

THE PROBLEM OF "BLIND SPOTS"

# MODERN WIRELESS

1 1/2 MONTHLY

Edited by

NORMAN EDWARDS,

M.I.R.E., M.R.S.L., F.R.G.S.

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# Valve Set Owners Are Fast Learning This Secret\*

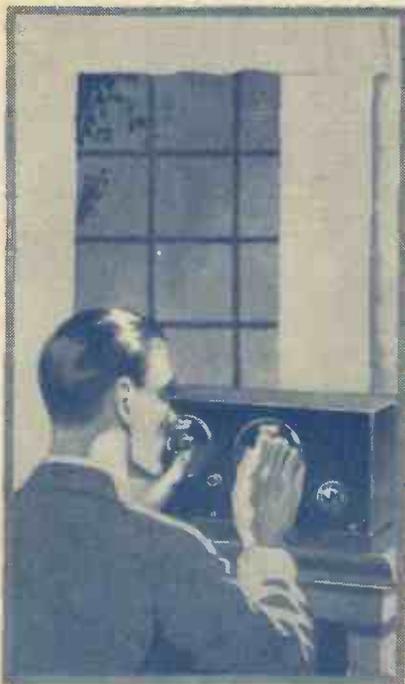
★ the secret of increased range and greater economy in the operation of their radio receivers

*It must have struck you at one time or the other that the radio results of certain of your friends who have sets based on the same circuit and the same number of valves, were better than those from your own receiver. The answer to the following question will give you the key to the secret of improved reception:*  
 "How copious is the emission given by the filaments of your valves over a range of filament temperatures?"

It may seem strange to you that the emission of a valve filament can make a marked difference in the way your receiver operates and in the cost of its upkeep. If, for example, your set is "all out" when receiving a station, say 100 miles away, you have small hope of securing weaker distant stations as your friends may do, moreover, your battery consumption is naturally at its highest under these conditions.

### Why great emission makes all the difference

When a valve filament gives a copious and sustained emission at the correct filament temperature, a rich field of power is placed under your control which enables the best conditions to be secured to deal with the incoming signals, so that your



receiver is adjusted to suit the particular circumstances existing at the time. The local station may be tuned in purely and strongly with the minimum of energy expended because valves that possess a huge emission are able to function perfectly at considerably less than their full capacity. Then, as you reach out for more distant stations or weaker signals, you are able to adjust the operating energy of your high emission valves, particularly in the detector stage, to suit the exact demands

for ideal reception. It will be realised that by the use of Mullard P.M. valves with their abundant electron emission you will save upkeep costs since your receiver will only consume minimum energy from your batteries.

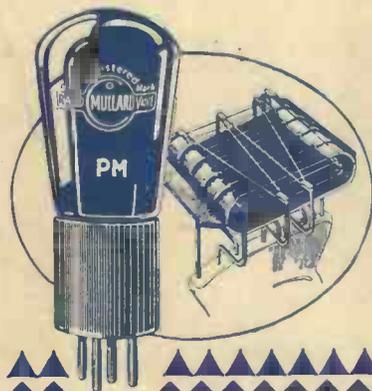
**A valve filament that has up to 5½ times the emission surface of an ordinary filament**

To no one so much as the owner of Mullard P.M. Valves is the truth of this boon of great emission so apparent. The wonderful P.M. Filament—the foundation of the famous series of Mullard P.M. Valves—is so generous in its dimensions that the emission surface is immense. This remarkable fact is due to the length of the P.M. Filament being up to 3 times that of an ordinary filament, and its greater diameter. These two factors are responsible for the supreme efficiency of the Mullard P.M. Filament which possesses an emission surface 5½ times more effective than an ordinary filament.

### A Government Test

Convincing proof of the high emission of the wonderful P.M. Filament was recently given by the 1000 hours' test report of the National Physical Laboratory. This proved that the emission of Mullard P.M. Filaments was so abundant and consistent that an 18/6 Mullard P.M. Valve was still worth 18/- after 1000 hours' continuous life test, equivalent to a year's broadcasting service. Bring your radio receiver up to the highest pitch of efficiency by installing Mullard P.M. Valves with the wonderful P.M. Filament and remember they consume absolutely minimum current. Ask any radio dealer for full information.

