circuit to *any* other is two minutes. Interaction is a thing practically unknown in the set. Of all the circuits yet published none has interested me so much as the four-valve T.A.T., described by Mr. John Scott-Taggart in the December, 1924, issue. I have had some wonderful results with it, and tuning to stations by aid of the loud-speaker alone is a comparatively easy thing. Some of your correspondents seem to have a little difficulty in cutting out the local station. I don't know if mine is an exceptional case, but my aerial is 50 ft. high and 48 ft. long and less than half a mile from the Sheffield relay station as the crow flies, and I do not find the slightest difficulty in getting Nottingham or Leeds and Bradford without a murmur from the local station. The number of stations I have logged are too numerous to mention; suffice it to say America has been received on many occasions.

Again many thanks.—Yours faithfully,

W. CROOKES, JUN.

Pitsmoor, Sheffield.

A READER'S HINT

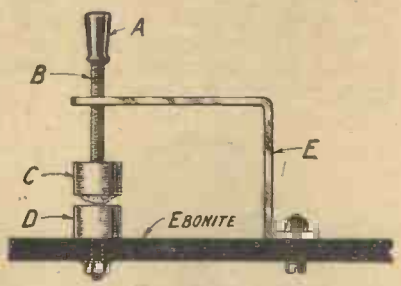
SIR,—As a constant reader of your very excellent journals, I think perhaps the enclosed sketch of a new form of crystal detector may be of interest to many of your readers.

The sketch is purely for descriptive purposes, as the detector can be constructed in many forms. I have never seen a description of this system, and I discovered it quite by accident.

Mr. Crookes' four-valve receiver with which a large number of circuits may be tried.

Instead of using a cat-whisker, which has always given me more or less trouble, especially when working with reflex circuits, I bring the crystal into contact with clean brass filings contained in an ordinary crystal cup. The sketch shows clearly how this is done.

When using this detector I find a considerable improvement in signal strength. I am using



An illustration of the idea suggested by Mr. Wardrop:—

A—Ebonite knob.
B—Brass rod.
C—Crystal cup fitted with crystal.
D—Cup containing brass filings.
E—Brass strip. B passes through a tapped hole in this latter.

this detector in the S.T.100 circuit with excellent results.

I reside about twelve miles from Buenos Aires, in which city there are six or more commercial broadcasting stations, on waves varying from 250 to 400 metres, and with your S.T.100 tri-coil and the detector described I have no difficulty in tuning to any one of them when they are all broadcasting at the same time.—Yours faithfully,

CHAS. C. WARDROP.

Buenos Aires.

20-METRE RECEPTION

SIR,—I duly note reference made to the reception of U1XAM by a Blackheath amateur in your May 6 issue, and as a constant reader of all your excellent publications, I thought the enclosed list of stations heard on the 20-metre band would be of interest.

I have taken considerable interest in these short waves, and have been doing some exploring since last July, when I was doing some special observation work for F8BF, when he was carrying out tests with an Army station in Morocco on a wavelength of 40 metres. In a previous letter I mentioned about the reception of a harmonic of KDKA on about 10 metres, and since writing I have found KDKA's 2nd harmonic on about 21.5 metres, and both speech and music have been heard very well when conditions were good.

During April I had the opportunity of keeping observation on the conditions of reception from U.S. stations throughout the 24 hours, and some very useful data has been gathered. It is yet rather early to draw any conclusion regarding these ultra short waves, but graphs plotted of signals received are very interesting, and show that there are great possibilities for these short waves when used during certain hours of the day and night. Reception can be carried on up to the time of sunset in the 75th meridian, and transmissions from this country can also be carried out successfully up to that time, but signals fade out from 10 to 20 minutes after sunset. The reception of British stations on 20 metres is a matter of great uncertainty, and here at roughly 220 miles from London I am situated in the zone of inaudibility for a transmitter in London. Those stations which have been received have been most difficult to get even after several repeats, so this will give an idea of the weakness of signals. Yet the signals have been reported in various districts in the U.S. as QSA, and the replies from America have been received here strength R3 to R6. So there is one point rather certain, viz., that the emitted waves from a given point which are travelling in the parallel plane are absorbed before they have covered, say, 200 miles, whilst the waves at practically all angles from the horizontal are reflected to very great distances. The fact that they are reported QSA at a distance of 3,500 miles is certain proof that very little of the initial energy is lost. There is one very interesting point which may be found later on, as to whether there are several points of reflection *en route* giving a number of maxima and minima of signal strength in given areas, and there is one really wonderful record accomplished by G2OD which may later on materially assist in clearing up some of the mysteries relating to these short waves. His signals were received in Australia, but I am rather certain that it would be

a matter of impossibility for an American amateur to pick up the same signals, and I had this in mind before I read the report in the Press about 2OD. It is now necessary to make a complete study of the action of the sun on the atmosphere throughout the whole period of sunrise to sunset, and I am in a real fix, as instead of results turning out as expected, they are quite reversed, and one is going deeper into trouble all the time. But, after all, the observations are most interesting.

I hope these notes on short wave work will be of interest, and I would like you to inform Mr. Alford, who, I understand, is carrying out tests on short wave at midday G.M.T., that every effort has been made here to get his signals, but so far I have been unsuccessful, and no doubt these notes will be of interest to him. If possible I would very much like to hear from this gentleman whether he has received any reports of his test signals having been heard QSA at a distance of 25, 50, 100, and from 250 to 500 miles, then 1,500 to 3,500 miles, and whether he can receive 11RG, and at what strength.

Trusting you will not be offended at my taking this liberty, which is entirely towards advancing the knowledge concerning these short waves.

With best wishes for success for all your publications.—Yours faithfully,

R. E. Williams.

Holyhead, N. W.

P.S.—My reason for asking *re* 11RG is because some London friends to whom I have written report no trace on 20-22 metres, yet he comes through here R5 on Saturdays and Sundays. He is on 10 metres at 1400 G.M.T. Sundays, but I have not been able to listen for him at the time given so far.

First District, U.S.A.—PL, OW, CMP, CKP, CMX, XAM, ASF, KC, SW, YB, HN, TE, BOQ, RD, CXX, SF, ZAD.

Second District, U.S.A.—MU, ZV. BGI, CTF, HIN, CTN.

Third District, U.S.A.—BQ, BZ, ZW.

Fourth District, U.S.A.—DM, SA, XE, TV, UA.

Eighth District, U.S.A.—OW, LL, GZ, TO, BTK, AVL, BUK.

Ninth District, U.S.A.—ZT, XAX, CXX, EFZ, BDW, DAK, CBX, U, NKF.

French, 8SM. Italian, 1RG, 1NO, IDO, Unknown, OCDJ. French, 8BF.

The above stations have been received with o-V-1 receiver from April 9 to date.

9XAX and 1XAM have been heard all hours of the day from 2 p.m. and up to 1 a.m., sending test signals with automatic transmitters.

[Reports have been made of 1XAM being heard at 10 a.m., but according to my observations this is a very freakish reception.]

"THE FOREIGN RADIO TIMES"

Sir,—Allow me to congratulate you in your new venture in *Wireless Weekly*. Of course I am referring to *The Foreign Radio Times*.

I would like to suggest that you include Hilversum and Frankfurt in your list of foreign stations. I am sure that this would be appreciated by many listeners.—Yours faithfully,

A. A. H. Campbell.

Woldingham, Surrey.

AN IMPROVED TWO-VALVE RECEIVER

Sir,—I wish to record my appreciation of the "Improved Two-

Valve Receiver" described by Stanley G. Rattee, M.I.R.E., in the January issue of *Modern Wireless*. On a 72-ft. aerial with 25-ft. lead-in I have received the local station at overpowering strength—the Johannesburg station, JB, is four miles away. I have also got Durban, 487 miles away, at good 'phone strength, and Capetown, 900 miles away, at very good 'phone strength.

I have endeavoured to get Durban and Capetown on two valves for many months, and have tried innumerable circuits without any success. I am therefore exceedingly pleased to get such good results from this set, and have now wired it up permanently, as we have only the three stations mentioned in this country, and I now get them all splendidly.—Yours faithfully,

PHILIP KING.

Johannesburg.

1XAM

SIR,—With reference to the paragraph in *Wireless Weekly* for May 6, 1925, under the heading "Radio Notes and News," which states that Mr. R. W. H. Bloxham picked up signals on 20 metres from 1XAM, I wish to inform you that I received signals from Mr. Reinartz on this wave over a month previous to the date mentioned by Mr. Bloxham. Since then I have been successful in logging no less than 28 amateurs in the region of 20 metres, whose call signs I enclose. Although most of these have been received in daylight, a number have been received as late as 1 a.m. B.S.T., which was then six hours after dark here. As Mr. Reinartz's theory of the "reflection" of these ultra short waves relies on the fact that the signals are "killed" by darkness, and at the time mentioned it must have been dark over a very considerable portion of the route across the Atlantic, it would be interesting to know why the signals are considerably louder after sunset here. Incidentally, I have held since 1922 a permit to transmit on a wavelength of five metres, and although I have experimented considerably with this wavelength, no great distance has been covered. Should any other readers of *Wireless Weekly* be interested in 5-metre transmission work, I should like to hear from them with a view to interchange of ideas.

Wishing your papers the continuance of their present success.—Yours faithfully,

ERNEST A. DEDMAN.

New Malden, Surrey.

United States calls heard by E. A. Dedman on 20 metres during March and April, 1925:—

NKF, 1XAM, 1AS, 1MY, 1OW, 1CCX, 1CKP, 1CMP, 1PL, 1XU, 1PM, 1CMX, 1BOQ, 1II, 1SW, 1MU, 2AXF, 2MU, 2ZV, 3CTF, 3DU, 3APV, 4DU, 4XE, 8GZ, 9CXX, 9XN. Canadian 1AR.

ENVELOPE No. 2

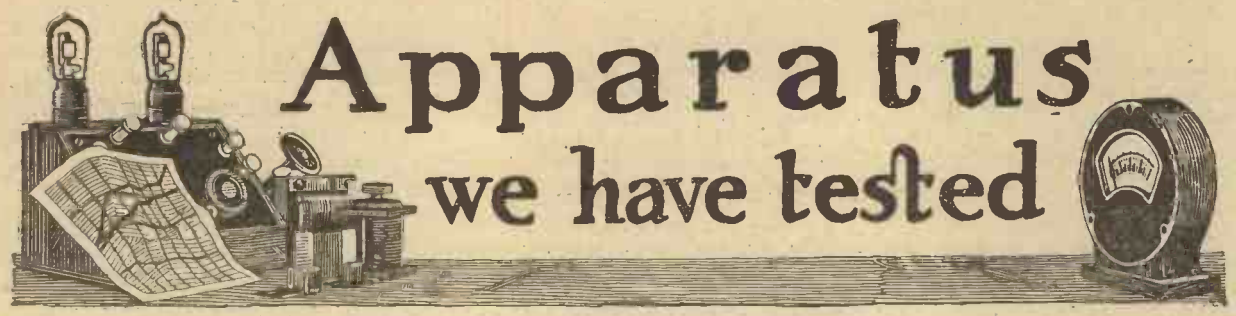
SIR,—I have built the Four-Valve Family Receiver as described in the Radio Press Envelope No. 2, by Percy W. Harris, M.I.R.E., and am highly satisfied with the results obtained.

I am the following distances from the nearest broadcasting stations: Sheffield 12 miles, Nottingham 24 miles and Manchester 50 miles, all of which I can get on the loud-speaker with three valves only working. Madrid, Paris, Brussels, Koenigswusterhausen and Rome I can pick up clearly and with good volume on the loud-speaker, also all B.B.C. stations.

The cost was rather less than that stated in the instructions, although only best quality components were used and fixed on ebonite panel, but the results have exceeded those which Mr. Harris so modestly claimed for it in the instructions.—Yours faithfully,

GEO. H. GODBER.

Shuttlewood, near Chesterfield.



Apparatus we have tested

Conducted by A. D. COWPER, M.Sc., Staff Editor.

Marconiphone Variometer

A sample of the new Marconiphone series-parallel variometer has been submitted to us for test, in which a large wavelength range is covered in one rotation (through 360 degrees) of the rotor spindle, by means of a series-parallel switching device incorporated in the instrument itself. In this a cam on the end of the lower end of the spindle makes a wiping contact with either of two spring brushes, and simultaneously operates a make-and-break switch as it revolves, thus connecting up the stator and rotor windings in series or in parallel at will.

The variometer is of the moulded spherical type, with a composition rotor and an internally wound stator showing exceedingly small clearance. It is arranged for mounting behind the panel by means of four bolts, metal angle plates being provided for this purpose. Small terminals, a good quality bevel scale and knob, secured on a stout spindle by a substantial set-screw, are supplied. The instrument is about $3\frac{3}{4}$ in. diameter, and is 4 in. deep below the panel.

The windings show a large number of turns of fine gauge silk-covered wire, but by the expedient of using the two windings in parallel for the lower wavelength scale the effective resistance is diminished to an extent which enabled this variometer to give, on actual test, a signal strength in crystal reception of the local short-wave station only slightly below the standard "straight" low-loss receiver, the heavy crystal damping largely masking any difference in actual H.F. resistance. The tuning range on a P.M.G. aerial of .0003 μF capacity was from below the wavelength of the Radio-Belg. station to that of 5XX. With valve-panel capacities in addition it covered the range of from 1,000 kilocycles to 180 kilocycles. On trial, with a single-wire 80-ft. aerial of but .0002 μF capacity, the local station came in well on the parallel range, and 5XX (in a N.W. London suburb) at comfortable 'phone strength at about the maximum setting of the series range.

The convenience implied by this arrangement (whereby both the local and the high-powered stations come in on one 360-degree dial without external switching) for everyday reception of broadcasting is manifest.

Ormond Variable Condensers

Messrs. The Ormond Engineering Co. have sent for our test and comment examples of their latest pattern of one-hole fixing variable condensers, with ebonite end-plates, three-plate " vernier " or fine-adjustment feature controlled by a co-axial knob, and of the snail-cam or " square-law " design of plate.

These are handsome well-finished instruments, equipped with substantial terminals and with a fixing-bush long enough to allow some latitude in panel thickness. Substantial stops are provided, a neat, bevel dial, and the concentric knobs and pointer required by the double action. On trial they operated smoothly, showed an excellent insulation resistance, and low losses on ultra-short waves. The capacity of the fine-adjustment part was rather large, however, for comfortable fine-tuning in the reception of KDKA on the ultra-short waves, whilst hand-capacity effects were rather prominent without special precautions.

The maximum capacities were around .0006 μF for the larger type, nominal .0005 μF, with 7-8 $\mu\mu$F minimum, the three-plate part giving a range of around 50 $\mu\mu$F. The smaller type showed a maximum of .000375 μF, with minimum of just under 7 $\mu\mu$F, and a " vernier " range about the same as before.

Fine Adjustment Coil-Holder

A friction-driven, fine adjustment coil-holder of simple design has been submitted by Messrs. Hall & Brenard, Ltd. This is arranged on a small ebonite base (2 in. by $2\frac{3}{4}$ in.) which is to be mounted on a panel by a one-hole-fixing device of the usual pattern, but here reversed, *i.e.*, with the nut below the panel. One coil-holder is fixed on two short pillars; the other rocks on an axis between two other pillars, and is moved by a rubber friction-wheel actuated by a long-handled controlling spindle. The driving roller turns simply in a groove in the fixed plug mount, and could readily be sprung out of position if any undue force was used. The device operated satisfactorily on trial, and best with the spindles vertical, all but the largest of plug-in coils being controlled readily by the fine adjustment device. The insulation resistance proved excellent. Accessible terminals are provided for connections, the usual untidy flex connections being avoided. The device appeared to us to be rather on the light side for regular use.

" Zenith Super Flux "

From Messrs. the Zenith Super Flux Co. comes a sample of their radio flux, described as anti-corrosive. This consists of a yellowish, strong-smelling fluid supplied in a small bottle; the fluid is found on test to be strongly acid and inflammable.

On trial in ordinary soldering operations in a radio set the flux certainly facilitated operations in a surprising manner, and gave a clean, well-tinned iron in a moment. It was necessary to be careful with it on account of its inflammability, and it proved unpleasant when it got on the fingers or elsewhere than on the work itself. With a strongly acid substance, such as this proved to be, it is essential to wash the work carefully after completion, best in water containing an alkali such as ammonia or soda, if subsequent corrosion is to be avoided. The flux should not, accordingly, be used in very critical or inaccessible places in electrical apparatus; for exterior and less exacting work, and for cleaning a badly oxidised iron, this powerful flux has evident application if used with proper care.

Information Department

SUPPLIED BY RADIO PRESS SERVICE DEPT ., LTD.

S.P.R. (SEVENOAKS) has built the two-valve drawing room receiver described by Mr. Underdown in the April issue of "Modern Wireless" and obtains very satisfactory results, but in order to get slightly louder loud-speaking, for dancing purposes, he has attempted the addition of a stage of resistance capacity coupled amplification which is giving trouble. With the three-valve arrangement he is using a general purpose valve for the second stage, and a B4 for the last stage. 100 volts high tension is used on both of these valves. Although the receiver worked satisfactorily as given in the design in "Modern Wireless" the further valve when brought into circuit causes but slight increase in signal strength, and the signals are terribly distorted. Experimenting with the values of grid bias on both of the last valves, merely cuts down signal strength without improving quality.

Evidently from our correspondent's letter the trouble is located in the resistance capacity coupled stage, and not in the receiver, which he says works satisfactorily. Trouble of this nature may be due to wrong connections, a much too high value of grid-leak or, what seems more likely in this case, a broken-down anode resistance. From practical experience we think that the latter cause is the most likely source of our correspondent's trouble, and would advise him to test the anode resistance for a circuit, using telephones and a dry cell. This is readily carried out by connecting one tag of the telephones to one side of a small battery, such as a flash-lamp battery, the free side of the battery to one side of the anode resistance, and tapping the other side of the anode resistance with the free telephone tag. If no plonks, however slight, are heard in the telephones it is definitely established that this component is the offender, and means should be taken to remedy this. Should the anode resistance be found to be defective, the substitution of a new one will cure the trouble. If, however, the trouble is not located in the anode resistance the effect of changing the grid-leak for one of smaller value should be tried. As low a value as ¼ megohm may often be used with advantage in this position. It should also be remembered that the value of grid bias applied to the second valve—that is, the last valve in the two-valve receiver—will be less than

when no resistance-coupled stage is added. This is due to the fact that with an anode resistance in the circuit of any valve the actual value of high tension applied to the plate of this valve is decreased by the drop in voltage across the anode resistance.

F.C. (SOUTHEND) has constructed the Loose-Coupled 3-valve Neutrodyne receiver described by Mr. Harris in "The Wireless Constructor" for November, and complains that the set is noisy, a continuous crackle being heard, and that no setting of the Neutrodyne condenser will give complete neutralisation. He states that in place of the normal Neutrodyne unit he has constructed two duolateral coils of 50 turns each which he has thoroughly impregnated with paraffin wax and bound closely together. The ends of these coils he has taken to an old valve base and plugged this in place of the Neutrodyne unit.

With reference to our correspondent's trouble with noisiness in his receiver, this may usually be traced to a number of causes, but the first offender to suspect is the high-tension battery. If this is old, we would advise that for a first test a new battery be substituted. If this fails to cure the trouble, next pay attention to the panel and see that no flux is sprayed on this. Surface leakage due to the presence of flux on a panel will often give rise to noisiness in a receiver, which naturally disappears when this is thoroughly removed. Poor insulation between primary and secondary windings of the L.F. transformer would also account for the trouble, and if another transformer is available, which is known to be working silently, we would advise that this be substituted in order that the trouble may be located by the process of elimination. Attention should also be paid to valve legs, and these should be cleaned and opened if necessary with a pocket knife.

With regard to the trouble of lack of neutralisation with the coils mentioned we would first advise that the windings to one coil be reversed, and if this does not cure the trouble the effect of separating the coils be tried. For effective neutrodyne stabilisation it is essential that magnetic and not capacitative coupling should be obtained, and the fact that the coils have been thoroughly impregnated with paraffin wax may have brought up the mutual capacity to a sufficiently high value to prevent complete stabilisation being obtained. In extreme cases where two coils of this type have been used, it is sometimes found necessary to separate these almost to an angle of 45 degrees before the set can be completely neutralised. This trouble is in all cases remedied when coils of really low mutual capacity are used, and the correct relation between the two coils obtained.

G.F.D. (LONDON, W.C.) contemplates the construction of a supersonic heterodyne receiver, and with a view to keeping down complication does not wish to tune the intermediate stage transformers in his set. He asks us whether it is essential that these transformers be variably tuned and the object of so doing.

Providing that special matched transformers are obtained for the intermediate stages of a supersonic heterodyne receiver it is not essential that these should be variably tuned. The object of so doing is that the particular wavelength to which the intermediate transformers are tuned may be altered if interference is picked up directly on this part of the set. In practice it is found that the intermediate stages of these sets occasionally tend to pick up long wave signals from various commercial stations, and when such interference is received it is advisable, of course, to be able to select another wavelength. By providing variable tuning for the intermediate frequency transformers this may readily be done.

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Intensified tuning— with LISSENAGON COILS

LIKE the narrow, concentrated beam of a searchlight—that's how LISSENAGON COILS TUNE—so sharply and so strongly, because each coil is designed and made to respond to a certain band of frequencies "within the beam," and to bar out all other frequencies.

They are essential coils for the experimenter, who wants coils that tune without loss of energy—coils that tune so sharply that they bring in distant stations that cannot be heard as soon as any other make of coil is plugged in.

Hold a LISSENAGON COIL up to the Light.

LISSENAGON TUNING CHART

TABLE I. Wavelength range when used as Primary Coils with Standard P.M.G. Aerial and .001 mfd. condenser in parallel.			TABLE II. Wavelength range when used as Secondary Coils with .001 mfd. condenser in parallel.		
No. of Coil.	Minimum Wave-length.	Maximum Wave-length.	Minimum Wave-length.	Maximum Wave-length.	PRICE.
25	185	350	100	325	4/10
30	235	440	130	425	4/10
35	285	530	160	490	4/10
40	360	675	200	635	4/10
50	480	850	250	800	5/-
60	500	950	295	900	5/4
75	600	1,300	360	1,100	5/4
100	820	1,700	500	1,550	6/9
150	965	2,300	700	2,150	7/7
200	1,885	3,200	925	3,000	8/5
250	2,300	3,800	1,100	3,600	8/9
300	2,500	4,600	1,400	4,300	9/2

The user of LISSENAGON COILS has a immense advantage on distant telephony. An while LISSENAGON COILS are more efficien than any other, they are freely interchangeabl with them.

A Condenser that combines all capacities—

1. It is a condenser which is immune from stray capacity effect—a station 1,000 miles away could be tuned in with the hand actually around the condenser, and perfect, exact tuning accomplished.

2. It has a negligible minimum—so small indeed that it can hardly be measured. YET IT HAS A MAXIMUM OF .001 rated (actually it is more than this).

3. Can be used as a vernier, a .00025, a .0005, a .001, or where any capacity is specified between a negligible minimum and .001 maximum.

4. Tunes through 710 degrees of scale.

5. POINTER MAKES TWO REVOLUTIONS—on the first revolution the change of capacity is small—use it, therefore, as a vernier on the first revolution. On the second revolution the changes of capacity are quicker and more critical.

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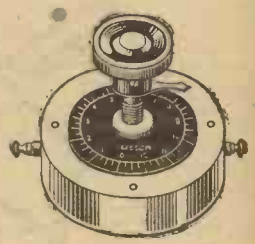

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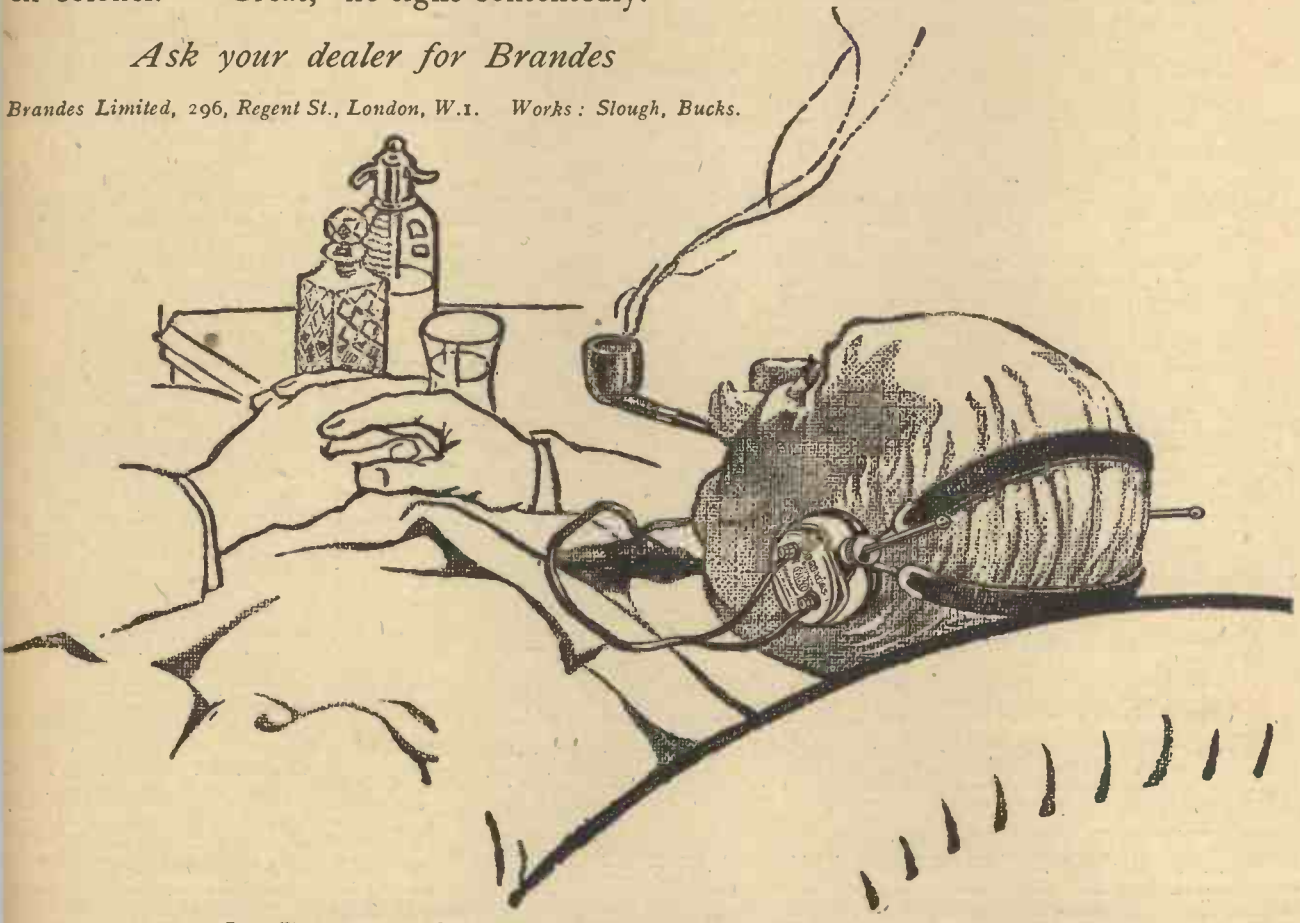

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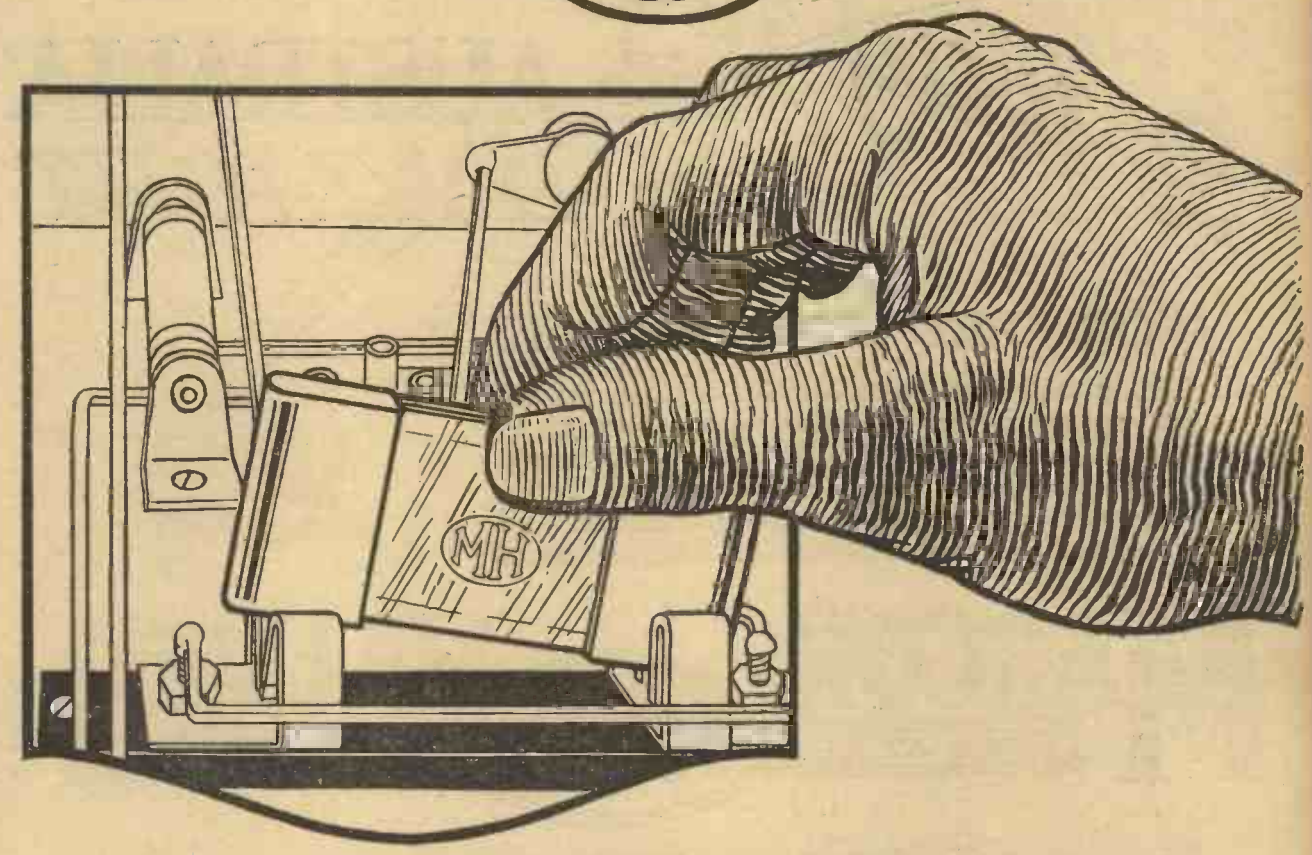


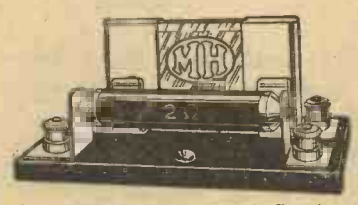
FIXED CONDENSERS

OF EVERLASTING SERVICE.

Over a month's immersion in salt water did not impair the insulation of a shipment of MH Fixed Condensers which went down in the S.S. Port Nicholson. You can therefore be confident when including these components in your receiver that you will get everlasting service from them. They are made of the finest materials and are robustly constructed. The method employed of mounting them in clips makes them instantly interchangeable, a valuable feature when undertaking experimental work. All capacities are standard in size.

PRICES—

Any values from 0·001 μF to 0·0001 μF .. **1/9** each. | Any values from 0·01 μF to 0·002 μC .. **2/3** each.
(Two clips with each.)



Grid Condenser and Leak mounted together on ebonite base, 4/- each.

Are you satisfied with the quality of your reception?

If it does not seem to be all it should be, a poor or faulty Grid Leak or Anode Resistance may be the cause. Difficult control and a noisy background may result, the last as a constant hissing noise that cannot be got rid of.

You can cure any trouble of this nature at once by fitting MH Grid Leaks or Anode Resistances as required in your set. Their actual value is that marked on each and they are constant,

Grid Leak, all values, .. 2/- Anode Resistance, all values, 2/6
Each with Two Clips.

Handsome cases containing the following components can be obtained :—Grid Leaks. 1 MΩ and 2 MΩ, Anode Resistances, 80,000 and 100,000 ohms. Condensers, one each, 0.0001–0.0003–0.001–0.003–0.005–0.01μF. Four clips for Leaks or Resistances and four for Condensers. PRICE **21/-**

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MARCONI VALVES

MADE AT THE OSRAM LAMP WORKS

(Wavelength 22 metres, i.e., Fourteen million cycles per second.)

What Mr. Simmonds says:

"... This was accomplished with the T.250 Valve you recently supplied to me, and is, I think, ample evidence of its efficiency and suitability for these frequencies. D. E. Q. Valves were also used for reception."

(Signed) **E. J. SIMMONDS**
G.2.0D

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TYPE	DESCRIPTION	OLD PRICE	REDUCED PRICE
For 2-Volt Batteries			
D.E.R.	General purpose	18/-	14/-
D.E.6.	L.F. Amplifier	22/6	18/6
For 4-Volt Batteries			
D.E.Q.	Detector	35/-	27/6
R.	General purpose	11/-	8/-
D.E.3.	General purpose	21/-	16/6
D.E.3.B.	L.F. Amplifier .... (for resistance capacity)	21/-	16/6
D.E.4.	L.F. Amplifier	26/-	22/6
For 6-Volt Batteries			
R.5.V.	General purpose	11/-	8/-
D.E.5.	L.F. Amplifier	30/-	22/6
D.E.5.B.	L.F. Amplifier .... (for resistance capacity)	30/-	22/6
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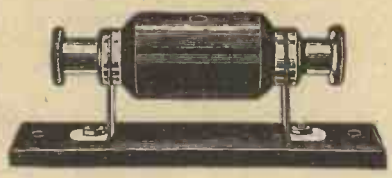
Announcement of The M.O. Valve Co., Ltd.

It will pay you always to watch WIRELESS WEEKLY *Advertisements.*

Protect your set against lightning



Not only your set but your home also. It is very important that every precaution be taken against lightning — the fullest possible protection should be secured.

THE "DUCO" LIGHTNING ARRESTER

permits instruments to be operated with perfect safety. Should a "charge" accumulate on the aerial whilst the set is receiving the "Duco" Lighting Arrester will immediately discharge it to earth.

List No. RA96/50. Large pattern. 3/6
„ RA96/51. Small „ 2/3

A neat and necessary fitment you cannot safely do without.

Ask your Wireless Dealer for the "Duco" Lightning Arrester

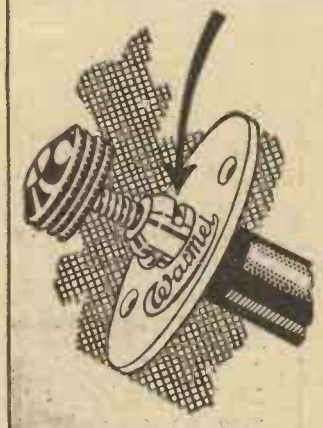
Brown Brothers Limited

— *Allied Companies* —

THOMSON and BROWN BROTHERS, LTD.
BROWN BROTHERS (Ireland), LTD.
Wholesale only. *Head Offices and Warehouses:*
GREAT EASTERN STREET, LONDON, E.C.2.
118, GEORGE ST., EDINBURGH. And Branches.

SURPRISING—

the difference this can make to your reception!



IN everything it is true that the little things count. In radio most certainly. This we realised when designing the Watmel Variable Grid Leak, with the result that the special attention given to details in its construction makes it perfection. Take, for instance, the improvement illustrated.

A small but strong D-shaped spring fixed to the collar compresses against the controlling plunger. This spring is an exclusive feature of the Watmel, and its purpose is to ensure that perfect electrical contact is maintained even after constant use.

It's a little thing, but it makes all the difference and is much appreciated by the many Watmel users. They find it gives just the final touch needed to bring in Broadcast that is full of tonal quality. Its reputation amongst radio experimenters for consistent reliability is unequalled. Therefore, if you want the best Grid Leak obtainable you must buy Watmel.

If you are troubled with poor results pay particular attention to the working of the Detector Valve. Reduce the H.T. voltage consistent with good volume and incorporate a WATMEL Variable Grid Leak.

Send P.C. for Descriptive Folder.

5 to 5 Megohms .. 2/6
50,000 to 100,000 Ohms 3/6

WatMel

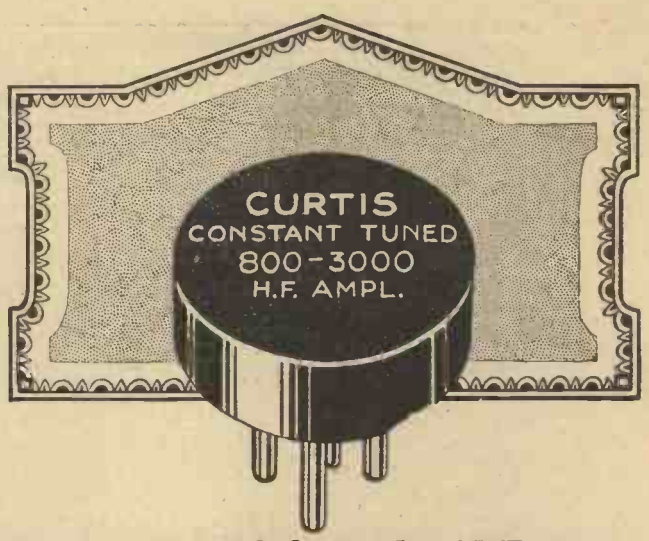
All goods of our manufacture bear this mark. It is your only guarantee.

The WATMEL WIRELESS CO. LTD.

332a, Goswell Road, LONDON, E.C.1

Telephone - - - - - - *CLERKENWELL* 7990

Barclays 1140



Dispensing with Control in H.F. Stages

CURTIS CONSTANT-TUNED (Aperiodic) H.F. AMPLIFIER

Automatic Tuning—*No Condenser required.*
As used in DUODYNE and CURTIS Circuits.

The use of one or more H.F. Stages (whether Tuned Anode or Transformer Coupled) introduces further tuning controls which complicate the operation of the receiver.

Self-oscillation is almost incontrollable with sharply-tuned circuits resulting from the use of tuned transformers with steep resonance peaks.

The employment of the Curtis Constant-Tuned (Aperiodic) H.F. Amplifier introduces the desired effective control. THESE RESPOND TO AND GIVE EQUAL AMPLIFICATION OVER A DEFINITE BAND OF FREQUENCIES. In operation, it increases selectivity by giving a very smooth control over self-oscillation and, obviously, by permitting the safe use of more reaction.

An aperiodic stage, of course, requires no tuning control. This is the great utility of the Curtis Constant-Tuned (Aperiodic) H.F. Amplifier. As many as four H.F. stages are effective if coupled in this way. The first input and the last output circuits need only be tuned. While the Curtis Constant-Tuned (Aperiodic) H.F. Amplifier gives all the amplification required—the working of an H.F. Receiver is so simplified that a child could tune it.

"Using a Curtis Amplifier and the Duodyne Circuit, I receive all British stations with an indoor aerial on a set made by myself."—J. S., Tufnell Park.

For Super Heterodynes

Tuning Out Long Wave Interference

The Type C Curtis Constant-Tuned (Aperiodic) H.F. Amplifier is designed to respond to and give equal amplification over a band of frequencies ranging from 2,000 to 7,000 metres and is particularly suitable for the Intermediate Frequency Long Wave Amplifier of Super Heterodynes.

By reason of the high sensitivity of this type of receiver, long wave C.W. is picked up on the long wave side causing considerable interference. Such devices as completely shielding the receiver do not entirely overcome it.

It is extremely difficult to tune out this powerful interference—in fact, unless each separate stage of the Intermediate Frequency Long Wave Amplifier is tunable it cannot be tuned out.

By using the Curtis Constant Tuned (Aperiodic) H.F. Amplifier no difficulty is experienced. The Long Wave Amplifier should be designed with a tuned filter (or transfer) circuit and the remaining stages to incorporate the Curtis Constant Tuned (Aperiodic) H.F. Amplifier Type C.

These are aperiodic stages and are untuned. Should the intermediate frequency pick up long wave interference it may be tuned out by only retuning the filter circuit. Over the prescribed waveband (2,000 to 7,000) the Curtis Constant-Tuned (Aperiodic) H.F. Amplifier will respond to the new frequency and give an equal amount of amplification.

An H.F. Valve employed in front of the first detector gives increased selectivity. The most efficient coupling is The Curtis Constant-Tuned (Aperiodic) H.F. Amplifier (Type A) which gives good amplification and aids selectivity without adding another tuning control. Lastly, its design removes the necessity for potentiometer grid control.

Full information and diagrams can be obtained upon request.

Type A, 300 to 800 metres. Price 15/-

Type B, 800 to 3,000 metres. Price 17/6.

Type C, 2,090 to 7,009 metres. Price 18/6.

Type C is especially designed for Super Heterodynes.

The Curtis Constant-Tuned (Aperiodic) H.F. Amplifiers are obtainable from all dealers. If you have any difficulty please send direct, giving name and address of dealer who could not supply.

Sales Organisation: **PETER CURTIS, LTD.**

in association with THE PARAGON RUBBER MANUFACTURING CO., LTD., HULL.

75, CAMDEN ROAD, N.W.1.

Telegrams: "PARACURTEX." *'Phone:* NORTH 3112.

BIRMINGHAM: 76, Newhall Street. Central 7236
MANCHESTER: 312, Deansgate Central 5095

Ping! and never a discord from the Loud Speaker

EVER since the first Dull Emitters were used, wireless enthusiasts knew that microphonic noises seemed inevitable. A touch on the table—an adjustment of a rheostat—even vibration set up by passing traffic—and a succession of discords would mar the pleasure of otherwise perfect Loud Speaker reproduction.

So acute has become this problem of preventing microphonic noises when Dull Emitters are used that various ingenious shock-proof valve holders are on the market. All these devices are merely the outcome of an endeavour to eliminate harmful vibration. They are just an effort to improve an admitted defect.

But there is now available a Dull Emitter which does not need the aid of any form of shock-proof valve-holder—the new Cossor Wuncell. And here microphonic noises have been completely banished by the simple expedient of improving the design of the valve itself.

Everyone should know that these noises are principally caused by the vibration of two parts—the filament and the Grid. In the ordinary Dull Emitter the filament is long, straight and slender. It is usually supported in a vertical position and kept taut by means of two electrodes sprung apart. The Grid is generally a spiral of wire. With such a design, therefore, the risk of vibration is very grave.

But the Wuncell employs an entirely different principle. Its filament is arched and stayed at its centre by means of a third support. Its Grid is also arched in formation and built up on a stout metal grid band—each turn of the wire being anchored in three distinct places. The result is that the Wuncell is to all intents and purposes quite vibration-proof. The technical staff of *Amateur Wireless* reported that "... the valves are entirely free from microphonic noises. In fact no disturbances were heard when the bench on which the Valves were placed was thumped hard"

But the absence of microphonic noises is only one distinctive feature of the Wuncell. Every user marvels at its wonderful sensitiveness, its unprecedented volume and its exceptionally long life. If you have not yet investigated its merits see your Dealer about it at once, or write to us for interesting descriptive literature.

Wuncell Dull Emitters

Types W1, W2 & W3

W1 is the Detector Valve, W2 (with red top) is the H.F. amplifier specially designed for long-distance use. W3 is the new Cossor Loud Speaker Valve. All function at 1.8 volts.

Types WR1 & WR2

To enable users of multi-valve Sets to try out Wuncells along with their existing bright emitter valves from a 4- or 6-volt accumulator, we are also supplying them with a resistance incorporated within the base. In all other respects the WR1 and WR2 correspond exactly to the W1 and W2. When not required, the resistances can be short-circuited and the valves operated at their normal voltage of 1.8 volts.

Technical Data:

Filament voltage, 1.2 to 1.8
Fil. consumption, .3 amps.
Plate voltage, 20 to 80

Important Reduction in Prices of all Cossor Valves

Bright Emitters:

	Old price	New price
P1	11/-	8/-
P2	11/-	8/-

Wuncell Dull Emitters:

W1	18/-	14/-
W2	18/-	14/-
WR1	20/-	16/-
WR2	20/-	16/-

Loud Speaker Valve:

W3	22/6	18/6

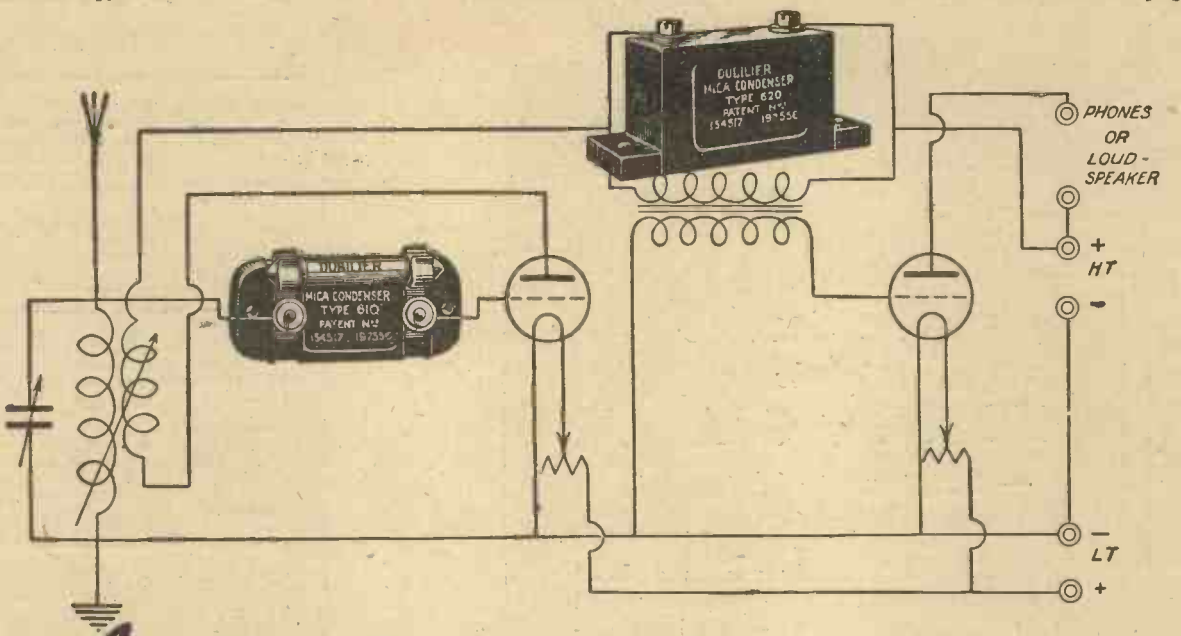
A. C. Cossor, Ltd.,
Highbury Grove, N. 5

— the long life Dull Emitter

Cossor Wuncell

Gilbert Ad. 2891

It will pay you always to watch WIRELESS WEEKLY *Advertisements.*



Little things that matter!

It has always been difficult to pick out the little things in life that matter. It takes accountants to find the little errors in accounts; engineers those little failures in a machine that mean so much; and experts to tell what is really wrong with an inefficient wireless set.

This last is always a troublesome affair; a number of very minor defects and mal-adjustments, each insignificant in itself, may together make a good set apparently useless.

For example: condensers, which are really essential in EVERY set, can, if defective, cause rapid exhaustion of H.T. Batteries, and in a grid circuit, they can prevent the grid from reaching its maximum efficient potential, thus weakening the signal strength.

It always pays to have the best, in Wireless as in everything else. That is why, for condensers for all purposes, it is wiser to

Specify Dubilier

Type 610
For all purposes of Wireless Reception. Fitted with screw terminals & detachable Grid Leak Clips.

Type 620
Similar to Type 610 but for vertical panel mounting.

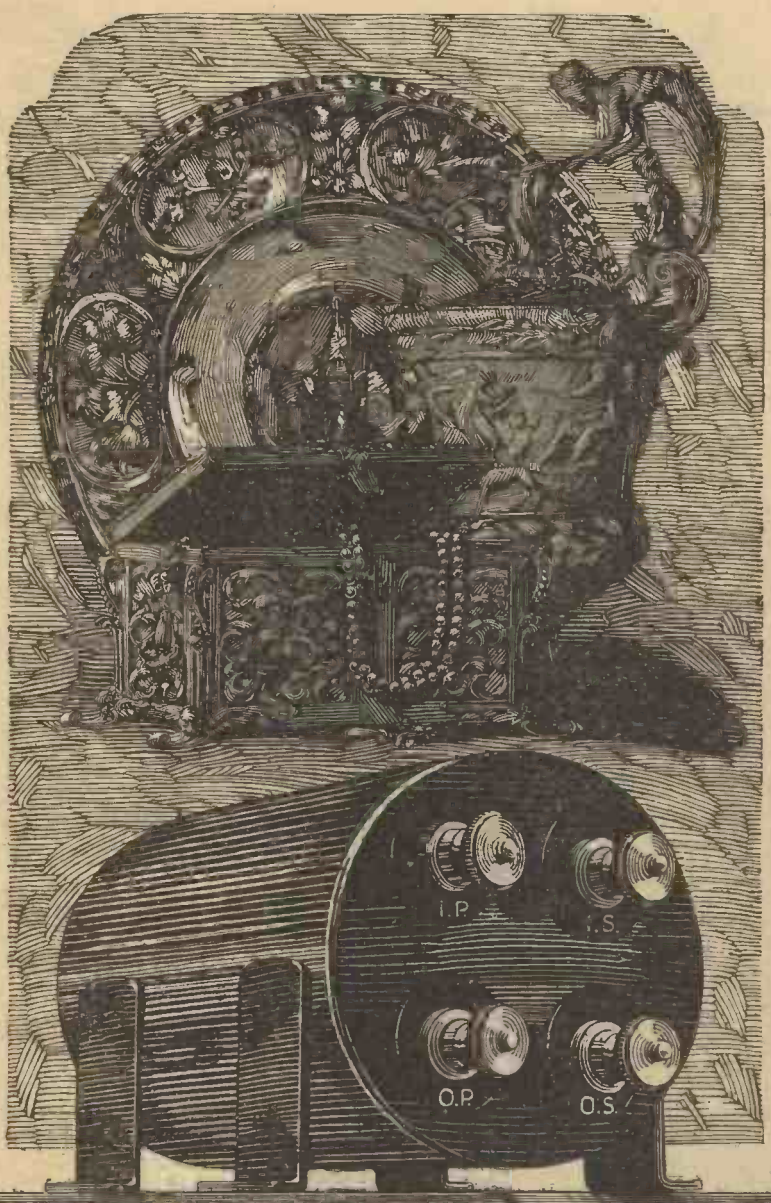
In capacities of
0·0001—0·0009 mfd. 3/-
0·001—0·009 mfd. . 3/6
0·01 mfd. 4/-
0·011—0·015 mfd. . 4/6

DUBILIER CONDENSER CO. LTD

ADVERTISEMENT OF THE DUBILIER CONDENSER CO., LTD., DUCON WORKS, NORTH ACTON, LONDON, W.3. TELEPHONE: CHISWICK 2241-2-3.

E.P.S.139

Wireless Weekly Small Advertisements.



A treasure indeed

JUST as the connoisseur—skilled in the art of choosing the genuine and discarding the false—takes a keen delight in acquiring the treasures of the past, so the radio enthusiast of to-day demonstrates an equal acumen by selecting the Eureka. A design that is basically correct, coupled with superb workmanship, are the two features which have enabled the Eureka to reach a standard of perfection entirely without parallel. To the critic and lover of fine music it comes as a treasure indeed.

EUREKA

Advertisement of Portable Utilities Co., Ltd., Fisher Street, London, W.C.1. G.A. 2899.

The Crystal Set Loud Speaker

IF your Crystal Receiver gives signals that are loud enough to be heard with the headphones held 12 inches from the ear, it will work a Crystavox Loud Speaker. With the Crystavox there are no valves to buy and no accumulators to be continually recharged. First cost is last cost—the only maintenance is the replacement once every six months or so of a small inexpensive Dry Battery.

The Crystavox is a full size Loud Speaker giving sufficient volume to fill a room of average size with clear mellow tone free from the distortion that is often inherent with every Valve Set. For economy of upkeep and purity of tone it is entirely without equal. See your Dealer about it to-day.

£6 : 0 : 0

S. G. BROWN LIMITED
Victoria Road, N. Acton, W.3

Showrooms:

19 MORTIMER STREET, W.1
15 MOORFIELDS, LIVERPOOL
67 HIGH ST., SOUTHAMPTON

Brown

G.A. 2896.

Electradix Radios

Our New Spring Catalogue of Bargains now Ready.

75 pages and 214 illustrations of Famous Apparatus at Low Prices.

R.A.F. Steel Masts, 5/- per 10 ft. Earth Spikes, 1/3. Mats, 15/-. Accumulators, 4v. 10a., 10/-. Battery Chargers, AC to DC, £4 10s. Cabinets and Panel, 9/6. Bells, 1/6. Power Buzzers, no contact, 1/3. Coupling Condensers .03 mfd., 1/6. Crystal Sets with phones, 12/-. 1,000 ohm. Chokes, 1/6. Gen. Radio 15/-. Variometers at 9/6. Heterodyne Blocks, 4/6. 1,000 volt Megger Hand Generators, £8. 2½ h.p. Douglas Engines, £12. Portable 2-range E.E. Substandard Meters, £5/-. Tinsley Mirror Galvos., £3 10s. Morse Keys, 2/6. Pressure Gauges, 8d. Angle Telescopes, 7/6. Receivers: 2-valve Marconi, 40/-. 3-valve Aircraft, £3 10s. 5-valve, £5. Morse Recorders, £7 10s. Panel Potentiometers, 600 ohms, 4/6. Resistance Units from 6d. Switchboards, 20/-. Ammeters and Voltmeters, all sizes, new. Dewar Switches, 2/6. Fila. Auto Control, 15/-. Loudspeakers; T.M.C., 16/-. Pleated Paper, 2/6. Sullivan Phones, 5/6 pair. F. Thomson-Houston, 14/-. Continental, 10/-. Transformer and Micro., 5/6. Navy Inter-valve, 6/6. Transmitters, Spark, 15/6. 1-valve, £4 10s. 10 in. Marconi Spark Coil, £7. Valves, Dull Emitters, 12s. 6d. Bright, 5/6. Rubber Flex, 1d. per yd. Phone Extension Wire, 100 ft., 1/-. Wavemeters, Townsend Broadcast, 60/-. Forward Short-wave, £4. Chatterton's 4-oz. Slides, 1/-. Protractors in case, 7/6. Electric Soldering Irons, 12/6.

MORSE RECORDERS

For the experimenter; simple in use, enable high-speed messages on any wavelength to be recorded and read at leisure. Magnificent British work, solid brass case, fine finish. Mahogany base with drawer for tape reel. Cost £50 each, are guaranteed perfect order. Such instruments are rarely obtainable and never before at our price. Make wireless interesting outside broadcasting hours. Work off three-valve set with relay. Instructions with each recorder. Price £7 10s.

200-WATT MIDGET ALTERNATORS 52A.

The most perfectly made little Generator used on aircraft, gives 500 cycles 10 volts 20 amps. Weight 7½ lbs., in aluminium cover. The Generator of **unlimited possibilities.** Unused and fully guaranteed

52A £3 10s.

MILLIAMMETERS, 25/-. 2-RANGE VOLTMETERS, 10v. and 100v., 12/6.

We are instrument Specialists and have the finest stock of Laboratory, Precision and Panel Instruments for every purpose. A few from our List are shown here. Prices a fraction of Cost.

0-10 m/a. 25/-

Elliott 4-range Laboratory. £5

French All in World Beater Sets. 52/6

Micro-ammeter. £3

Wheatstone Bridges, 45/-. Meggers, £5. Capacity Bridges, 0-10 mfd., £8

2,000 volt Condensers. 50/-

G.P.O. Test Sets, 4-range. £3 10s.

Dull Emitter D.E.C. 12/-.

New Osram "C" Valves, Low Loss Type, 5/-.

24/- for six.

Adapters, 4-pin. 1/-.

D.C. DYNAMOS.

12v. 8a	60/-	H.T. 750v.	£12
H.T. 350v.	£4	,, 1,200v.	£22
2 kw. 2,000v.	£35		

Rubber Battery Leads. 1/- pair.

VALVE RECEIVERS AND AMPLIFIERS

H.F., L.F. and Super-Heterodyne.

2-Valve T.B. in case (Valves extra)	£2 0 0	6 v. H.F. and L.F. (Valves extra)	£5 10 0
3-Valve Mk. IV L.F. ,,	£3 0 0	5 v. H.F. C. Type ,,	£4 10 0
6-Valve T.M. L.F. ,,	£6 0 0	7 v. H.F. and L.F. ,,	£5 17 0
3-Valve M. IV H.F. ,,	£2 10 0	7 v. No. 55 Marconi, less valves	£8 0 0

AERIAL WIRE. 7/23 copper, 50 ft., 10d. 100 ft, 1/8; 110 ft. cartridge aerial, 1/3. Morse practice outfits, 5/6. 25,000 pairs zincite-bornite crystals in Perikon cups, 6d. pair. Folding frame aerials, 21/6. Copper strip aerials, 2/6 per 100 ft. 7/22 enamelled, 3/- per 100 ft.

These are a few items from our Bargain Catalogue. It will pay to send 4d. stamps for this at once if you cannot call at our showrooms at the Minories.

LESLIE DIXON & CO.

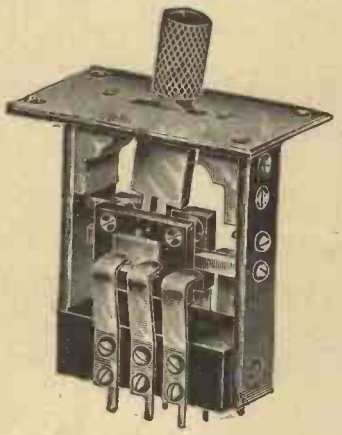
9, COLONIAL AVENUE, MINORIES, E.1.

Telephone—Avenue 4166. Telegrams—Electradix, Ald.

EFESCA

WIRELESS COMPONENTS

Efesca Wireless Components are designed by Radio Engineers of many years' experience, and represent the highest standard of British workmanship. They combine maximum efficiency with absolute simplicity of application, and are the ideal of home constructors.



Used in the new Crystal Change-over Set designed by Mr. Percy W. Harris as described in the "Wireless Constructor" for June.

The self-capacity of the Efesca Anti-Capacity Switch is nil. Self-capacity when dealing with Radio Frequency Currents in Crystal or Valve Circuits is fatal to efficiency. In Crystal reception particularly you have no Current you can afford to waste. Therefore conserve it by using the Efesca Anti-Capacity Switch.

PRICE 8/- each.

Specially suitable for the Change-Over Crystal Set designed by Mr. Percy W. Harris.

As permanent as it is possible to make a Detector. The construction is such that an accidental jar or vibration will not disturb the contact, and in consequence the Detector will remain stable for months without adjustment.

PRICE—complete as illustrated 6/- each.
Detector with Clips only 5/- each.

Of all Ironmongers, Electricians, and Wireless dealers. Wholesale only.

FALK, STADELMANN & Co., Ltd.,

Efesca Electrical Works, 83-85-87, Farringdon Road, London, E.C.1.

And at Manchester, Glasgow, and Birmingham.

Write for Catalogue No. 522 showing full range of Efesca Components and Efescaphone Wireless Receiving Sets.

SELECTION FROM CONTENTS

The "Change-Over" Crystal Receiver.
By Percy W. Harris, Editor.

A Three-Valve Tuned Anode Receiver (free blueprint given).
By John W. Barber.

A Selective Three-Valve Set with "Split-Secondary" Tuning.
By C. P. Allinson.

A Useful Filter for Your Loud Speaker.
By John Underdown.

Wireless on the Map.
By Stanley G. Rattee.

Some Interesting Experiments with a Single-Valve Panel.

More About Crystals. Opera and Broadcasting. Etc., etc.

6D MONTHLY
RADIO PRESS

Facts

¶ "The Wireless Constructor" is bought by over a quarter of a million Experimenters, Amateurs, Constructors, Experts, Theorists and Beginners. It has therefore the largest circulation of any wireless magazine published in the British Isles. Why is this?

¶ Because—"The Wireless Constructor," as its title implies, satisfies all the requirements of the man who builds his own receivers.

¶ Because—the complete details given in the constructional articles enable even the veriest novice to make successfully the sets described.

¶ Because—these sets are so designed that only the smallest possible number of tools is needed, thus making construction a cheap and easy matter.

¶ Because—not only are there articles which appeal to the beginner, but the expert, too, will find much that is of interest to him.

¶ Because—every care is taken to ensure the technical accuracy of the articles that appear in its pages, so that the novice knows that he is on the right path.

¶ Because—it has done more to assist those interested in receiving broadcast reception than any other radio publication.

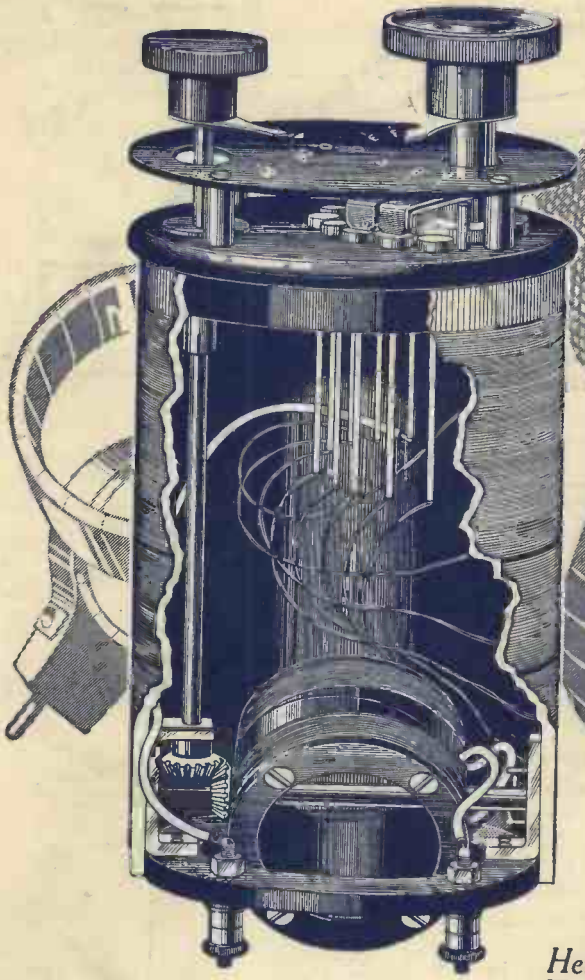
¶ Because—it is produced and published by Radio Press, Ltd., whose whole energies are devoted entirely to supplying reliable radio information and instruction.

¶ ***And because***—at the price of 6d. a copy, it presents value for money that cannot be equalled.

If you have not yet seen this splendid issue, be sure and buy a copy now.

ONLY SIXPENCE MONTHLY
ON SALE AT ALL BOOKSTALLS & NEWSAGENTS

The Wireless Constructor



Better than a complete set of coils

R.I. adds yet another success to its list of wireless components for the perfection of wireless reception.

Here we have a sectional view of the new **R.I. Aerial Tuning Inductance with variable Aerial Reaction** *designed for panel mounting and covering a wavelength range of from* 175—4,000 *metres.*

The unit is better and in addition is cheaper than a complete set of coils.

It comprises a cylinder of paxolin on which is wound a number of turns of silk-covered wire, with eight tapping points leading to a special dead end switch fitted in a panel, which is secured to one end of the cylinder. The aerial reaction is operated from the front of the panel by means of a fine bevelled gearing which gives a beautiful smooth action, allowing adjustment to the finest degree. A large black ebonite dial, suitably engraved with two scales, one indicating the tapping points and the other degrees of reaction, is supplied with each instrument and can be used as a drilling gauge for fixing the unit to the panel of the receiving set.

This R.I. component ensures correct and efficient aerial reaction over the entire range of wavelengths in a manner almost impossible with plug-in coils.

The special dead end switch entirely eliminates all energy loss, and when used in conjunction with a variable condenser it practically forms a complete receiving circuit.

Price **39/6**

Write for leaflet W.W. free on application.

R I LTD

12 HYDE ST NEW OXFORD ST LONDON W.C.1.

Contractors to the Admiralty and all Government Departments.

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Wireless Weekly, 6d. Net. Wednesday May 27th, 1925

Wireless Weekly

Vol. 6. No. 8.

RECEPTION ON 20 METRES AND BELOW

By A. D. COWPER, M.Sc.

Give your set a fair chance of showing its powers

PEOPLE who wear unsuitable spectacles do not see things in their true perspective. To them there is no " depth " in a country landscape, and they cannot see the distant hills. Bright colours appear flat. What a difference properly made spectacles make! Everything becomes intensified, colours appear natural, and hitherto unseen details show up clearly.

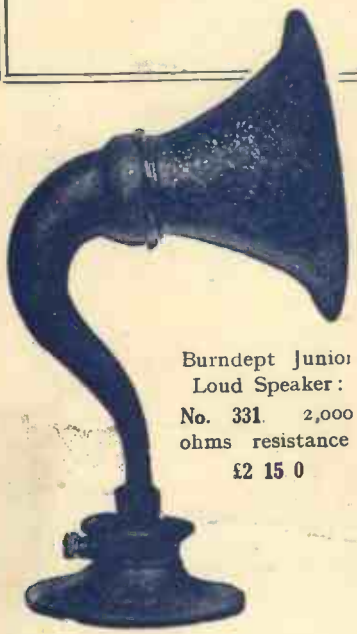
A very similar thing happens when you use a good loud speaker with your set for the first time. Music, once distorted becomes deep and rich, and the most delicate harmony is brought out. All sounds are recorded in their " true perspective " and your set has a fair chance of showing its powers.

Go to the local Burndept Agent and ask him to let you hear the Ethovox and the Burndept Junior Loud Speakers. One of them will certainly suit your requirements.

The Ethovox, which has a pleasing, mellow tone, gives great volume without distortion. It is most handsome in appearance, being gracefully shaped and coloured a warm mahogany shade. It is 26 inches in height. The diaphragm is adjustable.

The Burndept Junior Loud Speaker will give sufficient volume to fill an average-sized room. It is clear and sweet in tone. The adjustable diaphragm is of the " floating " pattern. A neat black crystalline finish gives this instrument a distinctive appearance.

Ethovox Loud Speaker:
No. 203.
120 ohms resistance
No. 204.
2,000 ohms resistance
£5 0 0



Burndept Junior Loud Speaker:
No. 331. 2,000 ohms resistance
£2 15 0

The comprehensive Burndept range includes everything for radio reception, from components to complete installations.

BURNDEPT
WIRELESS LIMITED

Head Office: **Aldine House, Bedford Street, Strand, London, W.C.2.**

Telephone: Gerrard 9072. *Telegrams*: Burndept, Westrand, London.

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Radio Press Ltd Bush House, STRAND W.C.2

EDITED BY JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

An Attempt to Solve a Grave Problem.

FOR some little time paragraphs of a somewhat sensational nature have been appearing in the daily Press, from which it might be inferred that drastic steps are about to be taken to abate the oscillation nuisance. Of the gravity of the problem presented by the carelessly handled reaction set, no one who makes any attempt to listen to the distant stations can have any doubts. It is impossible for any one observer to form a true estimate of the prevalence of the trouble, but reports from the large centres of population show that if the nuisance is not actually increasing it is certainly not diminishing.

Of the acuteness of the problem there is no need to speak, and any serious attempt to combat it is worthy of attention. The Press mentions to which we have referred have been somewhat alarmist in their tone, and the reader is left with the impression that serious disciplinary action is about to be taken by the Post Office. We understand, however, that the scheme which is about to be put into operation is in the hands of the Radio Association, and that its object is not the harsh one which might be inferred from such headlines as "Howlers to be Tracked Down and Prosecuted."

Many attempts have been made to improve the position by propaganda methods based upon disciplinary action, appeals to those who mishandle their sets and so on, with no very great success. The relative failure of such methods points to the conclusion that the real cause of the trouble is not to be found among the very small minority who use their sets with a wilful disregard for the annoyance that they cause their neighbours, but among relative novices who have built sets and possess perfectly easy consciences, simply because they do not realise that they are the offenders. It is evident that there is a greater hope of success in the adoption of educative methods, provided that means can be devised for getting into touch with this class of listener and persuading him to realise that he is indeed at fault.

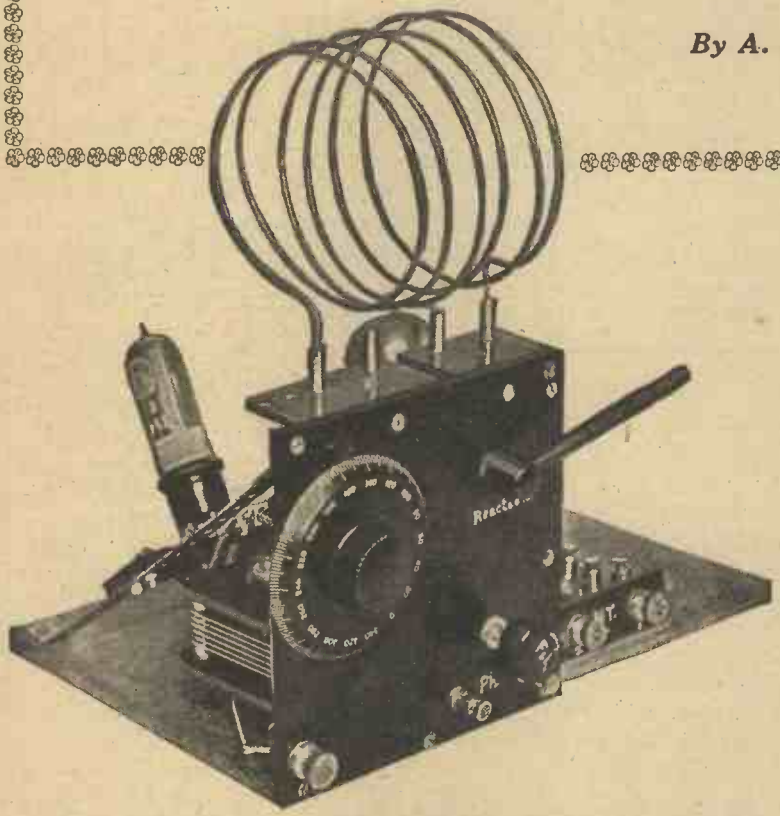
The method which the Radio Association is about to adopt is one which has been used in the past upon a small scale with some degree of success, and depends upon the use of portable receiving sets which are taken in cars to the centres of disturbances which are to be investigated. For the Radio Association to assume these responsibilities may result in an evanescent newspaper publicity, but we feel that their proposed methods as stated in the Press are likely to be futile, and in certain respects would be impudent and objectionable in a much more influential body.

We refer particularly to the invitation to listeners to send in confidential reports of supposed offenders. We strongly criticised the B.B.C. last year for extending a similar invitation in *The Radio Times*. Fortunately, wiser counsels prevailed, and the invitation was withdrawn. If the Radio Association, as is stated in the Press, continue in these directions they will lose what relatively small influence they now possess.

CONTENTS.

TWENTY METRES AND BELOW

By A. D. COWPER, M.Sc.,
Staff Editor.



The detector valve is mounted in such a way that the critical leads are extremely short.

PUBLIC interest in feats of long-distance two-way communication on low power, using extremely short waves, has been accentuated by the very fine performance put up recently by the indefatigable British amateur, 2OD, in establishing two-way communication in daylight with an Australian amateur. Many experimenters would like to know how one gets down to these extraordinarily short waves, and perhaps would like to listen occasionally on 20 metres themselves. There is actually a good deal of activity in the way of amateur Morse (of the slow, hesitating variety with a hideous raw A.C. note) rather higher up, on about 40 metres, though apparently but little telephony. On 20 m. in the early morning, after daybreak, the faint squeak of distant fast C.W. Morse can occasionally be heard. Lower down still there appears to be very little to hear at present.

For any intelligent experimental work on ultra-high frequencies the first essential is some kind of wavemeter in order to tell, at least approximately, where one is. There are no regular broadcast transmissions on known, fixed wavelengths, and but few genuine amateurs have access to a calibrated wavemeter going down below 50 metres, or can receive the occasional short-wave calibration signals given out for public use. A brief account of the method adopted for calibrating a wavemeter for this region, using the broadcast transmissions for standards, will therefore be in order.

Harmonics

The method depends on the familiar principle of *harmonics, e.g.*, Newcastle's nominal wavelength of 400 metres is accompanied by harmonics on 200, 100, 66.7, 50 metres, etc.; London has harmonics on 182.5, 121.6, 91.2 metres, etc, and so on. A heterodyne wavemeter of ordinary type, especially if the filament of the oscillating valve be brightened and the reaction forced, generates a similar series of harmonics. Any one of the early harmonics can be picked up on a short-wave receiver nearby (best with this just barely oscillating), and this gives a calibration point on the latter (if it be known which harmonic is in use) which can afterwards be transferred to a short-wave heterodyne wavemeter or even to a buzzer wavemeter in the ordinary way. As the harmonics decrease in intensity, and become crowded and irregular as one goes down the scale, it is preferable to make more than one step between the ordinary broadcast wavelength and 20 metres. A short-wave heterodyne wavemeter calibrated as described is in turn forced to give *its* series of harmonics, which are in turn picked up on an ultra-short wave receiver and give the calibrations for that. This would appear to give a pyramided error; but actually

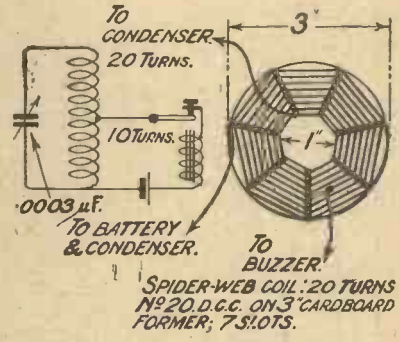
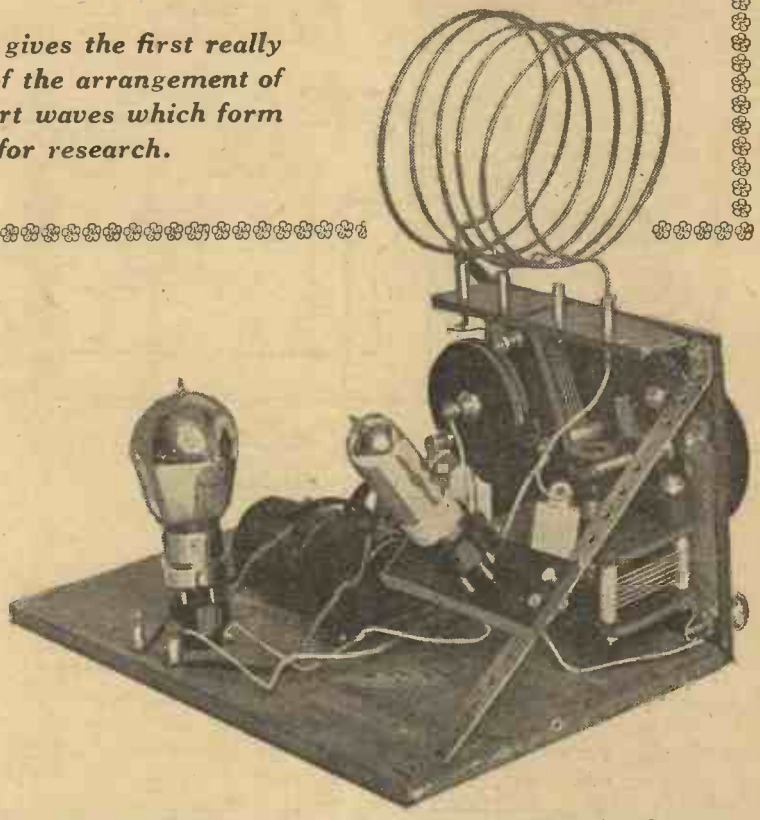


Fig. 1.—The buzzer wavemeter arrangements.

so many checks are available by running up and down the scale of harmonics, and by comparing at several points on the calibration curve as close together as desired, that any errors are negligibly small for ordinary reception purposes.

In this article Mr. Cowper gives the first really full and practical account of the arrangement of a receiver for the ultra-short waves which form so promising a field for research.



The radio choke may be seen immediately below the coil in this view.

Actually the wavemeter-receiver described by the writer in *Wireless Weekly*, Vol. 3, No. 18 (April 9, 1924) was used, calibrated carefully directly against the B.B.C. stations and a good Townsend buzzer wavemeter. By setting the reaction condenser at maximum capacity this will give a rich series of harmonics of any desired wavelength between about 260 and 650 metres. An ordinary two-valve (o-V-1) reaction receiver, with a 17-turn solenoid coil of No. 20 d.c.c. on a 3-in. former, and with an ordinary commercial No. 35 or 25 plug-in coil for reaction, in a two-coil holder, picked up these harmonics down to about 100 metres, the two instruments simply standing near one another and operated from the same batteries.

Forty Metres

Down to 40 metres an 11-turn air-spaced and self-supporting coil, 3 in. diameter, of No. 15 enamel-insulated wire, mounted

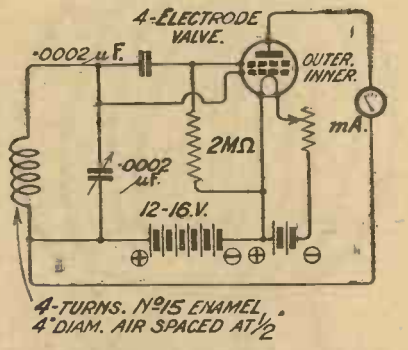


Fig. 2.—The wavemeter circuit used by the author for ultra-short waves.

in an ordinary coil-plug and with a suitable reaction coil, gave good results with a DE5B valve as detector. Actually a 3-turn coil would give oscillation, with a suitable reaction coil; but the shift of wavelength with adjustment of reaction coupling was prohibitively great, so that the arrangement is not suitable for telephony reception, though it may suffice for the very much less exacting task of receiving C.W. Morse with a freely oscillating valve (by autodyne reception) and with the relatively rough tuning implied by the width of the available audible heterodyne belt. An ordinary tuning condenser was used; it was very noticeable how much more readily the circuit oscillated on these very short waves when a two-plate condenser of "Neutrodyne" type, used normally for fine tuning in parallel with the main A.T.C., was disconnected. Yet this instrument was perfectly satisfactory on the broadcast frequencies.

The Buzzer Wavemeter

From the calibration points given by this receiver a *buzzer wavemeter* was calibrated from 40 to about 200 metres. A 20-turn spider-web coil of No. 20 d.c.c. wire on a cardboard former, 1 in. internal and 3 in. external diameter, tuned by a standard pattern J.B. .0003 μF variable condenser, gave this range. The buzzer circuit included only half this coil, a tapping having been made midway, thus considerably sharpening up the tuning. Comparison was made by the "absorption" method, as well as by buzzer signals. The former method depends on the fact that a tuned circuit brought near to an oscillating valve circuit which is *just* oscillating will stop the latter from oscillating by absorbing energy from it, when precisely tuned in unison.

Calibration

This is an extremely accurate method of calibration, and easy to carry out. Thus when the short wave receiver gave the well-known squeal as the heterodyne wavemeter was swung through 300, 400, 500 and 600 metres, and not between these points, it was clear that one was operating on 100 metres, and this point was transferred to the buzzer wavemeter. Then with a squeal at 300, 350, 400, 450, 500 metres, etc., one had the 50-metre point, and so on. This was carried down conveniently to 40 metres, the minimum of the buzzer instrument.

At this point the *ultra-short wave receiver* could be commenced. The general type of very short-wave receiver described by the writer in *Modern Wireless*, Vol. III, No. 7 (December, 1924), was taken as a starting point. The coil developed in connection with that receiver was tested here, but with the modification that the tuning condenser (a J.B. standard pattern, ebonite end plates, .0002 μF) was placed across only one half of the coil, together with the grid-filament capacity. The other half of the coil was used simply as a Reinartz type of reaction coil, being connected at the free end *via* a .0001 μF (7-plate) reaction condenser of the same make as the tuning condenser to the anode of the detector valve, the usual radio-choke of a large number of turns of fine wire with but little total distributed capacity (a very narrow slab-coil) being used between the plate and the L.F. transformer. This short-wave coil has 11 turns of No. 14 d.c.c. wire, with a central earth-tap, about 4 in. diameter, spaced at ¼ in. and mainly self supporting.

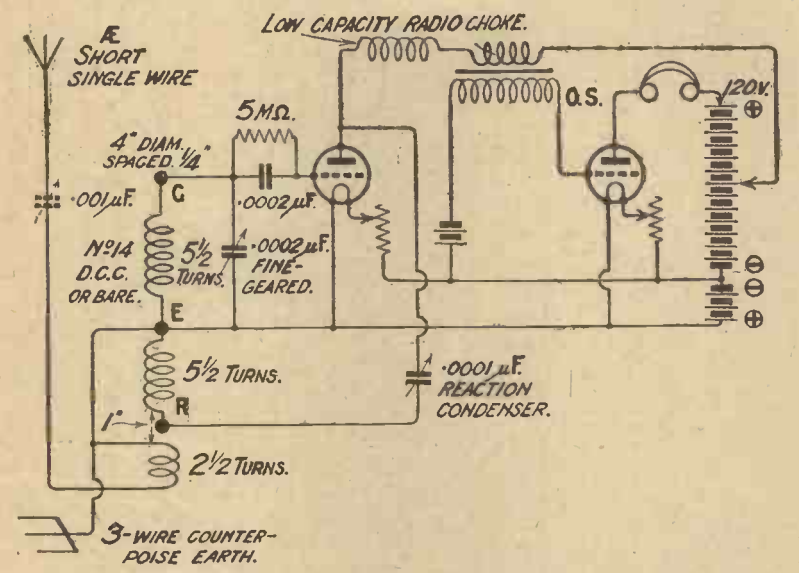


Fig. 3.—The complete circuit, showing the values for the 17 to 73 metres range.

Valves

This was found to give oscillation with a DE5B or a DE3B valve and proper H.T. over the whole range of the tuning condenser, and with a good R valve with hot filament and ample H.T. would give oscillation over most of the range. A receiver incorporating this coil was then calibrated down to 40 metres with the aid of the buzzer wavemeter, directly and by the "absorption" method, the maximum proving to be 73 metres.

A "Negadyne" Wavemeter

The next stage was the production of an *ultra-short-wave wavemeter* and its calibration. Here use was made of the powerful Numans oscillator circuit, developed recently by the writer under the name of the "Negadyne," into a number of practical receiving circuits, using a four-electrode valve and the curious circuit indicated in Fig. 2. With very careful manipulation of the filament resistance (the sole reaction control here) it was found possible to obtain steady oscillation over practically the whole range of a .0002 μF J.B. variable condenser, with an ordinary Phillips pattern of four-electrode bright-emitter valve, with a tuning inductance of but 4 turns of No. 15 enamel insulated wire, just over 4 in. diameter and air-spaced at ½ in., mounted on an ordinary plug fitting. Over part of the range oscillation could be obtained with but 4 volts H.T.; for the lowest range (which afterwards proved to be down to about 12 metres wavelength) 12 or 16 volts H.T. were required, and very careful setting of the filament temperature. A milliammeter in the plate circuit is invaluable in this connection to indicate the proper setting of the filament rheostat and the oscillation point. The actual negadyne wavemeter used was fully described in *Modern Wireless*, Vol. IV, No. 1 (February, 1925), as a super-regenerative unit; the large oscillator coil was simply removed and the connections shorted for this purpose. This was then calibrated down to 40 metres against the buzzer wavemeter, as before.

Ultra Short Waves

To extend the calibrations down to the bottom of the scale, the principle of harmonics was again invoked. With the negadyne adjusted to oscillate lower down on its scale, and with the 'phones connected to the (oscillating) ultra-short wave receiver, the point where the latter's first harmonic clashed with the fundamental wave of the negadyne gave readily the octave above the negadyne frequency at the moment. This was then immediately checked against the reading for the same receiver setting on the upper already calibrated portion of the negadyne wavemeter scale for the fundamental frequency. All this actually took less time to do than to describe, and a little experimenting will make the procedure obvious to the careful observer. It is necessary, of course, to be extremely careful not to mistake the particular harmonic used, by checking all up the scale, otherwise one

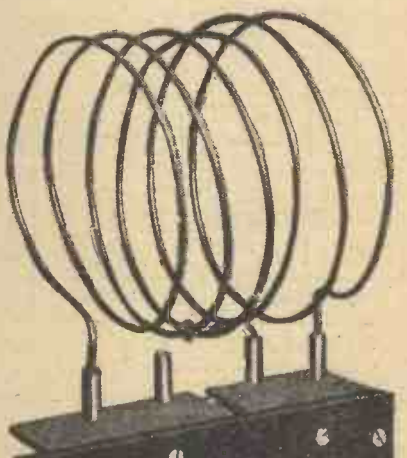


Fig. 4.—The coil with which Mr. Cowper succeeded in obtaining self-oscillation down to 9 metres.

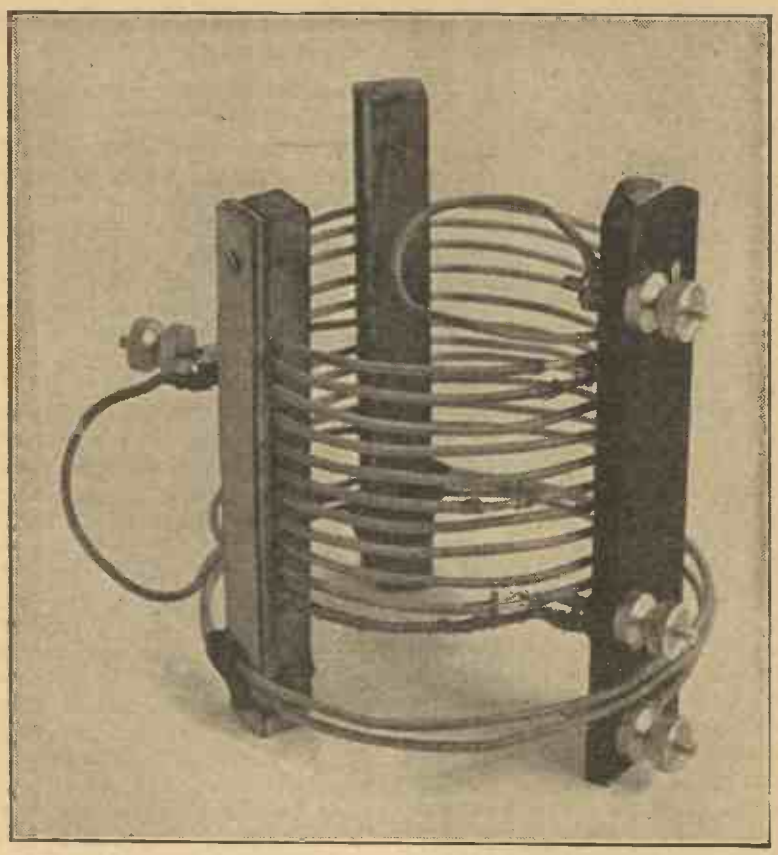
may be far wide of the mark. Thus the 12-metre minimum point was checked at 24, 36 and 48 metres; the 9-metre point (ultimately reached) against 18, 27, 36 metres, etc. With the two receivers standing close together on the same table, there is an extremely close coupling on these ultra-short waves, and this harmonic method becomes quite easy to carry out.

Twelve Metres

With the negadyne wavemeter calibrated from about 12 metres up to 48 metres (the available range with the 4-turn coil and a .0002 μF tuning condenser), the whole range of the ultra-short-wave receiver and its original 11-turn coil could be explored; this proved to be from a minimum of some 17 metres up to 73 metres, with the .0002 μF low-minimum tuning condenser. The calibration curve was as straight a line as could be drawn on the graph, using the standard type of condenser with ebonite ends.

Practical Reception

Some details of the actual receiver are given here; it was essentially an experimental type,



The type of coil which Mr. Cowper first used in his experiments in short-wave reception.

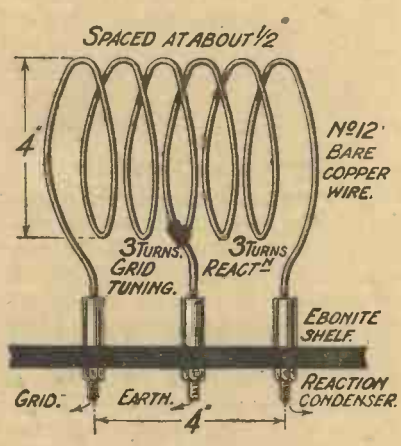


Fig. 5.—Mr. Cowper's original coil was wound with No. 12 gauge wire, but a slightly thinner gauge, such as No. 14, may be found easier to wind.

so that only necessary constructional details which diverge to some extent from usual medium-wave practice are indicated. The main points are low minimum capacities, wide air-spacing of the tuning inductance and other parts which carry H.F. energy, extremely fine adjustment of the tuning condenser and most careful elimination of hand-capacity effects. The valve (preferably of the type of the DE5B or DE3B with high M and fairly generous emission; those of small M and low power may refuse to give any results at all, thus the valve should be tested for free oscillation in an ordinary receiver first) is mounted on an ebonite shelf behind the panel, in the "A.C." valve sockets of Messrs. Sparks Radio Supplies, which show the smallest casual capacities between sockets of any measured by the writer. The grid condenser and leak are supported in mid-air by the connecting wires from the tuning condenser and the grid socket. The experimental tuning inductances are mounted in three valve sockets well spaced in a narrow ebonite shelf at the top of the panel and behind the latter, giving very direct connections. One socket connects to tuning condenser and to grid condenser; the middle one to earth and the other side of the tuning condenser; the socket at the opposite end is connected to the reaction condenser and thence to the anode. The rest of the two-valve receiver can be of conventional design.

The Aerial

The *aerial connection* can be of the most casual description on these waves; a long earth lead or preferably a connection to an insulated counterpoise "earth" generally suffices for local transmissions. An outside aerial at once introduces difficulties by entirely preventing oscillation (and hence sensitive reception) if by chance tuned directly to (or what is more probable, on a harmonic of) the operating frequency. Thus even a loose end of an aerial lead lying on the table close by may prevent oscillation over a certain band. The utmost coupling necessary is given by a coil of a couple of turns of stout wire placed near the tuning inductance, connected to aerial and counterpoise, with (if necessary) a *large* variable condenser (.001 μF) in series with the aerial to provide for detuning it when by chance a harmonic is struck and the set refuses to

oscillate. Experiments with *short* vertical aerials of stout wire or copper tape should be productive of good results. The best signals (and most mush) come in when the aerial is just detuned to a point where the receiver still feels the load, *i.e.*, more reaction than usual is required.

The Tuning Condenser

A finely-geared tuning condenser is quite essential; even long handles hardly give the fine tuning required. The writer experimented with a 10:1 gear taken from a Collinson Precision Screw Co.'s fine-tuning condenser and adapted to a .0002 μF J.B. condenser; this was hardly fine enough, as a touch on the edge of the dial would whip one right across a C.W. Morse transmission so that one could miss it entirely unless the transmission was very strong; yet the effective scale was nearly 3,600 degrees long, with the micrometer tangent-screw feed. Earthed screening plates are also imperative. With a counterpoise earth a station might disappear, or oscillation stop, when one's finger approached the "earth" terminal. Reaction control is no more critical than on the longer waves once oscillation is obtained; ordinary values of grid-condenser and leak appear to be correct, though for fine searching with the D.E. valves recommended a grid-leak of about 4-5 megohms may be better.

Listening on the Ultra-Short Waves

The first sign of success in reaching the neighbourhood of 20 metres is that every omnibus and heavy motor lorry within 50 yards is heard approaching and dying away in the distance; thus a London General omnibus supplies an excellent wavemeter for 20 metres, and the ubiquitous Ford car seems to be about 17 metres wavelength. The wiring of their ignition systems is apparently so arranged that these waves are radiated. During broadcast hours a whole series of harmonics of the various stations can be readily found (illustrating the carrying power of the ultra-short waves). With extreme care the nearest two or three stations, on an outside aerial, will give on around 60 metres belts of mush which can be resolved into something remotely resembling a musical transmission, recalling a poor American transmission with two or three local oscillators hard at it right on top of the distant station. This will, however, give further points to check on. Occasional Morse can be picked up, as already indicated, down to 20 metres.

Below 20 Metres

Further experiment with the receiver indicated here showed that with a DE5B valve and ample H.T. it was possible to obtain steady oscillation with a coil in the grid circuit having three turns of No. 12 bare copper wire, about 4 in. diameter and spaced ½ in., entirely self-supporting, with an exactly similar 3-turn coil for reaction, making a simple open solenoid of six turns, with a midway earth tapping.

Nine Metres

This was mounted directly in the sockets on the receiver, and gave a range down to a minimum of 9 metres wavelength, as checked against harmonics on the negadyne wavemeter. This coil oscillated up to about 30 metres, with a little over one-third of the .0002 μF tuning condenser across the three turns. Listening on a long lead to a three-wire counterpoise, there was but little to hear on this wave at the time. The wavelength of 9 metres seems to represent about a practical minimum of wavelength with the ordinary valve mounted in a holder of fairly conventional type, and with the Reinartz type of reaction circuit. The abandonment of the valve holder and the removal of the cap of the valve, together with the adoption of a "transmitter" type of circuit, appears to be indicated in order to go still further down, as experimenters are already doing in the States.

Precautions Necessary

The type of experimental receiver indicated here (which recalls in some points of design one described recently in *Wireless Weekly* by Mr. D. J. S. Hartt) can be recommended for this kind of practical research work, as different inductances can be made up in a few moments with some thick wire and tried out for range and oscillation, etc., with minimum trouble. The 9-metre coil illustrated took actually less than five minutes to make up and mount for trial. It is quite impracticable to box up these tremendously high frequencies in a small cabinet made of poor dielectric; experiments should be carried out on an open table far from other receivers and chance tuned circuits, etc., whilst body-capacity and body-absorption effects have to be guarded against with the utmost care.

A view of the transmitting panels at Rome, a description of which station appeared in "Wireless Weekly" for April 29.

Reception Conditions Week by Week

By W. K. ALFORD (2 DX).

Some general notes on the conditions during the week ended May 17.

A BLAZE of unlooked for summer weather has been causing considerable " atmospheric " interference to radio and now real thundery conditions have set in, presumably ending the spell of excellent weather and producing, to some, the menace of radio. On the night of the 16th the sky was in a continuous state of " flicker " from what was probably a severe storm over the Channel, as the extremely heavy crashes of atmospherics were of the " clean-cut " type usually associated with disruptive lightning as distinct from the " sizzles " associated with " sheet " or " silent discharge " lightning.

Interesting Observations

From personal observation at the time in question it was curious to observe that a distinct iridescence of the sky built up and culminated in a blaze of lightning on the horizon producing a simultaneous crash in the loud-speaker working at the time. Observations of this sort are extremely interesting, and may be carried out quite safely provided one keeps a good look-out as to the movements of the storm, although quite frequently much larger potentials are built up in the aerial when there is no actual storm in the neighbourhood.

For those people who are not too scared to look at a wireless aerial (duly earthed of course) during a storm at night, a most interesting phenomenon is sometimes noticeable in the form of a distinct " brush " discharge from the top of the mast, stay wires, etc., and commonly called St. Elmo's Fire. During a heavy storm in the early autumn last year I noticed this phenomenon very clearly, one hoop of a "sausage" aerial appearing quite luminous for several minutes with little purple brushes branching out where the wires were fixed.

Successful transmission of photographs by wireless from Honolulu to New York has been accomplished in recent tests made by the Radio Corporation of America. The above photograph shows the operator, Mr. A. E. Koenig, adjusting the apparatus used in the New York office of the Radio Corporation of America for the reception of the first pictures transmitted from Honolulu.

As regards actual reception conditions during the week, these have been quite good in the periods of quiescence of heavy atmospherics, and several American stations are quite fair strength in the region of midnight.

Reception Through Atmospherics

The great difficulty with receivers of conventional type when trying to get very distant stations during periods of heavy atmospherics lies in the fact that when working the receiver on the very threshold of oscillation (in order to get it in its most sensitive condition), even a moderately heavy " X " will throw the set into oscillation and necessitate constant retuning. This is a very difficult thing to overcome, as the addition of further stages of amplification, while allowing one to work further from the threshold of reaction, with consequently increased stability, make the discomfort of the listener much worse owing to the increased strength of the atmospherics in the 'phones. The one means of ameliorating the trouble, apart from highly complex systems of " X " filters, lies in the use of loop aerials, and although the actual efficiency of reception is considerably less than with an outside aerial, the net ratio of signal strength to atmospherics is often greater.

Frame Aerials

With a loop aerial 3 ft. square and an ordinary 3-valve set (H.F. Rect., L.F.) good reception with 'phones is possible up to 50 miles from a main broadcasting station, and in certain cases considerably more.

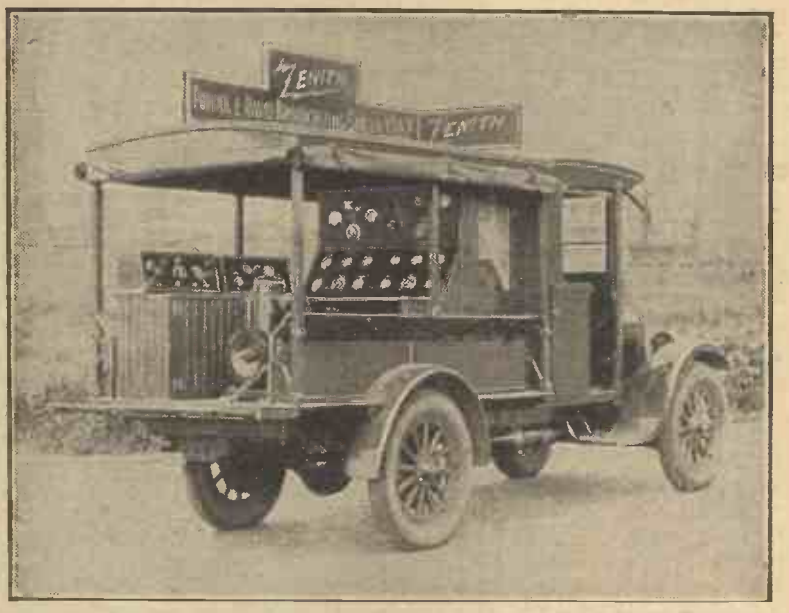
In addition, perhaps no greater indication of the efficiency of a stage of H.F. amplification can be gained than by trying it out under these conditions.

From personal experience a 4-valve set comprising H.F. (tuned anode) Rect., and 2 L.F. gives loud telephone strength from 2LO at 30 miles, 6BM at 75 miles, and 5IT at 110 miles, using a 30-in. square frame.

WJAZ

Some brief particulars concerning the only portable broadcasting station of its kind.

THE Zenith portable broadcasting station WJAZ is a complete self-contained, self-sustaining battery-operated broadcasting station, able to function entirely without any external sources of supply and carrying its own collapsible mast and aerial. The station can be set up in the middle of a field without any other power supply than its own, and without any aerial supports other than its own mast, and can be operated indefinitely, especially since it is equipped with a complete charging outfit which is able to charge the batteries while the outfit is in broadcasting operation. This feature is of special interest, as otherwise the period of operation possible would be rather short.



The complete equipment and apparatus of the American portable station WJAZ is carried on the motor van seen above.

The Transmitter

The set is of 100 watts power and uses four 50-watt valves, two as oscillators and two as modulators. All the apparatus is completely panel mounted. The inductances, condensers, and other apparatus are mounted behind these panels in a cabinet equipped with glass sides, allowing easy observation of the entire construction and interior of the set. Electric lights are provided inside the set for the same purpose.

The entire van is electric lighted with spot lights on the panels as well as a number of spot lights arranged to illuminate the mast, which is of sectional type, such as was used by the U.S. Army during the war, and is 53 ft. in height.

The Aerial and Earth System

The aerial is extremely novel, consisting of four heavily-braided copper cables with extremely fine wire, making them extraordinarily flexible. These wires are provided at each end with snap hooks which are attached to rings which fasten to two spreaders. Clips are provided on each spreader for connection purposes.

The entire frame work and body of the van, including the iron strips on the floor, are connected together and earthed, the earthing strips all being brought to one point at the side of the van, where a heavy connection lug is attached.

Other Equipment

The battery supply is 24 volts with a total of 320 ampere hours. This battery arrangement operates a 1,500-volt direct current generator, which, of course, is equipped with the necessary filter system to eliminate all generator hum. Standard broadcasting microphones, line amplifier, etc., are used. Three microphones may be used, one for announcing, one for orchestra, and one for studio purposes, where these are necessary. A switching control arrangement is provided whereby each one of these may be used at the will of the announcer. Special armoured cable is provided whereby the microphones can be placed as far as 300 ft. from the van, allowing the broadcasting of performances in halls, etc., with the van parked outside.

The wavelength is 268 metres. The call letters are WJAZ, and the average aerial current 4 amperes with an upward modulation of about 1 ampere.

Special switching arrangements are provided whereby the station charging outfit not only charges the 24-volt battery, but also charges the lighting and ignition batteries of the van at the same time, and also operates a 350-volt motor generator which serves to charge the accumulator high-tension accumulators used on the line amplifier. In this way the one generator charges the complete set of batteries, high and low voltage, all simultaneously, and this can be done while the set is in actual operation without in any way disturbing it.

The entire wiring of the set is of the bus-bar type, using gold-plated copper bus-bar.

Three stages of push-pull amplification are used in the line amplifier, and the output of this is connected to a 5-watt speech amplifier, and from this connection is made to the two 50-watt modulator valves.

A complete receiving set with loud-speaker is provided for checking the modulation and also for maintaining communication if this is desired at any time.

Jottings by the way

Those Reporters

ON the whole the average reporter in the daily papers does not put his foot very deeply into things as a rule when he deals with wireless, probably because, like most of us, he is generally a wireless enthusiast himself. Still, I have seen some pretty priceless things, as, for example, a paragraph which appeared announcing the opening

. . . *Poddleby is a gentle soul* . . .

of the Belfast station, whose power was stated to be 1½ kilocycles. And one fellow the other day, in a comment on the recent amateur feat of establishing daylight two-way working with Australia, raised what he described as a very interesting point: Do the waves travel round the world, or do they go slap through it on their way to the Antipodes?

Topical Articles

The *Little Puddleton Gazette*, whose editor is one of the two non-wireless men in the place, will, I am afraid, never quite get the hang of things. As the *Gazette's* one desire in life is to be topical, it cannot refrain from giving us articles dealing with wireless, which, though excellent in their intentions, are apt to be rather rocky as regards their facts. I imagine that the sub-editor-compositor - printer - office boy-reporter, who is the other person in the locality who has not so far recognised the blessings of wireless, has some difficulty in reading the shorthand notes which he makes at our meetings. And as he reads his own proofs, it obviously does not pay him to be too liberal in his corrections.

A Meeting Described

This is the sort of thing that we get at times, and I expect that you have it also in your own local paper: "A most interesting lecture was delivered at the Little Puddleton Wireless Club last Tuesday night by Mr. Poddleby on the subject of 'Contortionless Goat Magnifiers.' In the course of his remarks Mr. Toddleby explained what is meant by straight line amplification. Unless the lurking point of the valve is kept low down on the chatteristic curve there is a flow of grid voltage, which causes toughness in reception. Mr. Boddleby went on to show how this could be prevented by the use of a high grid voltage combined with the application of negative current to the plate by means of a pious battery. The next part of Mr. Coddleby's lec-

. . . *The staff hastily departed on seeing the General approach* . . .

ture was devoted to the various kinds of no frequency interval couplings. After touching upon transformations, the speaker considered at some length both the choke-rapacity and the persistence-rapacity systems. The former, he stated, had the advantage of permitting tower valves to be used, whilst the latter was remarkable for its impurity. It was a most instructive paper and everyone came away feeling that Mr. Foddleby had done a great deal to clear up almost, if not quite entirely, any difficulties that they might previously have had."

Poddleby is a gentle soul and is not much ruffled by this kind of thing. He may, in fact he does, stamp about the room vow-

. . . *"Oh, 300 picofarads!" you reply* . . .

ing that he will never buy the beastly rag again, but it never gets further than this, and he always produces his twopence when the newsboys turn out on the following Friday evening.

A Dilemma

General Blood Thunderby is a different proposition altogether. The editor, when the General is to read a paper, finds himself on the horns of a dilemma. His safest course, you might think, would be to leave the Wireless Club alone that week; but he knows quite well that if he did so he would have the General round next morning to ask why in the name of anything you like a report of the Wireless Club's doings were omitted from the paper just on the one occasion that he was doing something. On the other hand, if the report appears, it is fairly sure to contain some pretty priceless remarks fathered upon General Blood Thunderby which bring him, purple with hurry and, un-

luckily, by no means speechless with wrath, down to the *Gazette* office prepared to tell the whole staff exactly what he thinks of them. On the last occasion, when he was reported to have read a paper on "Bielectric Tosses in Carriable Condensers," he was in such a shocking temper that the staff of the *Gazette*, seeing him approaching in the distance, hastily fixed a notice to the door, indicating that the office was closed for the day, and departed with what speed they might to distant places.

A Beautiful Word

Talking of condensers, I have come across recently a beautiful new word (at least, it is new to me) for describing their capacity. This is the picofarad, which apparently means a micro-micro-farad. Thus, instead of referring to your grid condenser as "a three-noughts-three," you can now call it a three hundred picofarad if you feel like doing so. There is always something jolly about learning new words. They are excellent things to spring upon your friends, for they enormously increase your reputation if you do it in the right way. Next time you are discussing wireless on your way to or from business in the train, lead the conversation round to condensers and pull one out of your pocket.

Establishing a Reputation

Then proceed as follows:—"Neat little condenser this," you say, "and jolly well made." "What's the capacity?" somebody is sure to ask. "Oh, 300 picofarads!" you say, letting the word fall carelessly from your lips as if it was as familiar to you as "boots" or "pickles." "Three hundred what?" they all ask. "Why, picofarads, of course," you say, looking surprised. Nobody will dare to ask then what a picofarad is, and they will go running about for the next few days trying to discover without giving themselves away. I have shown you how to establish a reputation as a wireless expert; it is up to you to see that you do not neglect the opportunity. You may, of course, have the bad luck to find that all the other fellows are also trying to work it off. In this case you had better invent a new word of your own, such as leptocycles or saprowatts or brachyergs. I had a whole carriage full guessing the other day by talking about hippodynes. Seriously, do not you think that that is a far better word than horse power?

A Warning

It was, I think, indeed fortunate that the pioneers of the study of electricity had names which could be used so nicely for units of measurement. Ampere, Faraday and even Henry are splendid. But to-day there are all sorts of people on the verge of great discoveries whose names can never be perpetuated in this way. Can you imagine, for example, such a thing as a Kilopoddleby? Even abbreviated to Kilopoddle it is pretty bad. Then again does a Milliwayfarer, or a Picowayfarer charm the ear? I think not. Fellows with double-barrelled names are, of course, entirely out of the running. Nobody could possibly use a term as a Micro-bumplebybrown. That would be too awful, though I think that a Kilobloodthunderby does not sound too bad. It has a distinctly war-like sound, anyhow. Ambitious scientists in the future should take care to be born with short neat names, and they should be on their guard against marrying ladies whose christian names are Milly or Meg.

WIRELESS WAYFARER.

Planning Mr. Harris' American trip. Our photograph shows Mr. Harris holding a map upon which Mr. Scott-Taggart is indicating some of the details of the route.

A Series-Tuned-Anode Circuit on the Omni Receiver

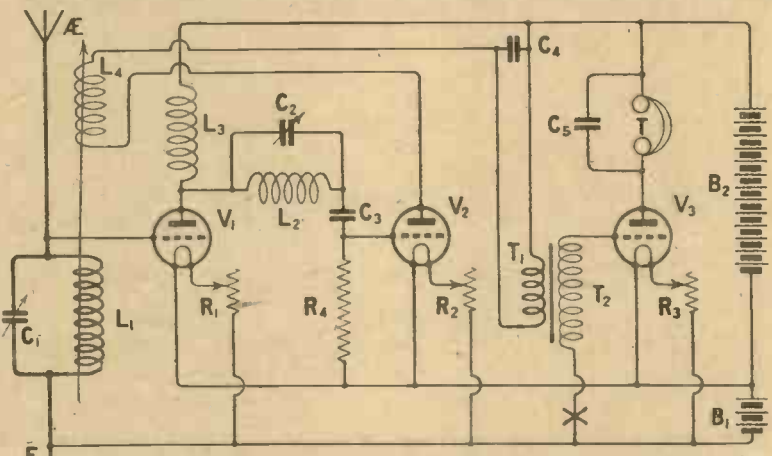


Fig. 1.—A three-valve circuit employing a selective form of H.F. coupling.

Another circuit which may be tried out on the popular Omni Receiver.

IN the issue of *Wireless Weekly* for April 1, a three-valve receiver, employing a special form of high-frequency coupling, was described. The method is known as "Series tuned-anode coupling," and is due to Mr. A. D. Cowper, Staff Editor of this journal.

The circuit diagram of the receiver mentioned is reproduced in Fig. 1 in slightly modified form, the chief difference being the application of similar anode voltages to each of the valves.

Functions of the Circuit

L1 is the aerial coil tuned by the variable condenser C1 of .0005 μF capacity. The incoming pulses are communicated to the grid of the first valve V1, which amplifies at high-frequency. Amplified currents result in the anode circuit of the valve, which is tuned by the coil L2 and variable condenser C2 of .0005 μF. A large coil L3 is also included to act as a choke to high-frequency currents, while allowing the passage of the steady anode current of the first valve.

C3 and R4 are the usual grid condenser and leak respectively, the former having a value of .0003 μF, and the latter approximately 2 megohms. Rectification is effected by the valve V2, in whose anode circuit are included the reaction coil L4 coupled to the aerial coil, and the primary winding T1 of the low-frequency transformer T1, T2. C4 is a by-pass condenser of .001 μF. The secondary winding T2 of the L.F. transformer is connected to L.T. – and to the grid of the last valve V3, which amplifies at low-frequency. The telephones T are shunted by a fixed condenser C5 of .002 μF.

The grid of the note-magnifying valve V3 may be given a negative potential by the introduction of a battery at the point X.

Connections for the Omni

Those readers who possess Omni receivers can easily try out the circuit, the following connections on the terminal board being required :—

51—17	43—40
17—18	6—33
26—25	21—38
25—52	37—22
17—12	50—24
52—48	30—16
4—49	29—48
4—53	8—31
53—34	31—47
42—54	39—23
54—19	23—24
27—14	32—40
27—35	22—41

21—24

Coils to Use

The fixed centre socket of the three-coil holder on the left-hand side of the cabinet is wired to

The apparatus used in New York for the successful reception of pictures transmitted by wireless from Honolulu on the occasion of the American Army and Navy manœuvres. One of the transmitted pictures is reproduced on page 239.

receive the aerial coil, while the front moving socket on the same holder is for the reaction coil L4. The choke coil L3 is plugged into the fixed socket in the top left-hand corner of the panel, and the anode coil L2 into the remaining fixed socket in the right-hand corner.

Regarding the sizes for the coils, the aerial coil must naturally depend upon the size of the aerial employed, as well as the wavelength to be received. To cover the usual broadcast band, Nos. 25, 35 and 50 should be tried. For the same wavelengths the anode coil L2 will be a No. 50 or No. 75, while L3 should be of large size, say No. 250. L4 must be determined by experiment, as described later.

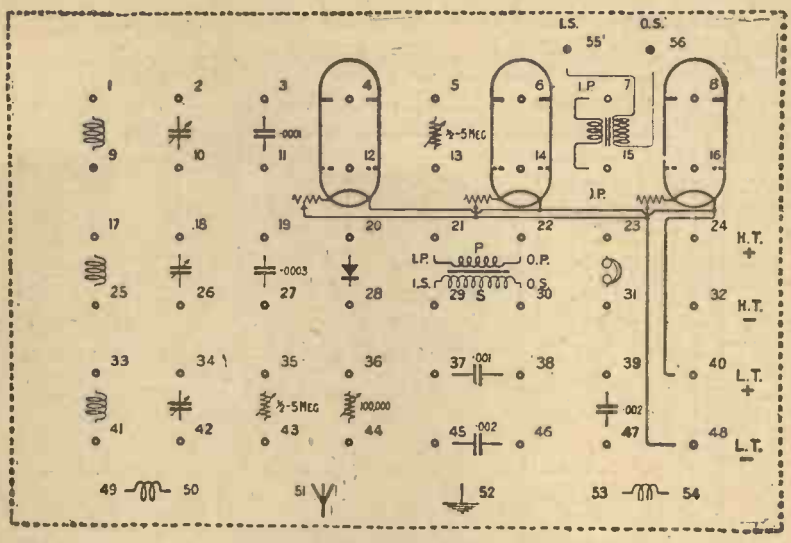


Fig. 2.—The terminal board.

Operating the Set

Having inserted coils of suitable sizes, the batteries and telephones should be connected to their respective terminals.

Tuning is carried out by adjustment of the two variable condensers C1 and C2. L4 should be a small coil during the preliminary tests—for example, a No. 25. If it is found that the receiver cannot be made to oscillate when accurately tuned, the reaction coil should be reversed and the effect observed. The reversal is effected by making the following alterations on the terminal board :—

Disconnect the leads 22—41 and 33—6, and join 22—33 and 41—6. The effect of using different sizes of reaction coil should now be observed. It is necessary, of course, to slightly retune on the aerial tuning condenser after each adjustment of the reaction coil.

An effective method of obtaining stability if necessary is to connect the lower side of the aerial coil to the positive instead of negative side of the L.T. battery. For this purpose it is necessary to disconnect the lead 52—48 and join 52—40.

Improving Quality

The application of negative grid bias to the last valve may, if dull-emitter valves are used, improve quality somewhat. A small dry battery is required, preferably tapped every 1½ volts, and is connected, as indicated previously, between the lower end of the transformer secondary winding and the negative side of the accumulator. First remove the connection 29—48.

The battery may be placed in any convenient position outside the receiver, two leads being taken from it (positive and negative) and joined to terminals 29 and 48, the positive lead going to terminal 48, and negative to 29.

Separate H.T. Tappings

Improved results may be expected upon applying separate potentials to the ancdes of the three valves, especially when grid bias is employed. A high-tension battery with a total voltage of 90 or 100 is suitable, and should be tapped in stages of 3 to 6 volts. Connect the negative terminal of the battery to its usual terminal on the receiver, and disconnect the following leads on the terminal board :—21—24 and 50—24. Three flexible leads terminated at their free ends by wander plugs should be connected to terminals 50, 21 and 24; the wander plugs are then inserted in various points on the H.T. battery. Terminal 50 feeds the first valve, 21 the second valve, and terminal 24 supplies the note-magnifier.

The connections to the secondary winding of the intervalve transformer may be reversed in order to determine which arrangement gives the better results.

The well-known airman Mr. Alan Cobham and Miss Heather Thatcher the actress who recently broadcast from the air.

The FOREIGN RADIO TIMES

Edited by Captain L. F. PLUGGE, B.Sc., F.R.Ae.S., F.R.Met.S. MAY 27, 1925.

NOTE :—All Hours of Transmission are in British Summer Time.

WEDNESDAY, MAY 27th

FRANCE.

PARIS.—*Station :* Eiffel Tower.—FL.
Wavelength : 2,950 metres—5 kw.

6.15 p.m.—Concert.

Artists : M. Maurice Gouineau, Mme. Gabriel Tristan Franconi, M. Marcel Chabrier, M. Jean Terzier (Tenor), Mme. Pierre Quinet (Pianist), and M. Bertin.

1. Scientific Review. M. Maurice Gouineau.
2. One Act Play, "Life Forgives Not," written specially for "La T. S. F." by M. Alexis Danan. Played by Mme. Franconi and M. Chabrier.
3. Selection (Wagner). M. Terzier.
4. Tarentelle (Chopin). Mme. Quinet.
5. I Love You (Grieg). M. Terzier.
6. Melisande (Melbonis). Mme. Quinet.
7. Thine Eyes. (Danie). M. Terzier.
8. Address "The Forests of the Colonies." M. Bertin.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

8.30 p.m.—Concert on 2,200 Metres and 2.5 kw.

10.0 p.m.—Close Down.

PARIS.—*Station :* Radio-Paris.—SFR.
Wavelength : 1,750 metres—8 kw.

12.30 p.m.—Concert.

1. March (Berville).
2. Flight of Birds (Waldteufel).
3. Serenade—Violin Solo (Toselli).
4. Caprice Exotic (Derveaux).
5. Thoughtless (Dagincourt).
6. Unexpected Serenade (Delune).
7. Song of Birman (Messager-Salabert).
8. Orchestral Suite (Guillot).
9. Pastorale (Herve).
10. Millions of Harlequin (Drigo).
11. Open Confession (Thome).
12. Believe Me (Wolff).
13. Cajoling (Bilhaud).
14. Delilah (Nicholls).
15. Lohengrin (Wagner-Alder).

1.45 p.m.—News Bulletin.

2.15 p.m.—Close Down.

8.15 p.m.—News Bulletin.

8.45 p.m.—Brazilian Soiree, organised by the Franco-Brazilian Committee of Paris.

10.0 p.m.—Close Down.

SWITZERLAND.

ZURICH. — *Station :* Radio-Genossenschaft.
Wavelength : 515 metres—500 watts.

5.0 p.m.—Concert by the Orchestra of Hotel Baur-au-Lac.

6.15 p.m.—Children's Hour.

8.15 p.m.—English Lesson.

8.30 p.m.—Musical Programme.

Artists : Music-Verein Harmonic Zurich, Lucerne Quartet, Julius Niedermann (Elocutionist).

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station :* Unione Radiofonica Italiana.
Wavelength : 425 metres—3 kw.

5.15 p.m.—Orchestral Selections by Albergo di Russia.

5.45 p.m.—Jazz Band.

6.15 p.m.—Close Down.

7.30 p.m.—News Bulletin and Weather Forecast.

8.30 p.m.—Concert.

1. Overture from "Norma" (Bellini). The Orchestra.
2. Adagio and Finale of the Third Sonate (Beethoven). Stefano Elkan (Pianist).
3. (a) The Nightingale (Rimsky-Korsakov), (b) Song (Alvarez). Giulia Becchi.
4. Concerto in E Minor (Nardini). Fleurange Salomone (Violinist).
5. Address.
6. (a) Marcia (Gounod), (b) Selection (Rubinstein). The Station Orchestra.
7. (a) Study in D Minor (Chopin), (b) Study (Chopin). Stefano Elkan
8. Two Songs (Pizzetti). Giulia Becchi.
9. Prelude and Allegro (Pugnani-Kreisler). Fleurange Salomone.
10. Selection from "German" (Franchetti). The Station Orchestra.

10.15 p.m.—News Bulletin.

10.30 p.m.—Jazz Band from Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station :* Radio-Wien.
Wavelength : 530 metres—1.5 kw.

4.10 p.m.—Concert.

1. The Danube.
2. Children of Carnival.
3. Selection.
4. Viennese Citizens.
5. Purple and Fine Linen.
6. Viennese Maid.

5.30 p.m.—Women's Hour.

6.10 p.m.—Address on Dante Alighieri. By Dr. Hans Nuchtern. Sonate to Dante (Liszt). Frau Prof. Stella Eang. Talk. Maria Pokerny. Lecture on the Work of Dante. Ferdinand Onno.

7.45 p.m.—English Lesson.

8.30 p.m.—Musical Selections from Mozart.

Artists : Lotte Schone (Vocalist), Prof. Karl Stiegler (Horn), Heinrich Graser (Viola), and the Sedlak Winkler Quartet.

1. String Quartet (Mozart).
2. (a) Song of Cherubin from "The Marriage of Figaro" (Mozart), (b) Song of Zerline from "Don Juan" (Mozart). Lotte Schone.
3. Quintet for Horn and String (Mozart).

10.0 p.m.—Dance Music.

CZECHOSLOVAKIA.

PRAGUE.—*Station :* Strasnice.
Wavelength : 550 metres—500 watts.

5.0 p.m.—Concert by the Trio of the Czech Philharmonic Orchestra.

Topical Songs by Mrs. Wiren-Rajmon.

1. Overture from "The Barber of Seville" (Rossini).
2. Nocturne (Mendelssohn).
3. Minuet of the Symphony in E (Mozart)
4. Polonaise in A Major (Chopin).
5. Invitation for Dance (Weber).
6. Hungarian Czardas (Brahms).
7. Military March (Schubert).
8. Fairy-tale (Kricka).

6.0 p.m. to 7.0 p.m.—Quartet of Members of the National Theatre: Mr. Suda, Mr. Mathiasko, Mr. Horny and Mr. Tomek. National Songs.

8.50 p.m.—News Bulletin and Close Down.

GERMANY.

HAMBURG.—*Station:* Nordische Rundfunk.
Wavelength: 395 metres—1.5 kw.

Note.—This Station is relayed by Hanover on 296 metres, and Bremen on 330 metres.

6.0 p.m.—Series of Flower Fables "The Violet." Hans Bodemstedt.

8.0 p.m.—Play—"De Dulle Deern" (Ruseler). Directed by Dr. Hans Bottcher.

10.30 p.m. — News Bulletin, Dance Music and Close Down.

THURSDAY, MAY 28th

FRANCE.

PARIS.—*Station:* Eiffel Tower.—FL.
Wavelength: 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists: M. Jean Givelet, Mme. Maligne le Tessier (Violinist), M. Benharoche (Baritone), and Mlle. Andree Teyssonniere (Pianist).

1. Italian Concerto (Bach). Mlle Teyssonniere.
2. If You Will Mignonne (Massenet). M. Benharoche.
3. Allegretto (Boccherini). Mme. Tessier.
4. The Little Children (Rousseau). M. Benharoche.
5. Light Rondeau (Schubert). Mme. Tessier.
6. Lilac Time. M. Benharoche.
7. After a Dream (Faure). Mme. Tessier.
8. The Caravan. M. Benharoche.
9. Sonate in G Sharp Minor (Chopin).

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

PARIS.—*Station:* Radio-Paris.—SFR.
Wavelength: 1,750 metres—8 kw.

12.30 p.m.—Concert.

1. Funeral March (Jouanneau).
2. Passionate Idyll (Razigade).
3. The Vain Woman (Couperin-Kreisler).
4. Russian Dance (Tschaikowsky-Salabert).
5. Serenade (Schwartz).
6. Minuet (Mozart).
7. Serenade (Gounod).
8. Tunis Scenes (Mouton).
9. The Happy Lady (Andrieu).
10. Spanish Dance (Granados).
11. Daughter of the Sun (Bonincontro).
12. Serenade (Lederer).
13. Vivace (Sammartini).
14. At Singapore (Vargues).
15. Werther (Massenet-Alder).

1.45 p.m.—News Bulletin.

2.15 p.m.—Close Down.

8.15 p.m.—News Bulletin.

8.30 p.m.—Lecture by Dr. Ott.

8.45 p.m.—Jazz Music by Mario Cazes and his Chateau Caucasien Orchestra.

10.30 p.m.—Close Down.

FRANCE.

PARIS.—*Station:* Petit-Parisien.
Wavelength: 345 metres—500 watts.

9.15 p.m.—Orchestral Concert.

1. Overture to "Prometheus" (Beethoven).
2. Roses of Autumn (Arezzo).
3. Finale of the Sonata (Franck).
4. The Juggler of Notre Dame (Massenet).
5. On the Banks of the Danube (Wormser).
6. Adagio (Schumann).
7. The Wheel of Omphale (Saint-Saens).
8. Barcarolle (Schubert).
9. Romance in A Major (Hahn).
10. Russian Dance (Tschaikowsky).
11. Divertissement (Messager).

SWITZERLAND.

ZURICH.—*Station:* Radio-Genossenschaft.
Wavelength: 515 metres—500 watts.

5.0 p.m.—Concert by the Orchestra of Hotel Baur-au-Lac.

6.15 p.m.—Women's Hour.

8.15 p.m.—Talk by Clement Berger.

8.30 p.m.—Orchestral Concert.

Artists: Frl. Alice Schenker (Pianist), and the Station Orchestra.

1. Piano Concerto in D (Haydn). The Station Orchestra.
2. Symphony (Mozart).
3. Overture to "Prometheus" (Beethoven).

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station:* Unione Radiofonica Italiana.
Wavelength: 425 metres—3 kw.

5.15 p.m.—Orchestral Selections from Albergo di Russia.

6.15 p.m.—Close Down.

7.30 p.m.—News Bulletin.

8.30 p.m.—Concert.

1. Address "The Theatre of Siracusa." Ugo Fleres.
2. (a) Viennese Song (Donizzetti), (b) O Fortunate Rose (Bellini), (c) The Dance (Rossini). Rachele Maragliana Mori.

9.15 p.m.—Scenes from the Opera "Cavalleria Rusticana" (Mascagni).

PERSONÆ.

Santuzza (Signora Annabella di Marzio, Soprano); Turiddu (Fernando Bertini, Tenor); Alfio (Ugo Donarelli, Baritone); Lucia (Luisa Castellazzi, Mezzo-Soprano); Lola (Luisa Castellazzi, Mezzo-Soprano). M. Alberto Paoletti, Pianist.

10.15 p.m.—News Bulletin.

10.30 p.m.—Jazz Music from Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station:* Radio-Wien.
Wavelength: 530 metres—1.5 kw.

4.10 p.m.—Concert.

1. The Wedding Journey (Grieg).
2. Minuet (Dvorak).
3. The Gypsy Woman (Balfe).
4. Rosenkavalier (Strauss).
5. Nocturne (Chopin).
6. Spring Song (Lacombe).
7. Waltz (Fetras).

5.15 p.m. — Children's Hour. "The Flower of Little Ida" (Anderson). Dora Miklosich.

6.15 p.m.—Address by Engineer Paul Bellak.

7.0 p.m.—Esperanto Lesson.

8.0 p.m.—Three Act Play "The Judge of Zalamea." Calderon de la Barca.

PERSONÆ.

Philip, King of Spain (Aurel Nowotny); Don Lope, General (Theodor Weiss); Don Alvaro de Atayde (Paul Pranger); Pedro Crespo (Viktor Kutschera); Nuno (A. V. Blum); Chispa (Gisa Wurm).

CZECHOSLOVAKIA.

BRÜNN.—*Station:* Komarov.
Wavelength: 1,800 metres—1 kw.

7.0 p.m. to 8.0 p.m.—Concert.

Artists: Mrs. Levickova Cechova (Soprano), and Mr. R. Macudzinsky (Pianist).

1. Fancies (Treglar).
2. Gypsy Melodies (Dvorak).
3. Campanella (Liszt).
4. Songs (Novak).
5. Songs (Kunc).
6. Slovakian Songs (Cernik).
7. Dumka (Suk).
8. Cake Walk (Debussy).

8.0 p.m.—News Bulletin and Close Down.

GERMANY.

HAMBURG.—*Station:* Nordische Rundfunk.
Wavelength: 395 metres—1.5 kw.

7.30 p.m.—Spanish Lesson.

8.0 p.m.—Programme of Selections from German Operas.

Artists: Martha Saegling, Kurt Huxdorf, Richard Wissiak and Station Orchestra.

1. Overture from "Martha" (Flotow).
2. Czar and Carpenter (Lortzing).
3. Song from "Martha" (Flotow).
4. Selection from "The Armourer" (Lortzing).
5. Czar and Carpenter (Lortzing).
6. "Martha" (Flotow).
7. Song of Bombardon from "The Golden Cross" (Brull).
8. Selection from "Undine" (Lortzing)
9. The Last Rose of Summer from "Martha" (Flotow).
10. Selection from "The Merry Wives of Windsor" (Nicolai).
11. Duet from "The Merry Wives of Windsor" (Nicolai).
12. Song of Falstaff from "The Merry Wives of Windsor" (Nicolai).

10.0 p.m.—News Bulletin and Dance Music and Close Down.

FRIDAY, MAY 29th

FRANCE.

PARIS.—*Station :* Radio-Paris.—SFR.
Wavelength : 1,750 metres—8 kw.

12.30 p.m.—Concert.

1. Union Is Strength (de Bozi).
2. My Charmante (Waldteufel).
3. Minuet (Paderewski-Kreissler).
4. Short Legend (Berville).
5. Czarina Masxhinska (Michiels).
6. Preamble (Delune).
7. Dancing Moon (Aubrey).
8. The Golden House (Fontenailles-Mouton).
9. Melancholy (Herve-Leveille).
10. Serenade (Drdla).
11. Habanera (Pesse).
12. A Kiss In The Dark (Herbert-Salabert).
13. The Wanton (Forqueray-Feuillard).
14. Fox Trot (Irving Bibo).
15. The Beautiful Helene (Offenbach-Tavan).

1.45 p.m.—News Bulletin.

2.15 p.m.—Close Down.

8.15 p.m.—News Bulletin.

8.45 p.m.—Fragments from "The Abbe Camargo" (de Montalent), and "Apples of Api" (Offenbach).

10.0 p.m.—Close Down.

SWITZERLAND.

ZURICH. — *Station :* Radio-Genossenschaft.
Wavelength : 515 metres—500 watts.

7.0 p.m.—Weather Forecast and News Bulletin.

8.15 p.m. — Address "Gardening in June." Frl. Anny Gabathuler.

8.30 p.m.—Concert.

Artists : Anna Zust (Mezzo-Soprano), Hans Jelmoli (Pianist), and the Station Orchestra.

1. (a) Little Mary (Reger), (b) Beetle Song (Humperdinck), (c) The Bell (Kehldorfer). Anna Zust and Hans Jelmoli.
2. Selections by the Station Orchestra.
3. (a) Mother of the Evening, (b) Song, (c) The Fiddler (Kehldorfer), (d) The Garland of Roses (Reinecke). Anna Zust and Hans Jelmoli.
4. Selections by the Orchestra.

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station :* Unione Radiofonica Italiana.
Wavelength : 425 metres—3 kw.

5.15 p.m.—Orchestral Music from Albergo di Russia.

6.15 p.m.—Close Down.

7.30 p.m.—News Bulletin.

8.30 p.m.—Concert.

1. Symphony from "Dinorah" (Meyerbeer. The Station Orchestra.
2. (a) Selection from "Zaza" (Leoncavallo), (b) O Sad Vision from "Erodiade" (Massenet). Franco Boderini.
3. Ciaccona (Vitali). Fleurange Salomone.
4. (a) To My Baby (Strauss), (b Song (Massenet). Giulia Becchi.
5. Fashion Review.
6. (a) Seventh Symphony (Beethoven), (b) Selection (Beethoven). The Station Orchestra.
7. (a) Aida (Verdi), (b) Rigoletto (Verdi). Franco Soderini.
8. (a) Aria (Porpora), (b) Capriccio Viennese (Kreisler). Fleurange Salomone.
9. (a) Selection (Gianolio), (b) The Gift of Magdala (Massenet). Giulia Becchi.
10. Selection from "Othello" (Verdi). The Station Orchestra.

10.15 p.m.—News Bulletin.

10.30 p.m.—Jazz Music from Albergo di Russia.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station :* Radio-Wien.
Wavelength : 530 metres—1.5 kw.

4.10 p.m.—Concert.

1. Love Waltz (Ascher).
2. Potpourri (Ascher).
3. Three Songs (Ascher).
4. Lolatte Waltz (Granichstadten).
5. The Night of Bacchus (Granichstadten).
6. Song from Orloff (Granichstadten).
7. Dance (Stolz).
8. Two Songs from "A Dream of Riviera" (Stolz).

6.15 p.m.—Programme of Danish Songs.

7.45 p.m.—English Lesson.

8.30 p.m.—Concert.

Artists : Anton Arnold (Vocalist), Gertrude Rixner (Vocalist), Prof. W. Wendt (Trumpeter), Anna Kainz-Schrotter (Elocutionist), and the Stiegler Horn Quartet.

1. Two Songs. G. Rixner.
2. Barcarole (Offenbach). The Horn Quartet.
3. Cornet Solo (a) Not At Home (Koschat), (b) Folk Song (Koschat) (c) Wagneriana (Richter).
4. Love's Dream (Hoch). Prof. W. Wendt).
5. Recitation. Anna Kainz-Schrotter.
6. Selections (A. Arnold).

CZECHOSLOVAKIA.

PRAGUE.—*Station :* Strasnice.
Wavelength : 550 metres—500 watts.

6.15 p.m.—Talk on "The Modern Home." Mr. Hesouna (Architect).

7.0 p.m.—Programme from Pagnani.

Artists : K. Cervenka (Violinist), Miss Masa Cerny (Vocalist), and Miss L. Priborsky (Pianoforte).

1. Concerto in D Minor.
2. Adagio and Rondo in A Minor.
3. Song from "Mignon."
4. Tarentelle from "Venetia and Neapolis" (Liszt).
5. Villanella Song (Dell).
6. Sonata with Variations (Pagnani).
7. Song (Isouard).
8. Waltz (Arditi).

8.20 p.m.—News Bulletin and Close Down.

GERMANY.

HAMBURG.—*Station :* Nordische Rundfunk.
Wavelength : 395 metres—1.5 kw.

7.55 p.m.—Weather Forecast.

8.0 p.m.—Programme of Folksongs.

Artists : Rudolph Moller, Carl Pundter The Soloists and Orchestra of the Station.

10.0 p.m.—News Bulletin, Weather Forecast and Close Down.

SATURDAY, MAY 30th

FRANCE.

PARIS.—*Station :* Eiffel Tower.—FL.
Wavelength : 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists : M. Noel Gallon (Composer), Mlle. Henriette Lebard (Vocalist), Denise Kerbrecht (Harpist), Odette Rithere (Violinist), and Mlle. Suzanne Tessier.

1. Fashion Talk. Mlle. Tessier.
2. Address on the Works of Noel Gallon. M. Andre Delacour.
3. Sonnet. Mlle. Lebard.
4. Fantasy. Mlle. Kerbrecht.
5. (a) The Rest in Egypt, (b) Chinese Song. Mlle. Lebard and the Composer.
6. Suite for Violin and Piano. (a) Serenade, (b) Scherzo, (c) Nocturne (d) Dance. Mlle Rithere and the Composer.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

PARIS.—*Station :* Radio-Paris.—SFR
Wavelength : 1,750 metres—8 kw.

12.30 p.m.—Concert.

1. Highlanders' Parade (Chauvet).
2. The Black Rose (Aubry).
3. Humoresque (Dvorak).
4. Habanera and Sevillane (Volpatti).
5. Spinning Song (Snoeck).
6. Allegro (Quef).
7. Song of Esmeralda (le Mesquita).
8. Phi-Phi (Christine).
9. The Myrtle (Wachs).
10. Castle of My Dreams (Fosse).
11. Prelude and Allegro (Pugnani-Kreissler).
12. Archers and Lorettes (le Page).
13. Caprice (Dunkler).
14. Habanera (Beaume).
15. Esclarmonde (Massenet).

1.45 p.m.—News Bulletin.

2.15 p.m.—Close Down.

8.15 p.m.—News Bulletin.

8.45 p.m.—Gala Concert, organised by "Le Matin."

SWITZERLAND.

ZURICH. — *Station :* Radio-Genossenschaft.
Wavelength : 515 metres—500 watts.

5.0 p.m.—Concert by the Orchestra of Hotel Baur-au-Lac.

6.15 p.m.—Children's Hour. Orchestral Concert.

8.15 p.m.—Address by Dr. W. Wartmann.

8.30 p.m.—Violin Concert.

Artists: Hedwig Fassbaender (Violinist), Max Siegrist (Pianist), and the Station Orchestra.

1. (a) La Follia (Corelli), (b) Sonata for Violin (Fassbaender). M. Siegrist and the Composer.
2. (a) Hungarian Dance (Brahms), (b) Spanish Dance. M. Siegrist and H. Fassbaender.
3. Selections by the Orchestra.

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station:* Unione Radiofonica Italiana.
Wavelength: 425 metres—3 kw.

5.15 p.m.—Orchestral Selections from Albergo di Russia.

5.45 p.m.—Jazz Music.

6.15 p.m.—Close Down.

7.30 p.m.—News Bulletin.

8.30 p.m.—Address. Fifth Conference on Astronomy. By Prof. Scheible.

8.45 p.m.—Concert.

1. Overture (Cherubini). The Station Orchestra.
2. Two Songs (Paisiello). Elena Angeloni (Soprano).
3. (a) Marcia (Dolmany), (b) Impromptu (Chopin). Stefano Elkan (Pianist).
4. (a) Song (Verdi), (b) La Tosca (Puccini). Franco Caselli (Tenor).
5. Dance (Saint-Saens). The Station Orchestra.
6. (a) Melody (Respighi), (b) Pastorella (Tirindelli). Elena Angeloni (Soprano).
7. Hungarian Rhapsody. Stefano Elkan (Pianist).
8. (a) Iris (Mascagni), (b) Pagliacci (Leoncavallo). Franco Caselli (Tenor).
9. Fantasy (Puccini). The Station Orchestra.

10.15 p.m.—News Bulletin.

10.30 p.m.—Jazz Band.

11.0 p.m.—Close Down.

AUSTRIA.

VIENNA.—*Station:* Radio-Wien.
Wavelength: 530 metres—1.5 kw.

4.10 p.m.—Concert.

1. Gay Dog (Suppe).
2. Viennese Blood (Strauss).
3. Nocturne (Mendelssohn).
4. Entr'acte and Dance (Schirmann).
5. Selection (Hubay).
6. Rigoletto (Verdi).
7. Cherry Duet (Mascagni).
8. Pudding Potpourri (Morena).
9. Naila,—Intermezzo (Delibes).
10. Dance—Intermezzo (Fall).

8.0 p.m.—Operette "Countess Mariza" (Kalman).

PERSONÆ.

Countess Mariza (Rosa Mittermardi). Furst Moritz (Ernst Rolle), Baron Koloman (Max Willenz), Bela Torok (Victor Flemming), Lisa (Paula Back), Karl Stephan Liebenberg (Oscar Oldingen), Furstin Bozena (Mizzi Gribl). Penizek (Hans Moser).

10.0 p.m.—Light Music.

GERMANY.

HAMBURG.—*Station:* Nordische Rundfunk.
Wavelength: 395 metres—1.5 kw.

7.35 p.m.—English Lesson.

8.0 p.m.—Opera in Three Acts, "The Merry Wives of Windsor" (Otto Nicolai.)

PERSONÆ.

Sir John Falstaff (Michael Gitowski), Herr Fluth (Bernhard Jackschtat), Frau Fluth (Erna Kroll-Lange), Herr Reich (Kurt Rodeck), Frau Reich (Clara Voss), Anna (Eva Schlee), Fenton (Ferdinand Schneider), Sparlich (Erwin Bolt), Dr. Cajus (Gustav Hauff).

10.30 p.m.—News Bulletin, Dance Music and Close Down.

SUNDAY, MAY 31st

FRANCE.

PARIS.—*Station:* Eiffel Tower.—FL.
Wavelength: 2,650 metres—5 kw.

6.15 p.m.—Concert.

Artists: M. Pierre Vachet, Mlles. Heylaerts (Violinist), Andree Segard (Pianist), and M. Charyton (Baritone).

1. Medical Talk. M. Vachet.
2. Sicilienne (Bach). Mlle. Heylaerts.
3. Nocturne in F (Chopin). Mlle. Segrad.
4. Air from Benvenuto Cellini (Diaz). M. Charyton.
5. Rondino (Beethoven-Kreissler). Mlle. Heylaerts.
6. Sonatine (Ravel). Mlle. Segard.
7. Berceuse Panurge. M. Charyton and Mlle. Heylaerts.
8. Second Sonate (Grieg). Mlles. Heylaerts and Segard.

7.10 p.m.—News Bulletin and Close Down.

8.0 p.m.—Weather Forecast.

8.30 p.m.—Concert on 2,200 metres and 2.5 kw.

FRANCE.

PARIS.—*Station:* Radio-Paris.—SFR.
Wavelength: 1,750 metres—8 kw.

12.30 p.m.—Concert.

1. Grecian March (Ganne).
2. The Violets (Waldteufel).
3. Prelude and Allegro (Pugnani-Kreissler).
4. Ballet Air (Massenet).
5. Song by M. Roland Lenoir.
6. Tea for Two (Youmans).
7. A Fly and a Bumble-Bee (David).
8. Largo (Handel).
9. Bagatelle (Kullman).
10. Narcissus (Nevin).
11. Song by M. Roland Lenoir.
12. Selections from "Madame Butterfly" (Puccini-Tavan).

1.45 p.m.—News Bulletin and Close Down.

8.15 p.m.—News Bulletin.

8.45 p.m.—Jazz Music by Mario Cazes and his Chateau Caucasien Orchestra.

SWITZERLAND.

ZURICH.—*Station:* Radio-Genossenschaft.

7.0 p.m.—Concert by the Orchestra of Hotel Baur-au-Lac.

8.30 p.m.—Concert.

1. Symphony No. 2 (Haydn).
2. Minuet (Schubert).
3. Andante from Fifth Symphony (Beethoven).
4. Prelude (Liszt).
5. Selection from "Parsifal" (Wagner). The Station Orchestra.

9.50 p.m.—News Bulletin and Close Down.

ITALY.

ROME.—*Station:* Unione Radiofonica Italiana.
Wavelength: 425 metres—3 kw.

5.15 p.m.—Orchestral Selections from Albergo di Russia.

6.45 p.m.—Close Down.

8.30 p.m.—News Bulletin.

8.45 p.m.—Selections from the Opera "Andrea Chenier" (Giordano).

PERSONÆ.

Andrea Chenier (Sig. Fernando Bertini, Tenor); Carlo Gerard (Sig. Ugo Donarelli, Baritone); Madalena di Coigny (Giulia Becchi, Soprano); Bersi (Luisa Castellazzi, Mezzo-Soprano); Madelon (Luisa Castellazzi, Mezzo-Soprano); Incredible (Fausto Poggioli, Tenor); Roucher (Alessandro Casini, Bass); Mathieu (Alessandro Casini, Bass). Pianist, Alberto Paoletti.

10.15 p.m.—News Bulletin.

10.30 p.m.—Jazz Music by Albergo di Russia.

11.0 p.m.—Close Down.

GERMANY.

HAMBURG.—*Station:* Nordische Rundfunk.
Wavelength: 395 metres—1.5 kw.

6.0 p.m.—Selections from Operas.

1. Lowland (d'Albert).
2. Butterfly (Puccini).
3. Il Trovatore (Verdi).
4. Aida (Verdi).
5. Selection (d'Albert).
6. Lohengrin (Wagner).

7.15 p.m.—English Lesson. Hans Bredow School.

8.0 p.m.—Concert.

Artists: Clara Voss, Ferd Schneider, Eva Schlee, Bern. Jackschtat, and the Station Orchestra.

1. Pastorale Symphony (Beethoven).
2. (a) Vision (Strauss), (b) Serenade (Strauss).
3. Spring Sonate (Beethoven).
4. Two Selections (Wolf).
5. Spring Song (Mendelssohn).
6. (a) Spring (Wolf), (b) Morning Hymn (Henschel).
7. Spring Suite (Artok).
8. (a) On the Sea (Brahms), (b) Love's Holiday (Weingaremer).
9. Rosamunde (Schumann).
10. Selections (Grieg).
11. Rosenkavalier (Strauss).

10.30 p.m.—News Bulletin and Close Down.

The Use of Shellac in Tuning Coils

By G. P. KENDALL, B.Sc.,
Staff Editor.

In our May 13th issue Mr. Kendall explained the effect of damp in tuning coils and is now engaged in experimental work with a view to minimising its ill effects by protective methods. In this contribution Mr. Kendall gives some hitherto unpublished results accruing from some of his investigations.

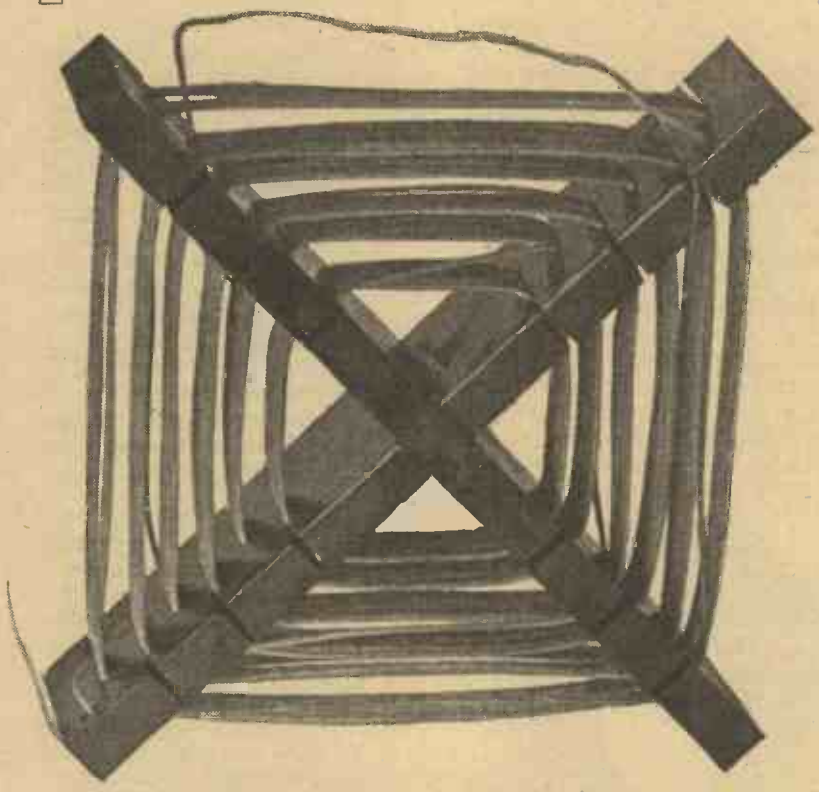


Fig. 1.—This type of coil is one in which moisture has little effect upon signal strength, and was the first coil upon which experiments were made.

IT may be remembered that in a recent issue of *Wireless Weekly* I gave a summarised description of a series of tests recently carried out upon the effect of moisture in different types of tuning coils, and the figures given seemed to show fairly definitely that in a number of the more compact types of coils, particularly those in which the turns of wire cross one another with a good deal of pressure, the effect of moisture might be extremely serious. Since, under quite ordinary conditions, it is possible for several common types of coil to absorb a sufficient amount of moisture to reduce signal strength by a really serious amount, it is evident that the question of a damp proofing impregnation should receive attention, and a series of tests have been carried out on the use of shellac varnish for this purpose, the object of this contribution being to give such an account of some of the more conclusive experiments as will enable the reader to draw some useful conclusions regarding the proper use of this particular impregnating medium.

Purposes of the Experiments

The experiments were intended to elucidate two points: first, whether a shellac impregnation formed a real protection against damp, and, also, just how much shellac was needed; and, secondly, what effect upon signal strength is produced by the presence of an impregnation of varying amount. Particular interest attaches to this second point, in that it has been fashionable for so long to deprecate the use of what is commonly described as "an excessive amount" of shellac, the allegation often being made that this will seriously impair the efficiency of the coil, and therefore the "minimum possible amount" is generally recommended.

A number of different types of coil have been experimented upon, but it will suffice for the purposes of this article to consider a few specimens, and we will take first the multi-layer cross coil illustrated in Fig. 1.

Multi-Layer Cross Coils

This coil is one in which the presence of moisture has little effect upon signal strength, as will be remembered by those who read my recent article on the effect of moisture in different types of inductances. The signal strength given by this coil in comparison with that of a commercial standard was measured, and the figure of 122 per cent. was obtained, this being with the cross coil in a dry condition after baking. The coil was now exposed to the air of a living room in the month of January for the period of four days, and it was then found that the signal strength had fallen to 116 per cent. of the standard, the latter being maintained in unvarying condition. The coil was next impregnated with dilute shellac and thoroughly baked.

The Use of Shellac

The shellac solution in question was prepared by dissolving the flakes of lac in absolute alcohol, and not in methylated spirits, since it has been observed that the latter gives a varnish of somewhat inferior quality. The varnish used was of such a concentration as would agree with the definition of "minimum possible quantity" so often recommended, the result upon the coil being to colour the cotton covering a pale yellow. The figure of 116 per cent. was now obtained upon comparing the

signal strength of the cross coil with that of the standard, and it is interesting to note that the effect of the shellac was to reduce the signal strength to the same figure as that given by the coil in its normal state of dampness when left in the living room mentioned. The effect upon the self-capacity of the coil may be estimated from the fact that after impregnation with shellac the correct condenser reading for a given wavelength (that of 2LO) was reduced by only two degrees upon the 180 deg. scale of a series condenser of .00075 μF capacity.

Exposure

The next test was to expose the impregnated coil to severe outdoor conditions in moist and foggy weather for a period of 24 hours, the coil being accompanied by a similar inductance which had not been impregnated in any way. Measurement now showed that the signal strength given by the unimpregnated coil was only 80 per cent. of that of the standard, it being remembered that the figure of 122 per cent. was given by the same coil in a fairly dry condition, while the impregnated coil had only fallen to 102 per cent.

Lattice Coils

It would seem that in this particular coil dilute shellac has an almost negligible effect upon the strength of signals obtained, and that it provides a considerable protection against damp, although it is by no means so complete an antidote as is generally believed. To bring out this latter point more clearly, we will proceed to consider a coil in which the effect of damp is very much more pronounced, viz., the lattice coil illustrated in Fig. 2.

This coil consists of 58 turns of No. 26 d.c.c. wire, and the measurements were all done, as in the case of the other coils, in the aerial circuit with a series condenser, signal strength being measured by the customary Moullin voltmeter method. When thoroughly dry this coil gave a figure of 96 per cent. of the standard, and when containing such an amount of moisture as would be absorbed in standing in a living room the value fell to 72 per cent., and to 2.2 per cent. when given the more rigorous test of outdoor conditions similar to those obtaining when the cross coil was investigated.

Impregnation

After these figures were obtained the coil was impregnated with the same concentration of shellac solution which was used in the case of the previous coil, and then thoroughly baked. The signal strength obtained was now 93 per cent. of the standard, showing a fall of 3 per cent. below the figure obtained before impregnation, but with the coil in a fairly dry state, and the change in condenser reading was 6 deg. The coil was now placed in a moderately damp room for a period of one week, after which it was found that signal strength had fallen to 59 per cent., which is to be compared with a value of 49 per cent. which had previously been obtained upon exposing the coil to these conditions without impregnation.

Fig. 2.—The lattice-wound coil is one of the most popular types and gave some interesting results.

One is led to a conclusion in the case of coils of this general type that impregnation with really dilute shellac has very little effect upon signal strength, but that the protection against damp thereby afforded is decidedly poor. The coil was, therefore, next given a second coat of more concentrated shellac solution, baked, and the figure of 91 per cent. obtained. The condenser reading was only altered by a further 2 degrees, and it will be seen that the reduction of signal strength was only of the extent of 2 per cent. The coil was now exposed to the same conditions as those which produced a reduction to 59 per cent. In the case of the light impregnation, and 49 per cent. when the coil had not been impregnated at all, and the figure of 72 per cent. was now obtained, indicating that a useful measure of protection had now been achieved.

Signal Strength

From these figures it appears that for coils of the tightly-wound multi-layer type, of which this lattice coil is a good example, a rather heavy impregnation is necessary to secure anything like adequate protection against damp, and when such an impregnation is used the effect upon signal strength is not really serious upon the ordinary broadcast wavelengths. Such protection as is afforded, however, is far from complete; so far from it, indeed, that one is led to suspect that some other method of protection should be sought.

Basket Coils

As an example of the results obtained in experiments upon a rather different class of coil, the following figures for a basket coil are given. The coil in question is illustrated in one of the photographs accompanying this article, and it will be seen that it is of the conventional type, wound upon a cardboard former, the wire used being No. 24 d.c.c. This coil is one in which moisture does not produce a very serious reduction in signal strength, as was explained in the previous contribution to which reference has been made. The reason for this would appear to be that the coil was rather loosely wound, and the turns do not press upon those beneath them at all tightly.

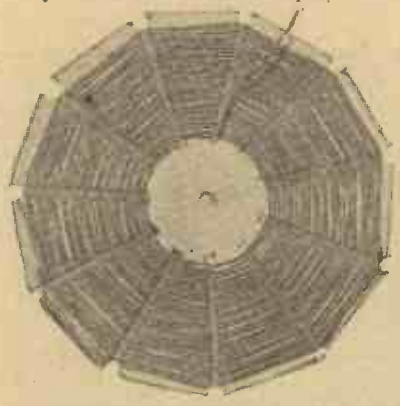
Slight Protection

Before impregnation and after thorough baking, this coil gave a figure of 115 per cent. of the standard, and after shellacking with the more dilute solution already mentioned, the figure of 111 per cent. was obtained with a negligible change in condenser reading. The effect of this impregnation as a protection against damp proved extremely slight, and merely made a difference of about 4 per cent. in the signal strength obtained after exposure of the coil to a given set of conditions of humidity, before and after impregnation. These figures conform closely with those obtained from a number of

other coils of this general type, viz., the variety in which the turns do not press tightly upon one another, and in which crossings are relatively few in number. Single-layer coils fairly loosely wound without the turns being packed very tightly together, for example, give similar results, and it is safe to conclude that the use of shellac of the much-diluted variety is of little practical value. Since coils of this general type are not affected seriously by a moderate amount of moisture, it would seem the better practice to leave them without impregnation, unless it is to be expected that they will be used under conditions of abnormal dampness, in which case heavy impregnation is called for.

Conclusion

The conclusions to be drawn from the series of tests from which I have selected the specimens described in this article appear to be that for coils which require adequate protection from moisture a fairly heavy impregnation is necessary to secure the desired end, and that where such a heavy impregnation is used the effect upon signal strength is by no means so serious as might be feared. It has not been considered worth while to carry out very elaborate tests upon the virtues of shellac, since it was early realised that this material left a good deal to be desired as a protection against dampness, and it is hoped that these notes will stimulate other experimenters to carry out similar tests upon various impregnating materials, with a view to discovering one which gives adequate protection against moisture without any undue sacrifice of signal strength or rise in self-capacity.



Experiments with basket coils seem to indicate that coils of this type are best used without proofing, unless employed in abnormally damp conditions.

In undertaking such experiments, it would seem desirable to standardise upon one particular kind of coil, and I would recommend the lattice as being quick and easy to wind, and giving good positive indications. Some procedure such as the following might be adopted. A series of identical coils should be wound, thoroughly baked, and their signal strength tested; it should be found that each gives within the limits of experimental error the same signal strength when in the thoroughly dry condition.

The coils may then be impregnated, each with its own particular damp proofing medium—say, dilute shellac varnish, concentrated shellac varnish, celluloid varnish, paraffin wax, and so on, and then the coils should be ex-

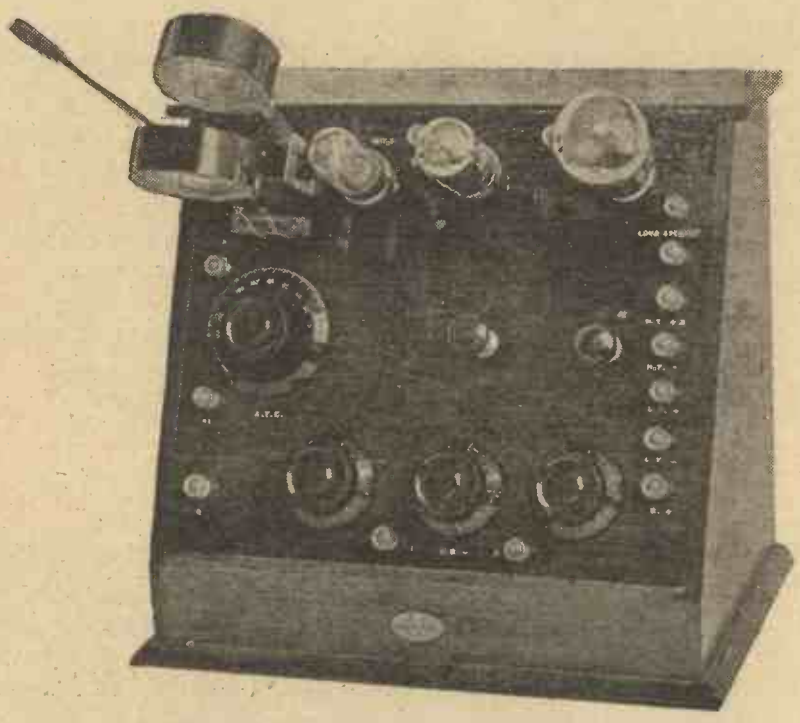
(*Continued on page 236*)

A view of the interior of the Zurich Broadcasting Station, a description of which appeared in the April issue of "Modern Wireless."

A CHOKE-COUPLED T

By JOHN

Full constructional details bution for the building of volume and pure reproduct addition to telephone recep stat



The receiver possesses a very distinctive appearance, and on account of the few tuning controls is very simple to operate.

Note the connections to the unusual form of grid coh

OF the available methods of low-frequency amplification probably that employing an iron-cored choke coil is the least used, and as the purity of reproduction obtainable by this method is, in my opinion, comparable with that obtained from resistance-capacity coupling, using the commercial forms of 80,000-100,000 ohms resistances, the choke method is deserving of far greater popularity than it at present enjoys.

Interest

Much interest has been aroused among readers of *The Wireless Constructor* by my article on " A Unit Choke Amplifier," in the April issue, and a very large number of constructors have made up this unit to add to their sets. The present receiver is, therefore, designed for those who desire a loud-speaking receiver for the local station, the one aim being to obtain the purest reproduction possible in the circumstances.

The Circuit

The circuit diagram, Fig. 1, shows that the aerial tuning condenser C1 may be used either in series with the aerial coil L1 by joining the aerial lead to A1, and the earth to E, or in parallel by joining the aerial to A, earth to E, and A1 to E. In the anode circuit of the detector valve V1 we have the choke coil Z1, while the second valve is coupled by means of the condenser C4, a leak R5 being provided. Similar components form the anode circuit of V2, while the loud-speaker is included in the anode circuit of the last valve.

Provision is made for reaction by the inclusion in the anode circuit of V1, of a reaction coil L2, which is variably coupled to the aerial coil.

Condenser Values

The values of the coupling condensers C4 and C5 are by no means critical, almost any capacity over .007 μF being suitable, while .25 μF may be regarded as a general figure for the upper limit.

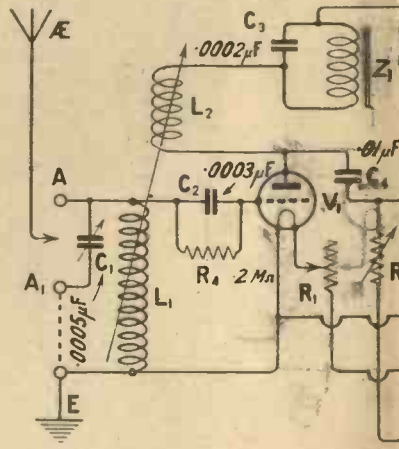


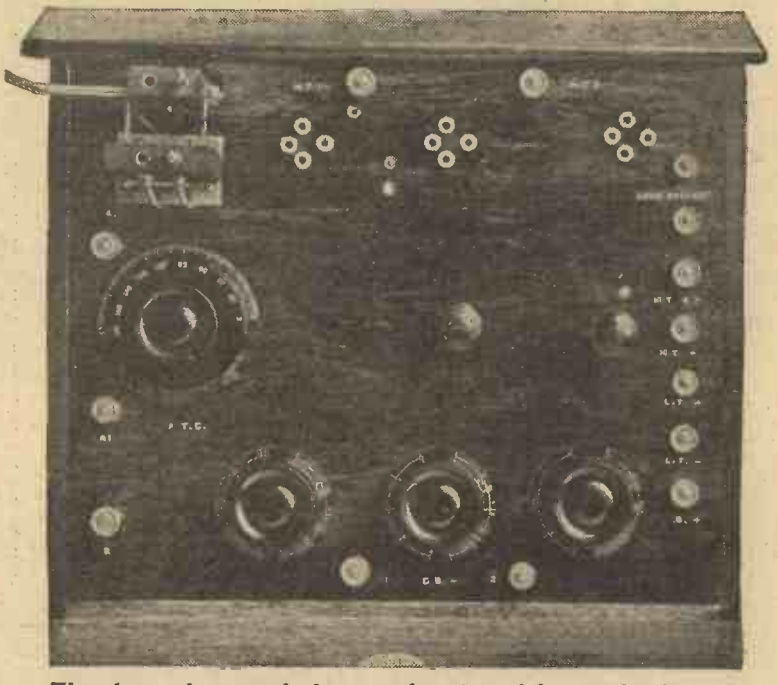
Fig. 1.—No value is given for speaker, as this is purely

THREE-VALVE RECEIVER

W. BARBER.

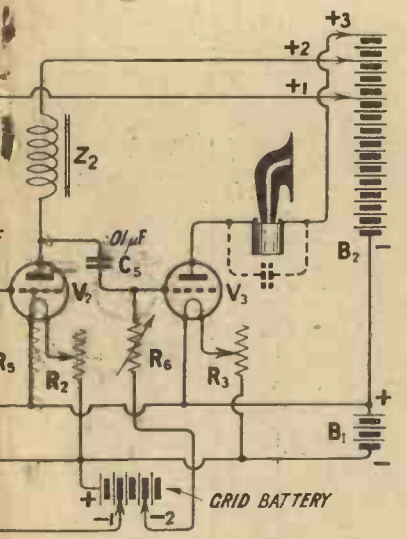
are given in this contri- a receiver which will give tion from the local station, in tion from the more distant ions.

e variable grid leaks and the denser in the background.



The above photograph shows a plan view of the panel indicating the simple layout.

The grid-condenser C2 and leak R4 have the usual values, .0003 μF and 2MΩ being suitable. I have used a " one-hole fixing " type of condenser and leak in this set, the combination being known as the Dorwood. On this component three tags are provided for soldering purposes, one being joined to one side of condenser and one side of leak, this tag being joined to the grid of the valve. Of the other two tags, one goes to the other end of condenser and the last tag goes to the other end of the leak, thus rendering it possible for the leak to be joined either across the condenser or across grid and filament. Complete instructions for connecting up are supplied with each condenser.



the condenser across the loud a matter for experiment.

Tone Control

No condenser for " tone control " purposes has been incorporated in this receiver, as the value of this condenser is a matter for experiment, each loud-speaker generally requiring a different value, and it would be a tiresome thing to have to remove the set from its cabinet each time a change of condenser became necessary. When the required value for a given loud-speaker is found, the condenser may, if required at all, be permanently wired up in the set.

Components

The usual list of components is appended. It may be understood that any equivalent make of part may be substituted for those mentioned if desired, but in regard to the choke, I do not advise any departure from the specification, unless the experimentor intends substituting one which he has personally tried out and is satisfied with.

1 panel 12 ins. × 10 ins. × ¼ in. or 3/16 in. (Radion Mahoganite).

Suitable cabinet (Camco).

1 two-way coil holder (Magnum).

2 L.F. choke-coils (Success).

3 filament resistances (McMichael dual one-hole fixing type).

1 .0005 μF variable square law condenser (Jackson Bros.).

2 .01 μF clip-in condensers and clips (McMichael).

1 Dorwood .0003 μF condenser with grid-leak holder.

1 2MΩ leak (Dubilier).

1 .0002 μF condenser (Dubilier).

2 variable grid leaks (Bretwood).

3 sets of valve sockets. I have used Clix here.

14 terminals.

1 set Radio Press panel transfers.

The Panel

No difficulty will be experienced even by a novice in drilling the panel to the dimensions and markings given in the diagram, Fig. 2. The majority of the components used are of the one-hole fixing variety, thus simplifying the construction by a reduction of the number of holes needed. It is hardly necessary to add that only ebonite of the best quality should be used, and the panel may be purchased from any of the advertisers in this journal with confidence. Equally simple is the next operation, which consists in mounting the various components in their correct positions on the panel.

Filament Resistances

The filament resistances should be mounted so that their soldering tags are all parallel and point in a convenient direction in order that the L.T.-busbar may be run to each with ease. Care should also be taken to see that the dials register the " off " position in conformity, as otherwise confusion may arise which may result in one valve not being turned off properly.

Fig. 3 shows the wiring of the receiver, and no trouble is anticipated in this respect if reasonable care be taken. A good plan is to cross out each line on the diagram as the wire it represents is soldered in place. When completed, the receiver may be mounted in any form of cabinet to suit the particular taste of the individual concerned. Personally, I very much favour the "desk" type of mounting, and have used such a box for this set.

Terminal Markings

The use of the three aerial terminals on the left of the panel has already been described, and will therefore not be repeated here.

Turning now to the high-tension terminals, it will be seen that there are three positive terminals, two at the back of the panel and one in the right-hand row, being the third from the top. This latter terminal supplies the anode voltage for the last valve, being connected to the loud-speaker terminal immediately above it, thus making the second terminal from the top the positive loud-speaker terminal. The other two H.T. + terminals are, from left to right, detector, and second valve, high-tension supply terminals. The detector valve will not require so high

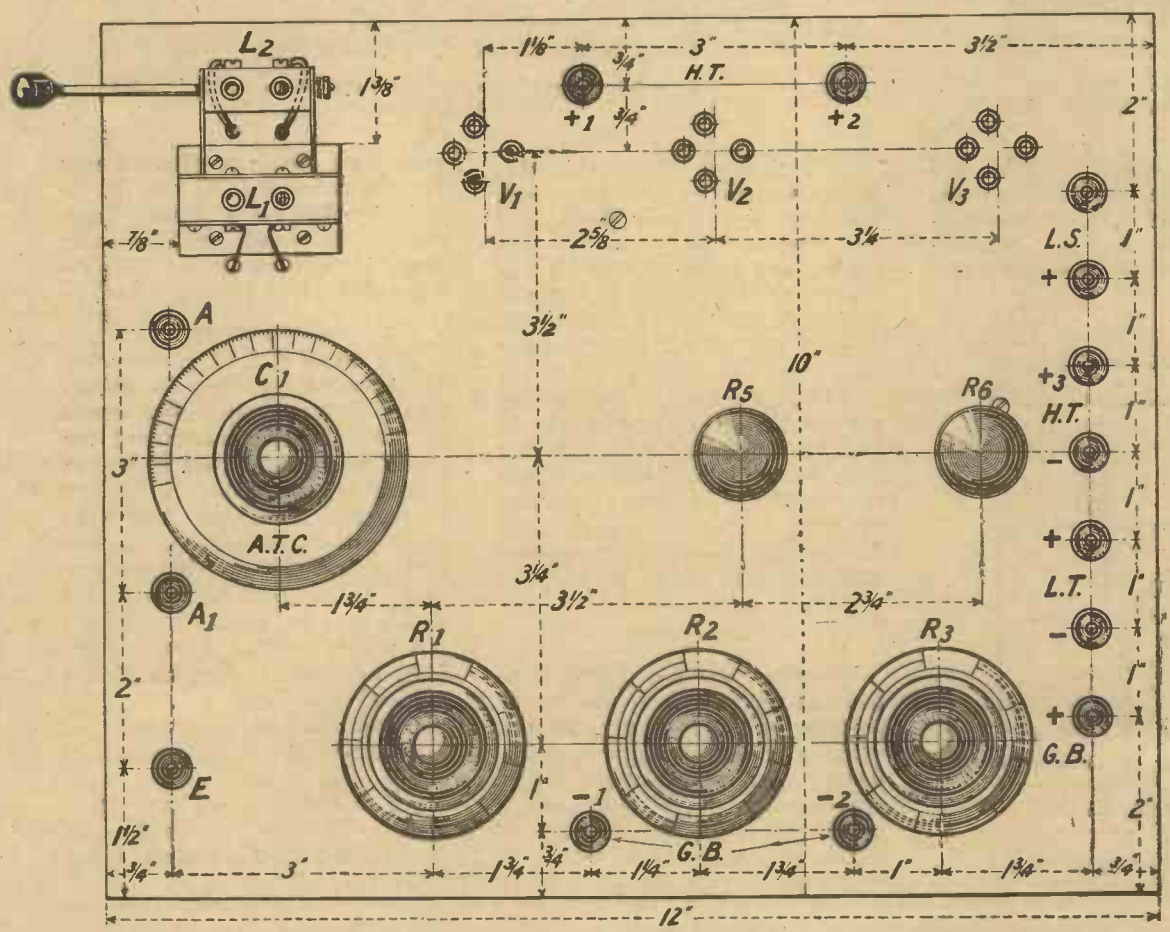


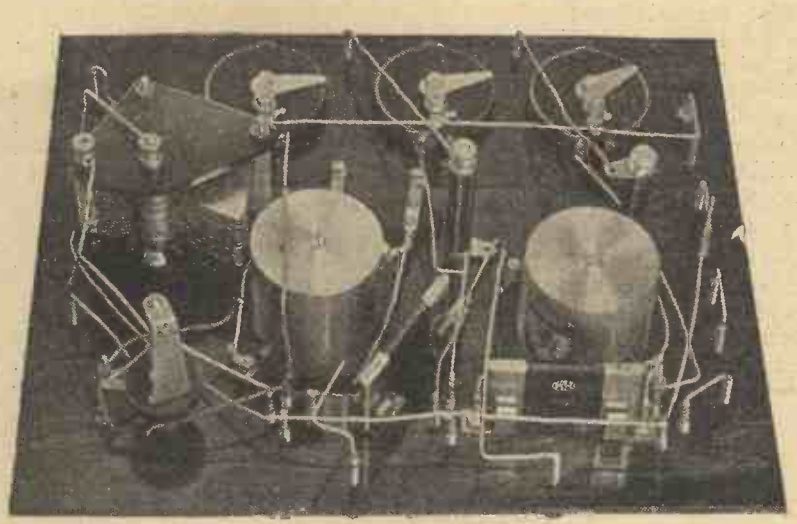
Fig. 2.—This layout of the panel showing all necessary dimensions may be obtained in Blueprint form upon quoting No. 119A.

an H.T. voltage as will the second valve, while the highest voltage may be applied to the last valve. The bottom terminal in the right-hand row is the positive grid-bias terminal, while the two negative grid-bias terminals are located in the front of the panel, that on the left suplying the second valve and that on the right, the last valve.

The values of the high-tension and grid-bias voltages applied to each valve will, of course, vary with the types of valve used, and must therefore be a matter for experiment, while the best value of grid-bias for a given valve will also depend upon the H.T. voltage applied to that particular valve, and different values should therefore be tried here also.

Testing

As an initial test, the H.T. + terminals may all be joined to one point on the battery, while the two negative grid-bias terminals may be joined to the positive G.B. terminal by means of a piece of wire. Parallel tuning may be used first of all, in the manner already indicated. A No. 35 or 50 coil, or the equivalent, is then inserted into the aerial socket, this being the fixed part



This photograph shows the manner of mounting the coupling condensers.

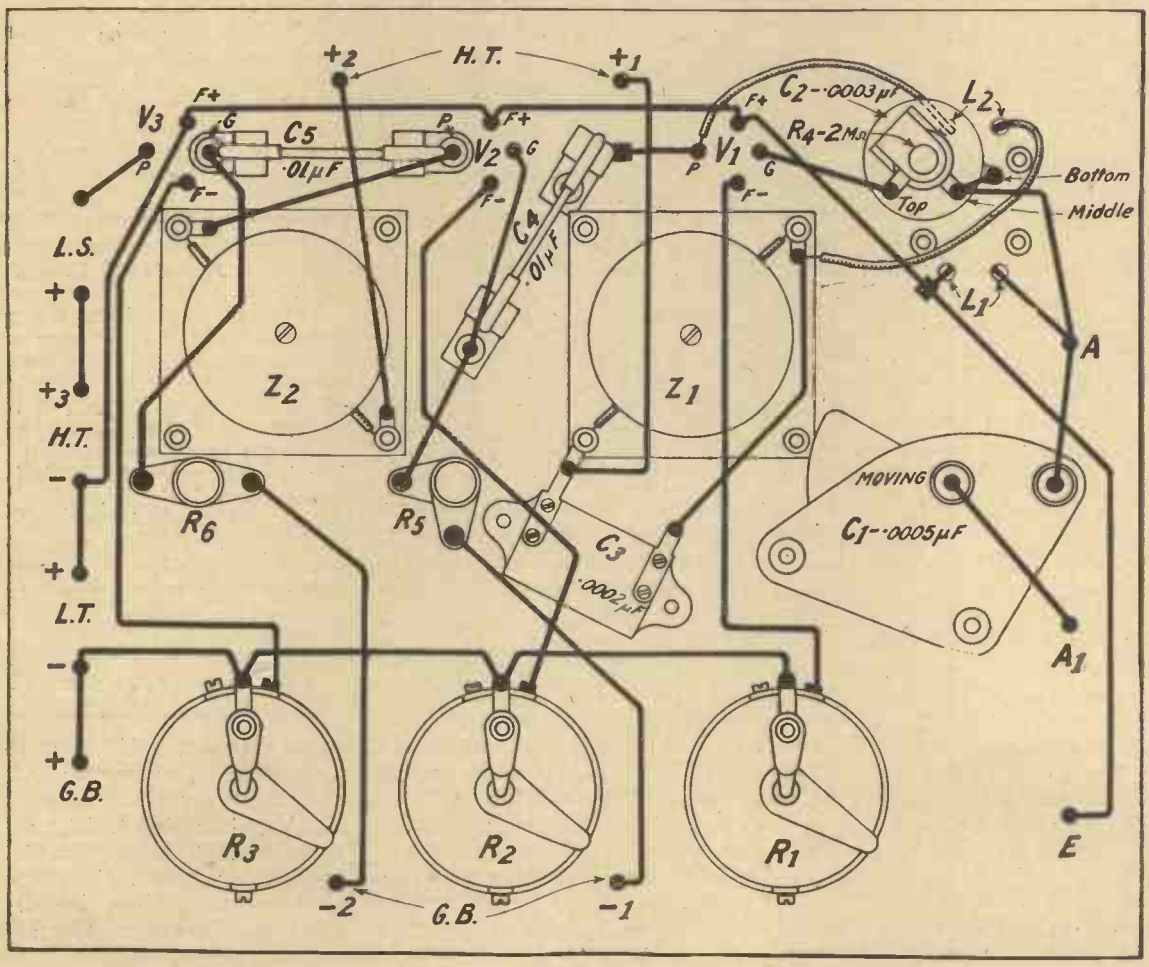
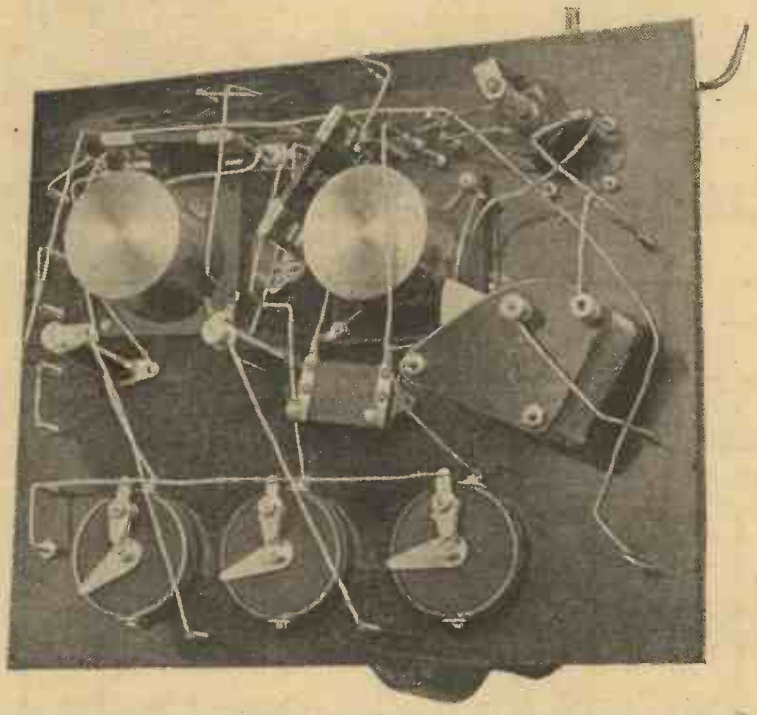


Fig. 3.—Practical back-of-panel wiring diagram. Note that the flexible reaction-coil leads are joined, one to the plate of V1 and the other to the choke coil Z1. Blueprint No. 119B.

of the coil-holder, while the reaction coil may be a No. 50, but will depend largely upon the particular aerial in use. The aim should be to have the reaction coil of such a size that the set will only just oscillate when the two coils are right close up to one another, and then, when working, keep them well apart.

Valves

In order to ensure safety of the valves, it is best to test the filament circuits before connecting up the H.T., and the valves should now be inserted and each tested by turning the resistance on. If each valve lights up, connect up the H.T., and, with the reaction coil well away from the aerial coil, vary the aerial tuning condenser until the desired signals are heard. Now bring the reaction coil slightly closer to the aerial coil and readjust the variable condenser. If no increase in signal strength results when the two coils have been brought quite close, the connections to the reaction coil should be reversed and the procedure repeated.



The method of joining up the Dorwood grid-condenser may be followed from the above view.

Grid Leaks

As soon as this has been done satisfactorily, the separate H.T. terminals may be brought into use as previously explained. The variable grid-leaks are adjusted to give the best results, and it will in general be found that this occurs when the knobs are screwed down quite considerably.

Results

Coming now to the results obtainable with this receiver, it was, as stated, primarily intended for loud-speaker reception from the local station, the great aim being purity above all things, and the desire is quite fulfilled. The set has been working as a "family" set for some months, and all who hear it agree that the quality is all that can be desired. A standard C.A.V. loud-speaker is used, and my particular model requires no condenser across it whatever. Background noise is entirely absent, the whole reproduction being very pleasing indeed.

On a long, low aerial, about twelve feet high, London, at, roughly, five miles, is audible two floors away, the announcer's voice being discernible, while orchestral items are loud enough to be enjoyed. On my main aerial, forty feet high, volume is sufficient for the announcer to be heard all over the house, and is far too great for the average room. On the same aerial Birmingham may be received at comfortable strength, while several other stations have been heard on the telephones. I can thoroughly recommend anyone who wants real music as opposed to mere noise to try this set, as I am confident that its good points will appeal strongly to the musical listener and his family.

Envelope No. 4

SIR,—Having built the "All-Concert de Luxe" receiver from the description by Mr. Percy W. Harris in Envelope No. 4, I think that it is only right that you should know how pleased I am with the set, also the results I have obtained. I am using an indoor aerial of 7/22 copper wire arranged in a triangle and placed under the roof about 25 ft. high. I have received all the B.B.C. main stations; Newcastle and Cardiff I have tuned in only when other stations have closed down, but these two stations are very difficult to tune in at Liverpool.

It is worth while mentioning that I am using this set about 500 yards from our local station, and when tuned to either Birmingham or Belfast and Continental stations the interference is very slight. The results are as follows:—

Manchester, loud-speaker, good; Birmingham, loud-speaker, good; Continental station, loud-speaker, fair; Bournemouth, headphones, good; Newcastle, headphones, fair; Cardiff, headphones, fair; London, headphones, good; Glasgow, headphones, fair; Belfast, headphones, good.

The components I am using are by no means first class, on account of the cost. With first-class components I consider that for three valves the set would take a lot of beating.

I now conclude wishing Mr. Harris every success with his future sets.—Yours faithfully,

ARNOLD JONES.

Liverpool.

The Use of Shellac in Tuning Coils

(Concluded from page 231)

posed to some uniform condition of dampness, such as would be obtained by placing them in an airtight box in which a wet sponge had been placed for perhaps 24 hours. The relative signal strength then given by the coils could then be taken as a measure of the efficiency of the various impregnations, from a damp-proofing point of view.

How to Use a Voltmeter

By JOHN UNDERDOWN.

An article of practical interest to those readers who as yet have not familiarised themselves with the various uses of a double reading voltmeter.

The double reading voltmeter as used by the author.

A SUITABLE voltmeter is an exceedingly useful instrument for determining the applied potential to both the plate and filament of a valve, and also for determining the value of grid-bias actually used. The mere fact that the scale reading covers the ranges one wishes to use is not in itself sufficient to show that the instrument is really satisfactory for wireless work. It should be remembered that a voltmeter is connected in parallel with that part of the circuit across which it is required to determine the voltage, and a little consideration will show that its resistance must be high. Consider, for example, the case of a voltmeter whose resistance is 100 ohms connected across a supply of 100 volts. By Ohm's law the current taken by the instrument will be the voltage to be measured, namely, 100 volts, divided by the resistance of the instrument. In this particular case it will be seen that a current of one ampere would be taken by the voltmeter so that an instrument of this resistance is totally unsuitable for measuring voltages of high-tension batteries, as such a load as one ampere is excessive and would soon ruin the battery even if only taken for a fairly short period.

Switching

In no case should an instrument of this type be allowed to remain in circuit in parallel with the battery, nor is this practice to be advised even with really high resistance instruments. Some arrangement should always be adopted so that the instrument can be used to measure the voltage required, and then immediately switched out of circuit. Taking now the case where the instrument resistance is 10,000 ohms the current taken will be one-hundredth of an ampere, or ten milliamperes. Ten milliamperes is a somewhat heavy load for the usual small type of H.T. battery, and it is not advisable to take this amount from the H.T. battery continuously. It will thus be seen that for measuring the voltages of H.T. batteries of the order of 100 volts a resistance of 10,000 ohms or above is indicated.

Cell Testing Meters

In no case would we advise the usual accumulator testing voltmeter to be used for the purpose of measuring the voltage of a high-tension battery, as the resistance of these instruments is often only of the order of 6 to 15 ohms. Even though such voltmeters would only measure the voltage of individual 3-volt units successfully, recourse should be made to them only in cases where no other means is available of locating a defective part of an H.T. battery.

Series Resistance

The current taken by a voltmeter may be reduced by using a suitable resistance in series with the instrument. This method is adopted in practice where it is desired to make the instrument read over an increased range. It will readily be seen by Ohm's law that if a series resistance equal to that of the instrument is used the current is halved, and at the same time, as only half of the voltage to be measured is applied to the instrument, the reading of this has to be doubled to give the true potential it is desired to read.

Reading Range

This is equivalent to doubling the range of the instrument. If the series resistance is made twice that of the voltmeter the current taken will now be one-third of that taken by the instrument alone, whilst its scale reading will have to be multiplied by three. Thus, if a series resistance of N times that of the voltmeter is used the scale reading will in each case have to be multiplied by N + 1, whilst the current taken will be inversely proportional to N + 1.

Where the resistance of a voltmeter is known, and this is too low for the purposes indicated above, series resistances may often be used with advantage. These may be obtained from a number of instrument makers, and little difficulty should be experienced, in many cases, in adapting the instrument for wireless purposes.

Double Reading Voltmeters

In practice it is a good thing to obtain an instrument with two or more ranges. For example, if one is obtained with a reading of 0 to 10 volts and 0 to 100, it may generally be used for filament readings, grid-bias voltage, and also for reading the value of high-tension applied to various valves. In my own case I am using a moving coil instrument with ranges of 0 to 10 and 0 to 100 volts, and find it suitable for general wireless work. The resistance for the 0 to 10 range is 1,318 ohms, whilst for the 100 volt range a multiplying factor of ten is used, making the total resistance 13,180. This means that when connected across a 100-volt high-tension battery 7.6 milliamperes are taken.

Application

Dealing with the practical application of a voltmeter such as previously described, reference should be made to the circuit diagram of Fig. 1, which shows a practical 3-valve circuit with separate high-tension tappings to the H.F. valve, the detector, and the low-frequency valve, and shows the use of grid-bias on the last valve. The points across which it is desirable to know the applied voltage are between 4-1, 9-1, 6-2, 7-3 and 5-4, 4-6, 4-7, 4-9 and 8-9, the first figures indicating the points to

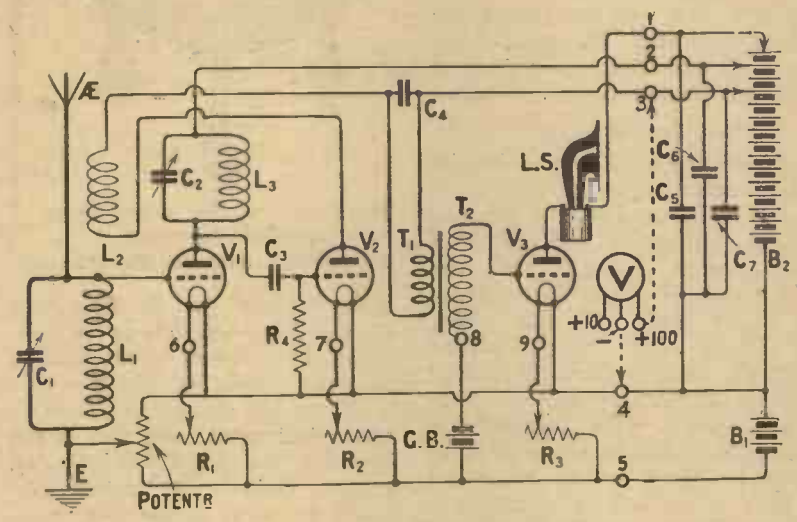


Fig. 1.—In this circuit the numbered points indicate where the voltmeter should be connected for various readings as described in the text.

which the negative terminal is connected. The voltmeter may readily be connected on the panel or alternatively may be used as a separate unit with suitable flex leads. Generally it will be found most useful to have the instrument detached from the set. To measure the voltage applied to the high-frequency valve the negative terminal of the voltmeter should be connected to 6, whilst a lead should be taken from the positive 100-volt terminal of the meter to the point 2. To measure the voltage applied to the detector the positive 100-volt terminal should be connected to 3, whilst to measure that applied to the low-frequency amplifying valve the latter terminal should be connected to 1, the negative terminal of the instrument being connected to 7 and 9 in these cases.

When accumulators are used their voltage should in no case be allowed to drop below a value of 1.8 volts per cell, that is, 5.4 volts for a 6-volt accumulator, and the battery voltage on load, that is, when the valves are alight, should be obtained by connecting the negative voltmeter terminal to 5 and the positive 10 terminal of the voltmeter to 4. This is, of course, readily done by connecting the appropriate leads from the voltmeter across the low-tension terminals of the set.

Valve Protection

To secure maximum life valves should not be run above the maker's filament rating, and to determine that the correct filament voltage is not being exceeded readings should be taken across the actual valve legs, the negative terminal of the voltmeter being connected to 6, 7 and 9 respectively, whilst the positive terminal is connected to 4.

Grid Bias

In order to reduce the value of high-tension current taken by the last valve to a minimum whilst at the same time working on the correct part of the characteristic curve for undistorted reproduction, it is necessary that the value of grid-bias be adjusted with some care. A suitable value of high-tension voltage used on the last valve may generally be determined from the maker's characteristic curve, and the grid-bias battery should be so adjusted that in conjunction with the drop obtained across the filament resistance R3, a suitable value is applied to the grid of the last valve. The actual value of grid-bias applied is measured between the negative filament leg of the valve and the negative side of the grid-bias battery, namely, the side connected to the secondary of the L.F. transformer. For this purpose the negative terminal of the voltmeter is connected to the point marked 8, whilst the positive terminal is connected to 9.

RADIO NEWS

The first British amateur to pick up messages from NRRL, the experimental station of the U.S.S. *Seattle*, cruising the Pacific with the American fleet, was, we understand, Mr. J. H. D. Ridley, of South Norwood. During the last week of April Mr. Ridley heard NRRL calling on a wavelength of 54 metres. Using a two-valve set he reports hearing the station at strength R-6.

His own station, G5NN, is now transmitting regularly on 45 and on 25 metres, and has been quite successful in getting across the Atlantic in daylight.

* * *

Both Mr. Albert Sammons and Mr. William Murdoch will be taking part in a Chamber Music programme at Manchester on Wednesday, June 10. They are to play a Brahms and a Goossens Sonata, as well as solo pieces. Mr. Arthur Wilkes, principal tenor of the Manchester Cathedral, will contribute a group of Schumann songs, and Miss Olive McKay will include a group of negro spirituals.

* * *

Gounod's "Faust" will be performed at the Manchester Station on Saturday, June 13, and will be relayed to 5XX. The principals are all well-known local artists. Miss Lily Allen is taking the part of Marguerite; Miss Rachel Hunt, Siebel; Mr. Wilfred Hindle that of Faust; Mr. Lee Thistlethwaite that of Valentine, and Mr. Herbert Ruddock that of Mephistopheles. They will be assisted as usual by the 2ZY Opera Chorus and the 2ZY Augmented Orchestra, conducted by Mr. T. H. Morrison.

THE SINGLE-VALVE RECEIVER FOR KDKA IN THE ARGENTINE

SIR,—I thought you might be interested in the performance of the "Single-Valve Receiver for KDKA," described by Mr. Stanley G. Rattee in *Modern Wireless* of March last. I had been experimenting with short wave receivers for some time, but I was so struck by the simplicity of construction of this set that I decided to make it.

The coils were constructed according to instructions, but I found ebonite clamps more satisfactory than string and mica for securing them.

In practice the receiver has proved very successful considering the difficulties of receiving conditions here. Some nights reception is impossible due to atmospheric interruption, the only sound in the 'phones being a continuous roar, punctuated by loud cracks. In the summer it is quite probable that five nights out of six are like this, so now that the winter is approaching reception should improve enormously. I can get KDKA any night now, sometimes good, sometimes bad, but a low-frequency single-valve amplifier is added to improve the strength. Many American amateurs are received regularly, and on one occasion Australian A4Z was copied for about an hour while working with RCB8. American reception is all the more remarkable when one considers that the waves travel over land most of the way, and pass through the tropics as well.

The most remarkable thing about the set is its quietness, and the capacity effects are negligible when extension handles are used. I have to thank Mr. Rattee for a very efficient receiver, and also to thank Radio Press for publishing such excellent papers.

Hoping that this letter may prove of some interest to you and your readers.—Yours faithfully,

WM. A. IMPETT.

Buenos Aires.

PLUG-IN COILS

SIR,—I am glad to note that in your issue of May 6 the plug as used in present-day plug-in coils is being brought under the limelight ("A Short-wave Coil Mounting," by R. W. Hallows).

The great band of wavelengths that can be covered by an interchangeable coil system is a tremendous advantage, and should be earnestly sought after by manufacturer and experimenter alike.

In my opinion, the present-day plug-in coil will die a natural death owing to the amount of work being done on the lower wavelengths and the super-efficient inductances that are being evolved almost daily.

The above illustration is a reproduction of a photograph which was transmitted by wireless from Honolulu to New York. On pages 223 and 227 photographs of the receiving apparatus are given.

These latter, without exception, have mountings other than the standard plug mounting. There is no reason why a self-supporting coil of 15 to 20 S.W.G. of low self-capacity and H.F. resistance should not be adaptable to the plug-in system for the lower wavelengths of 50 to 150 metres.

The sooner this matter is tackled by manufacturers, the greater will be the success of British goods in the fierce competition that is developing with the Continent.

It is now up to the people who produce the coil and similar holders to give us the same articles with the pins and sockets at least 2 in. apart. Who will be the first?—Yours faithfully,

JAS. HOWAT.

Millport, Scotland.

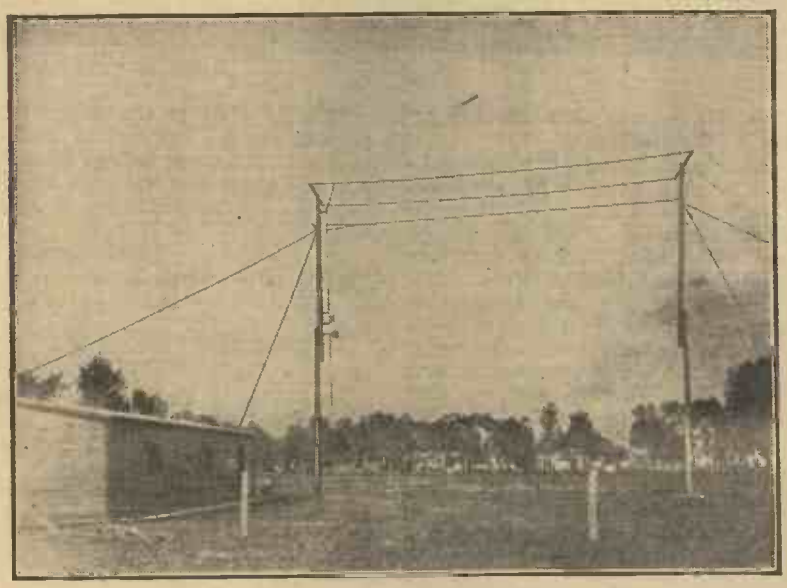
SUPERHETERODYNE RECEPTION

SIR,—I send these notes in the hope that others may give their experiences with this very interesting form of reception.

My instrument is purely experimental and has been re-built many times since I first tried this form of reception three months ago, and it will probably be modified further as experiment suggests improvements. At present it is board mounted with a long vertical panel carrying the controls. After trying various forms of the Tropadyne the separate oscillator valve was also discarded. I now use an old Bowyer-Lowe vario-coupler for the Tropadyne. It is very easy to tap at its electrical centre and the rotor forms an admirable plate coil, the variable coupling being very helpful. The filter is a home wound transformer, the primary being tuned by a small fixed condenser. There are three stages of long-wave amplification, the coupling being by home wound transformers with their secondaries separately tuned with .0005 μF variable condensers. I have tried many forms of coupling with units tuned by fixed condensers, but while it is simple enough to construct units matched by wave-meter, I find that when these units are put in place the accidental capacities in wiring and surrounding components are very difficult to balance, and consequently more volume is obtained when each transformer is accurately tuned by means of its own condenser. In an experimental receiver it is more interesting to have everything variable, and if I were building another I should make the filter condenser variable, too. A potentiometer is fitted to the common negatives of the transformer secondaries, and while it is rarely necessary for stabilising purposes, it

forms a ready means of reducing volume. The long-wave detector valve is followed by two stages of note magnification, the first transformer and the second resistance coupled. The latter is rarely used, as the volume is usually quite sufficient for the large Amplion with the single stage.

A low-loss frame of 11 turns of No. 14 d.c.c. in a helix 1 metre in diameter brings in all European telephony after dark, the tuning-in being accomplished direct on the Amplion. When the directional properties of the frame are not required, volume can be increased by winding a single wire round the outside of the frame and connecting it to a small indoor aerial and earth.



The masts and aerial at the Westinghouse Electric Manufacturing Company's station at Hastings, Nebraska. The call letters are KFKX.

The quality of reproduction is good, though perhaps not quite so good as the "Puriflex" (*Modern Wireless*, July, 1924, by Percy W. Harris), which I keep as a standard of quality. The outstanding characteristics seem to be selectivity and sensitivity. The former is wonderful, and I have not yet come across two transmissions which cannot be perfectly isolated so long as they are not absolutely heterodyning each other. The extreme sensitivity is most fascinating, and so long as a signal rises above static ratio limits it seems possible to tune it up to almost any volume.

My one great disappointment is that the instrument is no more successful than, say, the "Anglo-American Six" in excluding unwanted Morse. This district is a very live spot, but I hope it is unique for interference. Many of the world's greatest liners describe a full half-circle round my aerial, at one point hardly a mile distant, and there are several busy shore stations in sight, to say nothing of the activities of what some wag once described as our "silent" Service! Of course the frame is in some measure "directional," so that in practice one may choose which particular bunch of piercing cornet notes shall predominate. On one orientation of perhaps five degrees the ear-splitting nature of these notes can be somewhat reduced, but the remaining 355 degrees of orientation rarely make a shred of difference. On some evenings all telephony is entirely obliterated for one hour out of four, and only on rare and fleeting occasions one is able to realise what reception might be if only the spark had never been invented.

Although the Tropadyne condenser is only of .0002 μF capacity, I find a small vernier essential. B.T.H. B5 valves are used with 48 volts on the plates and B.T.H. B6 with 112 volts for the note magnifiers with suitable grid cells. The filament temperature of the first intermediate valve seems critical if one desires the greatest sensitivity, and also the Tropadyne coupling needs careful adjustment. I have tried reflexing the L.F. stages, but have not been successful in retaining the same pure reproduction which the straight circuit gives. With modern .06 valves the saving of current is not such a vital factor as it used to be, and the straight circuit is certainly more flexible from an experimental point of view.

—Yours faithfully,

DONALD STRAKER.

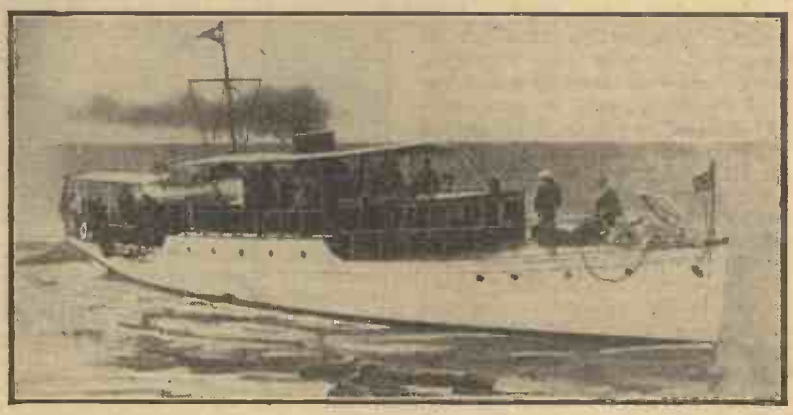
Bembridge, Isle of Wight.

A GENERAL-PURPOSE TWO-VALVE RECEIVER

SIR,—I have constructed the "General-Purpose Two-Valve Receiver described by Mr. John Underdown in *Wireless Weekly*, May 6 issue. The results are astounding, both as regards selectivity, purity, and volume. I am using a Naylor "Fulstop" variable condenser for tuning, and have also included a variable gridleak. The results obtained are, all B.B.C. stations, 5XX, Radio-Paris, Eiffel Tower, and at least six foreign stations. Several of these I can receive on the loud-speaker. In conclusion, I must congratulate Mr. Underdown on designing such a splendid set.—Yours faithfully,

P. S. GREEN.

Bolton, Lancs.



Commander E. F. McDonald, Jr.'s 95-foot yacht "Zenith," which is now being equipped with a 1 kw. broadcasting station, the call letters of which will be WSAX. This station will transmit on 268 metres and 51 metres simultaneously. The 51 metre wavelength will be used for broadcasting purposes. A photograph of Commander McDonald together with Mr. John L. Reinartz, was given in our issue for May 13.

RECEPTION CONDITIONS IN EAST AFRICA

SIR,—It may be of interest to you to hear of reception conditions in this country. On a four-valve 1—V—2 set, tuned anode, all the

South African stations come in at loud-speaker strength. Hamburg and Madrid are the only European stations received clearly. The amateurs of England might complain of their X's, but for four months of the year reception, even of J.B. (310 miles away), is practically impossible.

May I congratulate you on your very excellent paper (which I have taken from No. 1), and also the "Low-Loss Tuner for Short Waves," by Mr. Percy W. Harris (November 19, 1924). I constructed the set according to instructions, and using a power valve receive KDKA on 68 metres on the loud-speaker.

May I also congratulate you on your latest innovation, *The Foreign Radio Times*. I think it is great. Please make it a permanent feature and include Radio-Iberica.—Yours faithfully, ALLAN J. IMRIE.

Portuguese East Africa.

THE PROOF OF THE PUDDING . . .

SIR,—Although somewhat in doubt as to the propriety or otherwise of writing to you, yet I feel it is only due that I should do so, inasmuch as it is in the nature of an unsolicited testimonial.

In the April issue of *Modern Wireless* Mr. Percy W. Harris, M.I.R.E., gave some sound advice *re* the construction of first sets, and I quite hold with all he said.

Now for my own experience. I am 53 years of age, have never handled a soldering iron previously in my life, never used a drill, don't know what 2B.A., 4B.A. or 6B.A. signify, didn't know what a scriber looked like, and, in fact, have only used a hammer for knocking nails in occasionally. With all this as a handicap and desiring something better than a crystal set, I decided to have a try at building a valve set. Liking the title "All-Concert de Luxe," I paid for and obtained Radio Press Envelope No. 4, by Percy W. Harris, and the fun started. I got so engrossed with the marks on the blue print and layout that I forgot to go out in the evening, and, aided and abetted by my wife (or I should say "egged on"), I made a start three weeks ago.

First I drilled out the panel—it would have been better had I had all the components—then drilled out the strip, I mean strips, because I was only a $\frac{1}{32}$ or so inaccurate on the positions of the valve legs on my first strip, so had to drill another. Then I started mounting, but not with the components specified. Consequently I have too many holes in the panel. However, I got everything on, and then the real fun began with the soldering; the underpart of the strip has at the moment sufficient solder to spare to complete wiring a six-valve set!

I struggled on, however, and learned how to solder, and although I had to do a lot of cross wiring on account of using the different components, you will be pleased to know I finished the wiring a better tinman than when I started, and on trying the set I *got results*, both on the 'phones and the loud-speaker, and the set is simply "top-hole." I am delighted with it and myself.

Mr. Harris' instructions are splendid, and can be followed by anyone with the usual degree of intelligence. I am sure there could not be other readers any worse handicapped than I from a mechanical point of view, so let those new constructors Mr. Harris referred to take heart, follow Radio Press instructions carefully, and all will be well.—Yours faithfully,

Stoke-on-Trent. ALFRED GREER.

THE COWPER "SERIES-TUNED ANODE"

SIR,—I am writing to you about a wireless circuit of Mr. Cowper's design which I do not think has received the attention that it should. This is the "Series-Tuned Anode." I have during the last 18 months tried many circuits, but have found that for power, selectivity, sim-

plicity and ease of control nothing can touch it. I feel quite sure that if it were better known the listeners using the normal types of tuned-anode would be very few, and this would be all to the good, as we have tested and found interference from it to be very slight in comparison to the normal tuned-anode.

In my case, using one stage of H.F., reaction is on to the anode coil from the plate circuit of the detector valve; this, besides minimising interference, makes for easy control, as the anode condenser dial may be calibrated and set to the reading for the desired station when required; reaction in any case makes so little difference to the tuning.

We are at present placed only about two miles from our local station, and have a very short and low twin L type aerial, and have no difficulty in tuning out the Leeds station for Manchester and Sheffield with not the slightest background, and for London and several relay stations with but slight interference—not sufficient to spoil the programme.

Using one stage of H.F. by the "Series-Tuned Anode" method, detector and two stages of L.F., we have had most of the distant stations in Europe, but in no case have we found difficulty in separating stations, except in the case of Madrid-Hamburg and Lyons-Bournemouth, which are separated only by a few metres; even here not the slightest interference with speech on either station was apparent, but the heterodyne note could be heard.

In contrast to this I know many people with three and four-valve sets in this neighbourhood, and even the best of them—some loosely coupled—give Manchester with more interference than ours does on 2LO, except when the latter fades, which it does more often since the new transmitter has been in use.

In conclusion, I might add that I have had and am having great pleasure through reading *Wireless Weekly, Modern Wireless* and *The Wireless Constructor*.

I was extremely interested in the article by H. Warwick on the Weston Relay in the April 15 and 29 issues of *Wireless Weekly*.

With regard to the *Foreign Radio Times*, I should like to see this published as a separate paper or supplement with a whole week's programmes. Probably the most "listened-to" Continental stations in this district are Radio-Paris, Brussels and Petit-Parisien (when 2LO is not working).

Hoping these particulars may be of interest to you.—Yours faithfully,

K. C. BARKER.

Headingley, Leeds.

A GERMAN APPRECIATION OF THE SINGLE-VALVE RECEIVER FOR KDKA

SIR,—Please let me convey my heartiest congratulations on the wonderful "Single-Valve Receiver for KDKA," by Mr. Stanley G. Rattee. I built this little set quite recently, and it gives every satisfaction. An enormous number of amateur transmitting stations are received at good strength, some of them even audible at a distance of a yard from the 'phones, using a good outdoor aerial, but without any amplification. During the week-end (May 7) I tested the receiver for KDKA. At 2 o'clock I heard the announcer saying: "This is KDKA, Pittsburg," and from this time onward till the time-signal at 4 o'clock I received this station at very good strength; fifteen times the announcer was understood when spelling the call-sign. During the morning of May 17 the reception of KDKA was again tested, and results were quite as good or even better than a week before. Though I read a great many German, French, Italian and English wireless papers there is none equal to Radio Press publications. Wishing you even greater success.—Yours faithfully,

ADOLF DREIFUSS.

Frankfurt, Germany.

Apparatus we have tested

Conducted by A. D. COWPER, M.Sc., Staff Editor.

"A.C." Anti-Capacity Valve Sockets

A type of valve socket for fixing directly in the panel, which certainly possesses a minimum stray capacity between the sockets, is the "A.C.," supplied by Messrs. Sparks Radio Supplies. Sets of four sockets are provided in packets containing either sockets alone, the same with a brass drilling-jig, or these together with a suitable No. 16 twist drill, in each case at a most moderate price. The sockets cut their own screw-thread in ¼-in. ebonite, or, if desired, a No. 2 B.A. taper tap can be used with caution. After drilling for one socket, the tempiate is secured on the panel by a small bolt and nut provided, for the drilling of the other three holes, so that it is impossible to get them misplaced. It is suggested that the sockets be kept upright whilst screwing them into position by threading them over the pins of a burnt out valve. The back ends of the sockets are provided each with a hole and set-screw to carry bus-bar connections without solder or back-nuts.

On actually following the instructions, it was found a simple matter to apply the sockets as indicated, a neat and compact flush-mounted holder resulting. The stray capacity between the sockets, when measured on this holder, was less than we have observed with any other type, being of the order of one-fifth of 1$\mu\mu$F. We can certainly recommend these simple but very effective holders.

"Ray-di-o" Earth Tube

Messrs. Symplex Manufacturing Co. have sent for our practical test a sample of the "Ray-di-o" earth tube, of "Armco" iron. This consists of a 2-ft. length of iron pipe, with pointed end to drive into the soil, and fitted with a terminal cap taking a brass adaptor for connection of the earth-lead wire; this has a stout spring between cap and tube, ensuring good electrical contact. The tube is filled with a hygroscopic material, and perforated to allow of soakage of water. On trial, it was noticed that there was some danger of breaking the cap or burring the screw-thread unless a

piece of hard wood was interposed between the top of the tube and the heavy hammer used to drive it into the ground. It was driven well home in moist clay soil, and water poured liberally around it. On trial the next day, when rain was falling and the soil was thoroughly damp, in conjunction with both a single-wire aerial of moderate height and a large high aerial of triple wire, and tested against an excellent direct water-pipe earth on a low-loss crystal receiver, the relative signal-strength with this earth-tube was 87 per cent. (mean) of that obtained with the regular earth, indicating an appreciable resistance offered by the small earthing surface provided by the tube. By ordinary aural observation little difference was noticeable; with a poor aerial or with a set not of maximum efficiency very likely no difference at all would have been noticed. Where a good water-pipe or similar large earthing system is not available this device of a pipe to drive into the soil offers an effective alternative.

Quick-Change Basket Coil-Holders

For the amateur constructor who winds his own small basket coils and who wishes to use the ordinary type of coil-holder with these, a plug-in device which allows a rapid change of coils without necessitating the stocking of a number of plug fittings may have a special appeal. Messrs. Hall & Brenard, Ltd., have sent for inspection and trial samples of such a device in their "Change-Quick" basket coil-holder. This consists of an ordinary coil-plug fitting, carrying, however, two springy wire arms about 2½ in. long, and connected to plug and socket respectively. Small double fibre discs are provided, one for each basket coil in use, with terminal screws fitted with grooved circular nuts between which, when applied, the spring arms of the holder engage, acting at the same time as a support and as conductors. So that to mount a small basket coil the discs are fixed on each side of it and the ends of the wire taken to the screws; then the whole coil can be slipped into place on the holder in a second, and as easily removed. The discs were but 1½ in. diameter, and the whole device proved to be of a light construction, not suitable for the large, heavy type of coil. With a small coil of a limited number of turns and medium wire gauge it is eminently suitable for experimental work.

"Mozzullphone" L.F. Transformer

From Messrs. B. D. S. Wireless, Ltd., we have two specimens of their "Mozzullphone" L.F. intervalve transformers. These are of a familiar type, with open iron frame and large vertical coil; the iron circuit is unusually generous in cross-section, whilst care has evidently been taken that bolts do not pass through the laminations. The terminals are of good size, easily accessible and clearly marked. The instruments are of the medium-large order, being about 3 in. square by 1¾ in. The resistance of the windings on measurement, indicated a 5:1 nominal ratio, but the values were rather lower than is usual. Insulation resistance between windings and from windings to frame was adequate. On practical trial, using optimum conditions as to H.T., grid-bias and small power valve, etc., the build-up, in comparison with our standard types, left something to be desired, and the tone had not the rich fullness that indicates even amplification down to the lower audio-frequencies. However, compared with many moderate-priced instruments, there was no very noticeable distortion, and the performance would no doubt satisfy many experimenters.

Information Department

SUPPLIED BY RADIO PRESS SERVICE DEPT., LTD.

C.H. (EAST HAM) has been reading an article on a set using three stages of transformer-coupled high-frequency amplification in which the use of "negative reaction" is advised. He wishes to know what negative reaction is and how to obtain it.

When a high-frequency stage or stages is incorporated in a receiver there is always a tendency for self-oscillation to be set up due to the handing back of energy from the plate to the grid circuit of the high-frequency amplifier through the plate to grid internal capacity of the valve and coupling in the wiring. Whether the set actually breaks into self-oscillation is determined, among other things, by the damping of the windings in the grid and anode circuits and in the aerial and earth system.

If the aerial and earth system is of low damping some method of stabilising the set has often to be adopted. In practice a number of methods may be adopted, such as the use of a potentiometer, the introduction of Neutrodyne stabilisation, or the use of simple negative reaction. The former method, by making the grid of the H.F. valve somewhat positive with relation to the negative end of the filament, introduces sufficient damping to give stability. When, however, three stages of high-frequency amplification are used if potentiometer stabilisation is adopted, it will often be found that the potentiometer setting may be almost fully positive before complete stability results. This is far from being really efficient, and hence some other method should be adopted. The Neutrodyne method can be applied to three stages, but this necessitates the use of three Neutrodyne condensers, thus making the set somewhat more elaborate and costly to construct. Where this difficulty is regarded as a very serious one it can be overcome by using negative magnetic reaction, although the set will not be quite so easy to handle as one in which the Neutrodyne method is used.

Negative reaction is readily obtained by coupling a *small* coil in the plate circuit of the detector valve to the grid circuit of the first H.F. amplifier valve in the normal way. The direction of the leads to this coil, however, is reversed to that normally used to obtain positive reaction. A very small reaction coil must be used, of the order of a 25 coil or less, and this should be only loosely coupled to the grid coil. Bringing this towards the grid coil

will tend to stop the set oscillating providing it is not brought too near. In this latter case the set may be made to oscillate as a result of the capacity between the coils producing ordinary capacity reaction. It is, therefore, necessary to use such a size of coil, placed at such a distance from the grid coil that sufficient magnetic coupling is obtained without producing too much capacity reaction.

W.C. (BOGNOR) is using the Simplicity 3-valve set described by Mr. G. P. Kendall in Radio Press Envelope Number 3 and obtains excellent results but wishes for slightly more volume and asks our opinion on how to use a power valve in the last stage. He explains that at present he is using three .06 type of valves which take from 30 to 80 volts high-tension. He wishes, however, to use a power valve for which the makers advise a value of the order of 100 volts for the anode supply. Our correspondent wishes to adhere to the useful switching incorporated at present.

Extra high-tension and grid bias may readily be used on the last valve in our correspondent's set, but it will be necessary to make slight alterations to the wiring and also to use a separate high-tension battery for the extra voltage required by the last valve. Referring to the wiring blueprint it will be seen that a short lead is taken from the plate socket of the last valve, namely, the note magnifying valve, to one of the top contacts of the switch. This lead should be removed and a connection from the plate brought out to a further terminal which will constitute the *plus* tapping to the extra high-tension battery. A lead from the previously mentioned switch contact should also be brought out to a further terminal which will serve for the negative tapping to this extra battery.

The voltage of the extra battery will be such that when added to that of the original battery which supplies all three valves the total is that required by the power valve. If, for example, 60 volts are normally used on the three valves and the power valve requires 100 volts, 40 volts are indicated for the additional battery. This is not a stock size, and we would advise that a 36-volt battery be obtained for this position.

Provision for grid bias is readily made by removing the lead from the O.S. terminal of the L.F. transformer which goes to one side of the resistance R3. O.S. will now be brought out to a further terminal which will become "grid bias *minus*." "Grid bias *plus*" will be coincident with "L.T. *minus*," so that there is no need for an extra terminal.

A.S.W. (RUTHERGLEN) submits a diagram of a 3-valve set using variometer tuning on the aerial side, tuned anode coupling for the high-frequency valve and reaction on to the anode circuit. He wishes to know how to adopt this circuit for the Chelmsford wavelength and to know whether loading coils would satisfactorily meet the case.

The circuit submitted can readily be adopted for the reception of Chelmsford by adding a loading coil in series in the aerial circuit. We do not think, however, that sufficient variation will be obtained by tuning on the variometer, and would therefore advise that an externally boxed variable condenser of .0005 μF in value be connected across the aerial and earth terminals. A No. 150 coil should be used for loading this circuit. Apparently from our correspondent's diagram plug-in coils are used for the anode and reaction circuits, and hence these can readily be changed for a No. 250 and a No. 200 coil respectively. These two latter coils are suitable for the Chelmsford wavelength.

LISSENIUM.

SEPARATING
Chelmsford *and* Radio-Paris

Receiving Radio-Paris without interference from the high-power station at Chelmsford has previously been very difficult at any position within about 75 miles of Chelmsford. The high power used by the British Station has necessitated the use of a loose-coupled circuit, or other selective device, with the attendant difficulties of operation.

BY means of the new LISSENAGON "X" COIL No. 250, the necessary selectivity can be obtained without any addition to the existing tuning arrangements of the receiver. A very selective circuit is obtained by using a LISSENAGON "X" COIL No. 250 in the anode circuit of the H.F. valve. Any tuned anode circuit can be altered in a few moments by removing the wire connecting the plate of the H.F. valve to the anode coil, inserting the "X" coil and connecting the plate of the H.F. valve to one of the tapping points on the "X" Coil. The connection from one side of the anode coil to the grid condenser of the next valve remains unaltered, whilst the other side of the coil is still connected to H.T. Positive. It should be noted that the latter connection should be to the socket of the LISSENAGON "X" COIL, and the connection from the plate of the H.F. valve should be tried on each of the two terminals to prove which gives best results. The tuning condenser remains across the whole of the coil and tuning is carried out as usual.

LISSENAGON "X" COILS

No. 250	9/9
No. 50	6/-
No. 60	6/4
No. 75	6/4

ASK FOR LISSENAGON COILS—The Coils which intensify tuning.

The LISSENAGON "X" COIL can also be used as an aperiodic aerial coil, and in cases where interference is exceptionally heavy a LISSENAGON "X" COIL can be used in both aerial and anode circuits. For use as an aperiodic aerial coil it is only necessary to plug the coil into the aerial coil holder and connect the aerial to one of the terminals on the side of the coil mount. Note that the socket of the coil should be connected to earth.

In addition to the No. 250 LISSENAGON "X" COIL we are also making LISSENAGON "X" COILS Nos. 50, 60 and 75. Used as described above, they give a great degree of selectivity, stability, and smoothness of reaction control on the broadcast band of wavelengths. The LISSENAGON "X" COIL No. 60 covers the 300 to 600 metre band of wavelengths, but the No. 50 "X" Coil is recommended for the lower band of wavelengths, and the No. 75 for the higher wavelengths.

Send for TEXT Book of LISSEN Parts—FREE to readers of "Wireless Weekly."

OUR NEW ADDRESS IS:—

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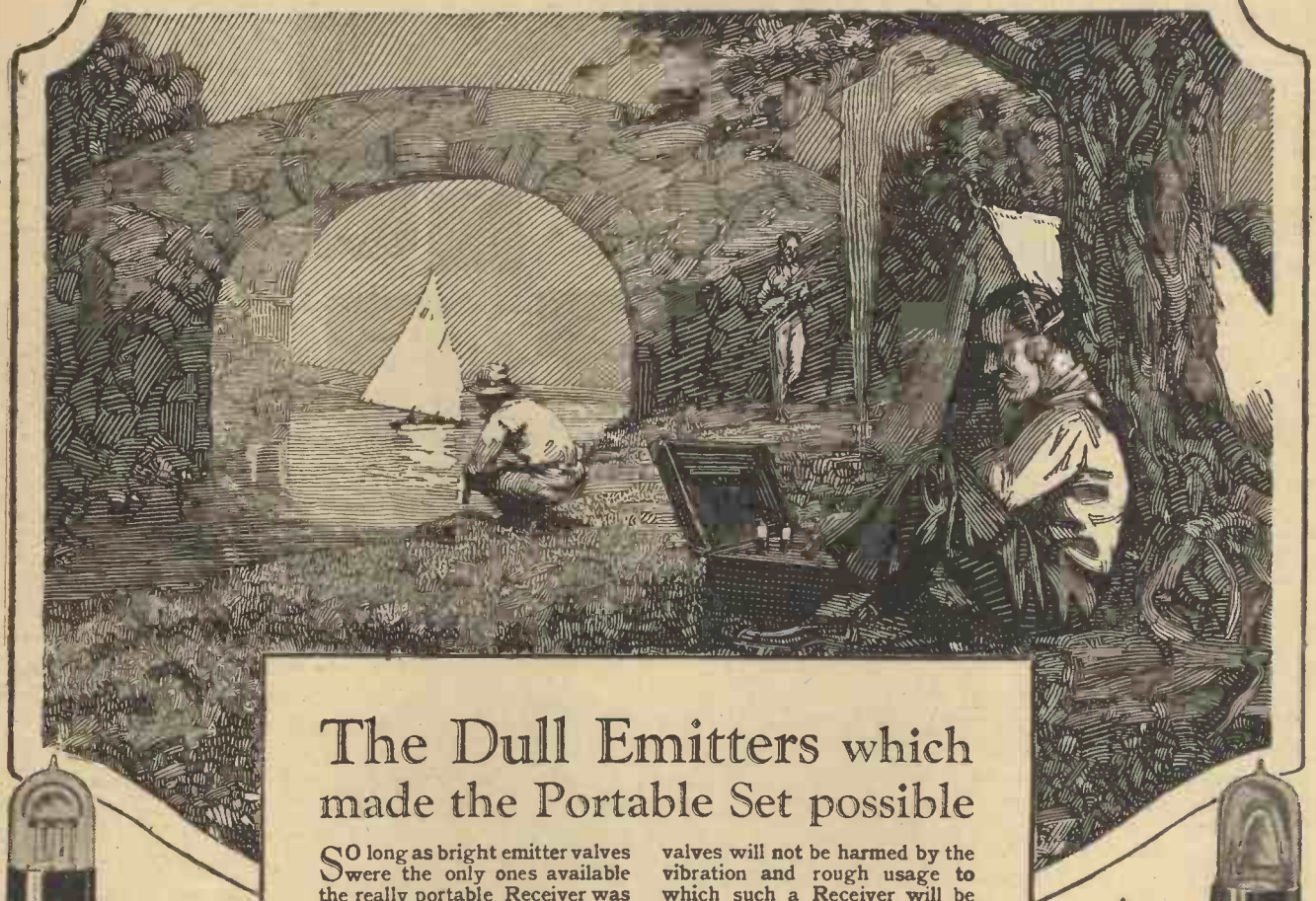
'PHONE:— *Richmond* 2285 (4 *lines*). **LISSENIUM WORKS, 30-32, FRIARS LANE, RICHMOND, SURREY.** *'GRAMS:—* "*Lissenium, London.*"

BUILD WITH ALL LISSEN PARTS — THERE IS ONE FOR EVERY VITAL PLACE.



The Dull Emitters which made the Portable Set possible

SO long as bright emitter valves were the only ones available the really portable Receiver was impracticable. No one wanted to carry big 6-volt accumulators out into the country for the pleasure of enjoying a Radio concert in the meadows—it wasn't worth the trouble. And even when the first dull emitters became more popular their extreme fragility rendered them unsuitable for the inevitable rough handling which every Set must get when carried from place to place.

And so the portable Receiver lagged in development. But with the introduction of the Wuncell, summer Radio becomes a new delight. It is now quite easy to design a three-valve Receiver which can be fitted into an attaché case complete with a 2-volt unspillable accumulator. Such a Receiver will give at least 10 to 12 hours reception on one charge. And, what is more important still, the Wuncell valves will not be harmed by the vibration and rough usage to which such a Receiver will be subjected.

The reason for this lies in the design of the filament and its method of manufacture. Instead of being a long straight filament, it is arched and further stayed at its centre with a third support. Instead of obtaining low current consumption by thinning down the filament at the risk of fragility, the Wuncell filament is manufactured under an entirely new process. This permits an exceptionally high electron emission at a temperature of only 800 degrees—when the Wuncell Valve is working its glow is practically invisible in daytime. Even in the dark, it is no more apparent than the luminous figures on a watch dial. As a result, therefore, we have every confidence in saying that the Wuncell Valve is quite as robust as even the well-known Cossor Bright Emitter.

Wuncell Dull Emitters

Made in two series: Types W.1 and W.2 for 2-volt accumulators. Types W.R.1 and W.R.2 with additional resistance, so that valves can be used with either 2-, 4- or 6-volt accumulators.

W.1 and W.R.1 are for use as Detectors or L.F. Amplifiers. W.2 and W.R.2 are specially designed for high frequency amplification. All Wuncell Valves consume only .3 amps., and require a plate voltage of 20-80 volts.

Note Reduced Prices:

W.1 14/- W.R.1 16/-
W.2 14/- W.R.2 16/-

A new Valve

The Cossor Loud Speaker Valve W.3

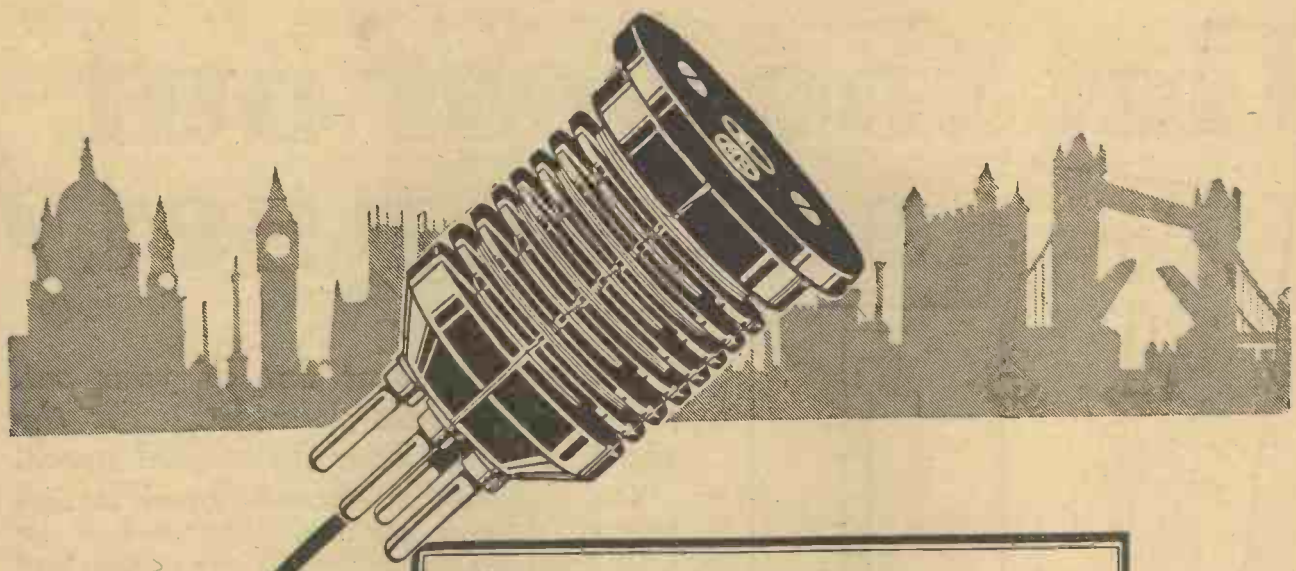
When used with a good low frequency Transformer this new W.3 valve gives an immense volume of pure and undistorted sound. Its use renders a second stage of L.F. amplification practically superfluous. The design embodies all the well-known Cossor principles and the valve is therefore quite free from microphonic noises. Filament voltage, 1.8 volts; filament consumption, .5 amps.; plate voltage, 80-120 volts.

18/6

—the long life Dull Emitter

Cossor Wuncell

Gilbert Ad. 2924.



Selectivity
—and distance

LOOK at the shape of a McMichael (MH) H.F. Transformer, observe the divisions carrying the windings, note the staggered slots conveying the leads.

The reason, elimination of losses.

The result, greater selectivity and reception of distant stations hitherto unobtainable.

(MH)

H.F. TRANSFORMERS

Supplied in six ranges of wavelengths, covering from 80 to 7,000 metres

No. 00	80 to 150 metres	10/-	No. 2	550 to 1,200 metres	10/-
No. 0	150 „ 300 „	10/-	No. 3	1,100 „ 3,000 „	10/-
No. 1	300 „ 600 „	10/-	No. 4	2,500 „ 7,000 „	10/-

A 6, Neutrodyne Unit (Broadcast Wavelength) .. .. each 10/-
No. 3 Transformer is suitable as a Neutrodyne Unit for 5XX.
The Complete Set in handsome case, Nos. 00—4 .. .. 55/-

Any number of each Transformer can be supplied matched at NO extra charge, if requested at the time of ordering.

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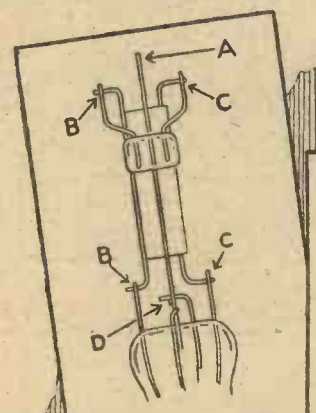
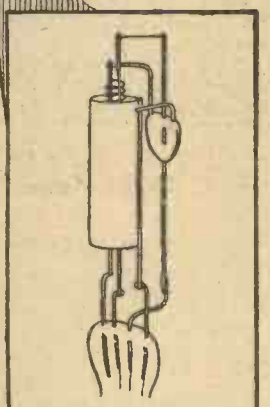
Barclays Ad.

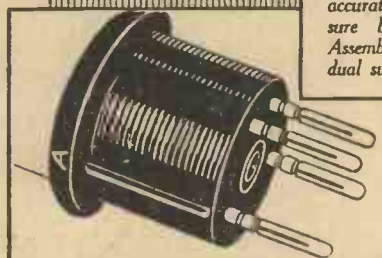
Get the *best* out of your set!



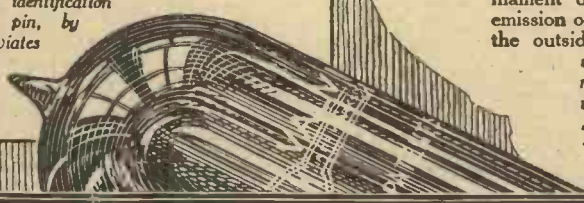
D.E.3 electrode system, front view. Spot welded at A (filament support), B (anode support), C (grid support), and D (filament support).



D.E.3 electrode system, side view. All parts accurately made to measure by machine jigs. Assembled under individual supervision.



All-Bakelite base. Low self-capacity. Wide collar at top (firm grip for inserting and withdrawing valve). Moulded rib on same side as anode pin (ready identification of anode pin, by touch. Obviates "burnout" due to incorrect insertion).



To get the best out of your set, put the best into your set. Fit the right valve for your individual needs.

The most efficient electrode system for one type of valve is not necessarily the best for other types. The electrode system of each type of the "*Valve in the Purple Box*" is the result of scientific determination of the best design for the conditions under which it is to be used.

A noteworthy example is

TYPE D. E. 3.

a general purpose valve for use with dry batteries, or 4-volt accumulators.

REDUCED PRICE 16/6

Outstanding features :—

FILAMENT.

Although current consumption is only .06 amp., electron emission equals that of bright emitter taking over twelve times the current. The filament does not depend for its emission on a substance coated on the outside which rapidly wears away in use. The *active material* permeates the *whole* of the filament.

GRID.

Special machinery provides for abnormally high exactness of manufacture. Spiral grid, each turn welded to grid support. Full control over electron emission ensured.

PLATE.

Most rigid construction employed (spot welding). Active portion of filament *entirely* enclosed.

The most economical valve in the World!

MARCONI VALVES

MADE AT THE OSRAM LAMP WORKS

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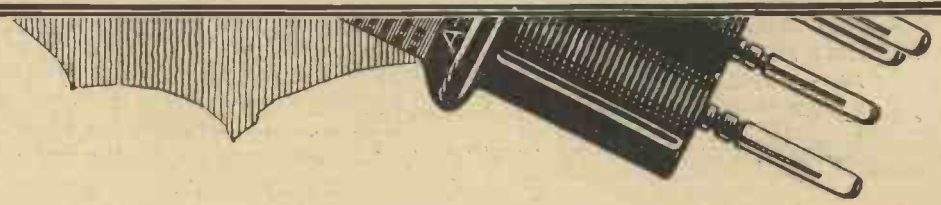

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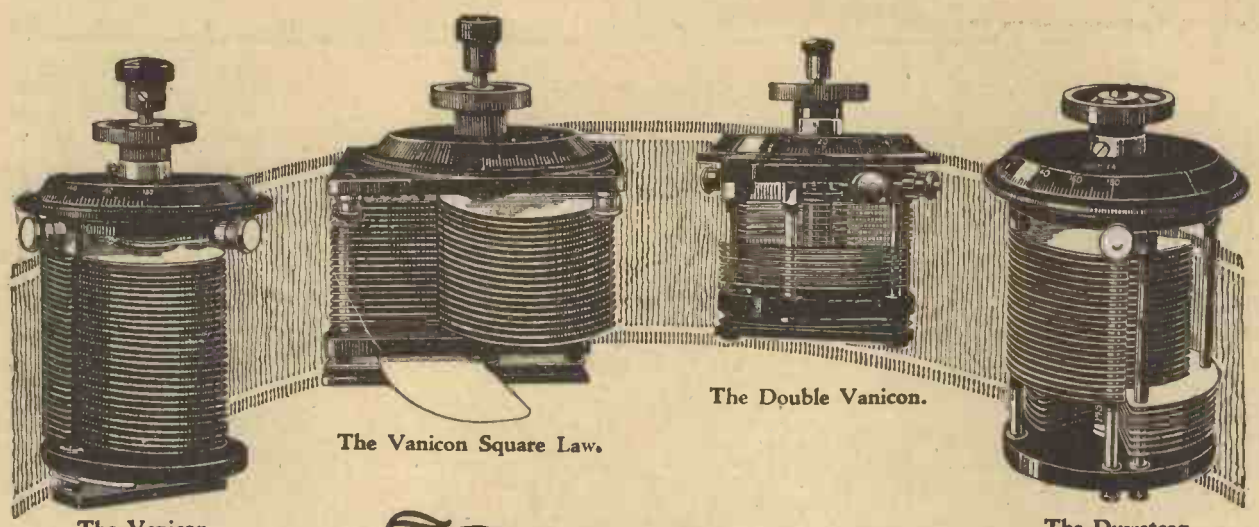

The Vanicon. The Vanicon Square Law. The Double Vanicon. The Duwatcon.

Dubilier Variable condensers

REPRESENTATIVES of each of the four types of the well-known Dubilier Vanicon range now available for the public are illustrated above.

The Vanicon was the original Variable Condenser produced by the Dubilier Condenser Company. Later the Double Vanicon and the Duwatcon were produced, and now the series has just been extended by the addition of the Dubilier Vanicon Square Law Condenser.

THE VANICON is suitable for all circuits, and is supplied with Vernier: 0.00025 mfd. 17/6 0.0005 mfd. 20/- 0.001 mfd. 25/-

THE DUWATCON is a special design for series-parallel working, giving a complete and uninterrupted tuning range over the whole wave-length band. 0.0007 mfd. 30/-

THE DOUBLE VANICON is a variable condenser giving simultaneous control of two tuned anode circuits. Capacity of each side 0.00025 mfd. With balancing plate, 25/6 Without balancing plate, 23/-

THE VANICON SQUARE LAW CONDENSER can be used for all purposes in a wireless receiving circuit. It is the latest and the best Square Law Condenser made, and is supplied complete with vernier. 0.00025 mfd. 17/6 0.0005 mfd. 22/6 0.001 mfd. 27/6

For both fixed and variable condensers of all kinds, it is always easiest and best to

Specify Dubilier

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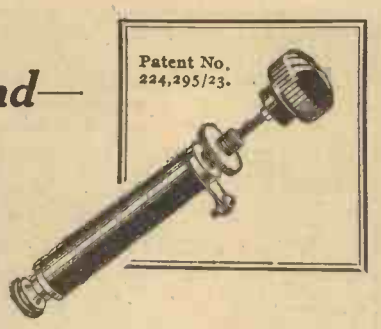
E.P.S. 134

A Silent Background—

is essential if long distance reception is desired. The usual grid leak containing carbon in some form or other is totally unsuitable. The physical properties of carbon do not allow of passing a small current without variation or interruption. The use of a grid leak containing carbon is bound to produce a noisy background. In a variable grid leak, especially, the resistance material used must be constant in use.



Such a variable grid leak is the

"BRETWOOD" GRID LEAK

The mastic is perfectly uniform and its action does not depend upon compression of its particles or vary with atmospheric conditions. Positive control of grid potential is ensured by its use.

Fit a "Bretwood" and improve your receiver.

The "Bretwood"

Anti-Capacity Switch.

Constructors will welcome news of a further Bretwood Product, an Anti-Capacity Switch, the principal features of which include:—Absolute freedom from capacity effects—Perfect Contact—Workmanlike finish and neatness of appearance—Simple single hole fixing and Easy to make wiring connections. Special spring loaded balls in the base make the Bretwood Switch wonderfully smooth in action and ensure clean and perfect electrical contact at all times. It is confidently offered to wireless constructors as the Anti-Capacity Switch *par excellence*, and of course it carries the famous Bretwood Guarantee.

Price **5/-** *Postage 3d.*

The "Bretwood"

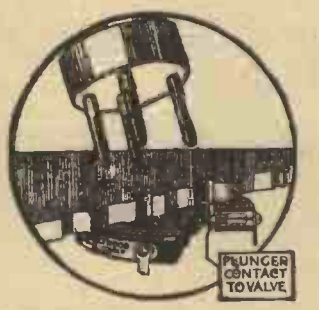
Anode Resistance.

(Patent No. 224,295/23) gives accurate readings consistently from 10,000 ohms to 100,000 ohms. This BRETWOOD Component is particularly suited for the ST100 circuit (*Modern Wireless*), the super-sensitive circuit (*Popular Wireless*), and for resistance coupling, etc.

It is constructed on the same principles that have made BRETWOOD Components famous, and, of course, it carries the BRETWOOD Guarantee.

Price **3/-** *Postage 3d.*

Designed on the same principle as the "BRETWOOD" GRID LEAK mentioned above.



The "Bretwood"

Patent Valve Holder.

Fix this efficient component and get maximum results. Positively no leakage or capacity effects. Perfect contact. Can be mounted on front or back of panel.

Price **1/9** *Postage 3d.*

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20 Years ago

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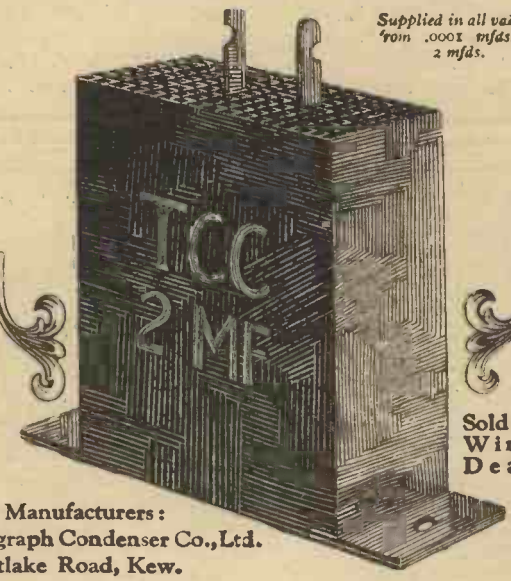

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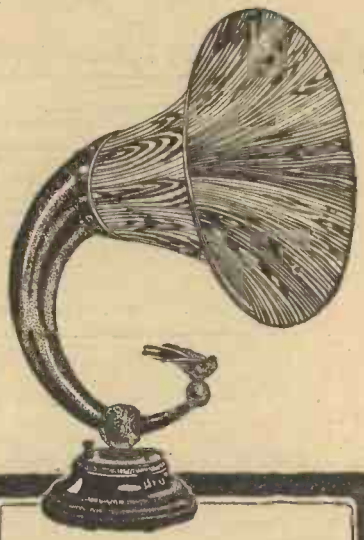

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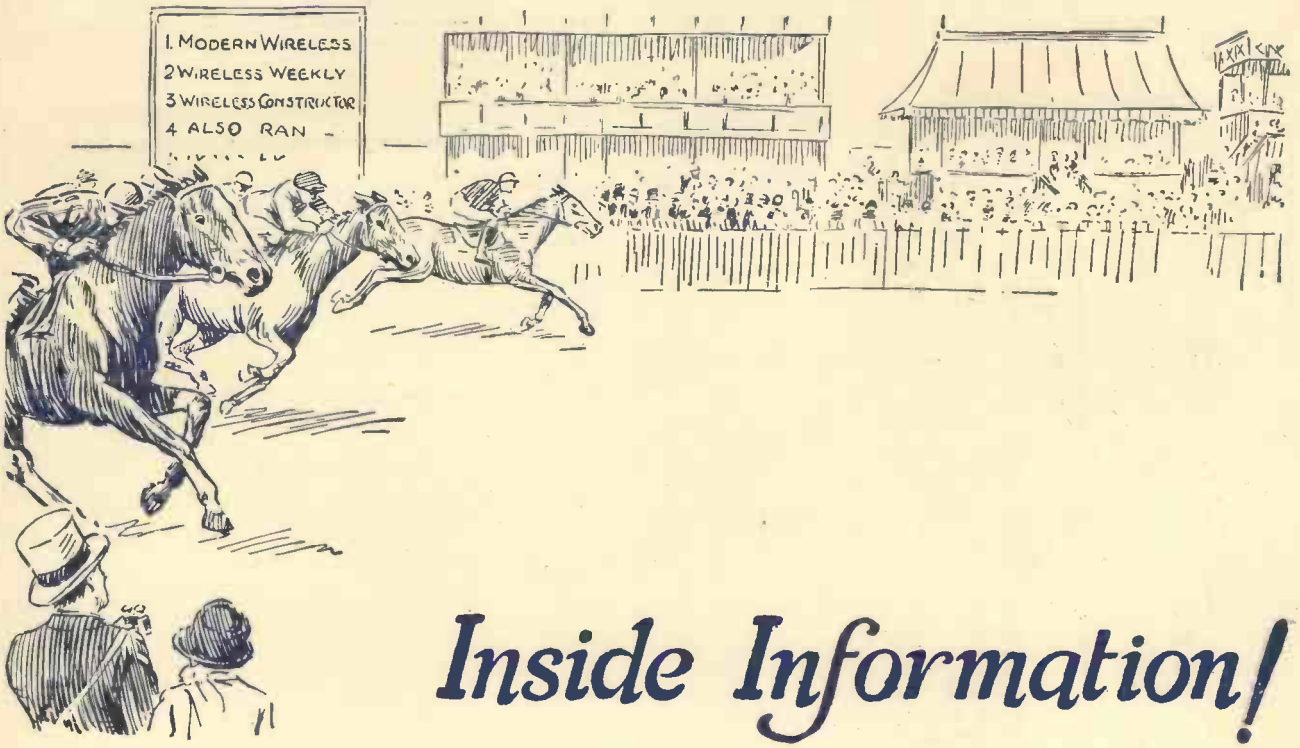

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