INSTALL MULLARD P.M. VALVES WITH THE WONDERFUL P.M. FILAMENT



# Mullard

## THE MASTER VALVE

Sectional view of P.M.5 showing generic proportions of P.M. Filament

- For 2-volt accumulator
  - THE P.M.1 H.F. 0.1 amp. 14/-
  - THE P.M.1 L.F. 0.1 amp. 14/-
  - THE P.M.2 (Power) 0.15 amp. 18/6
  - For 4-volt accumulator or 3 dry cells
  - THE P.M.3 (General Purpose) 0.1 amp. 14/-
  - THE P.M.4 (Power) 0.1 amp. 18/6
  - For 6-volt accumulator or 4 dry cells
  - THE P.M.5x (General Purpose) 0.1 amp. 14/-
  - THE P.M.6 (Power) 0.1 amp. 18/6
  - Super power valves for last L.F. stage
  - THE P.M.254 (4 volts, 0.25 amp) 22/6
  - THE P.M.256 (6 volts, 0.25 amp) 22/6
- These prices do not apply in Irish Free State*

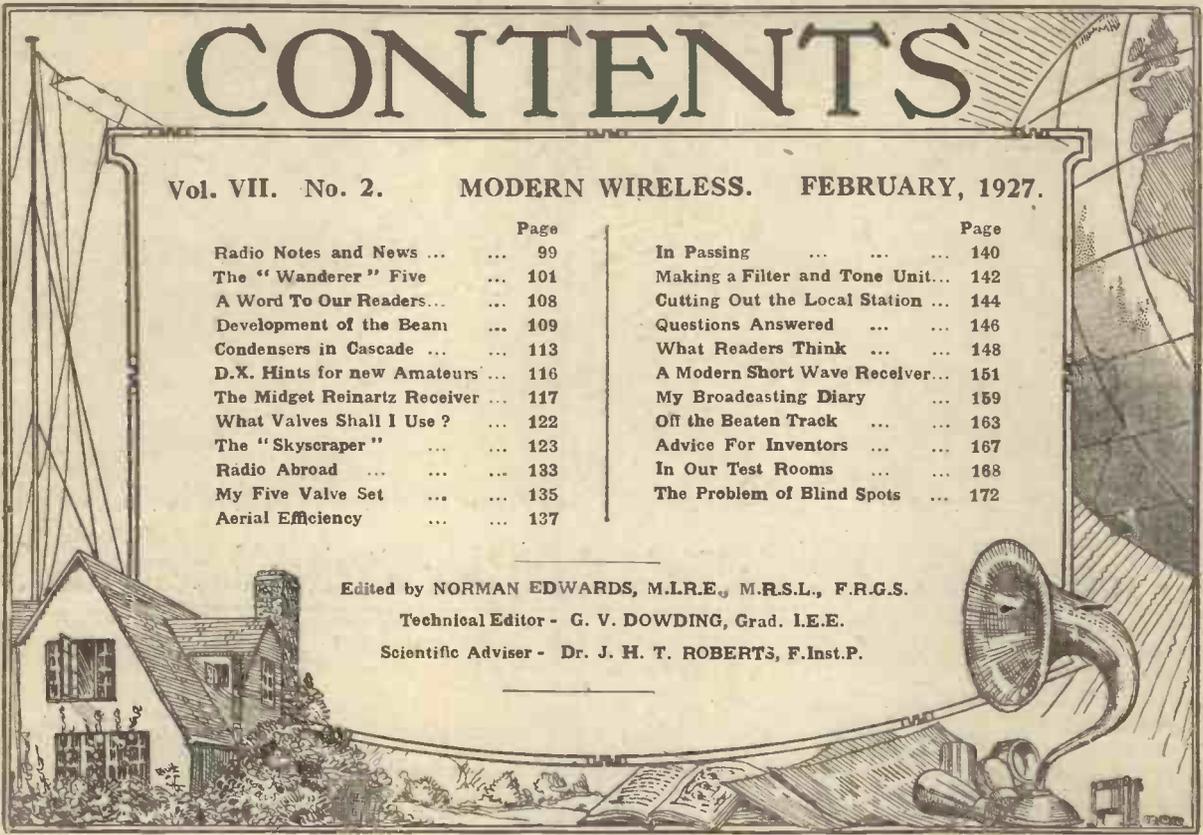
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# CONTENTS

Vol. VII. No. 2. MODERN WIRELESS. FEBRUARY, 1927.

	Page		Page
Radio Notes and News ... ..	99	In Passing ... ..	140
The "Wanderer" Five ... ..	101	Making a Filter and Tone Unit... ..	142
A Word To Our Readers... ..	108	Cutting Out the Local Station ... ..	144
Development of the Beam ... ..	109	Questions Answered ... ..	146
Condensers in Cascade ... ..	113	What Readers Think ... ..	148
D.X. Hints for new Amateurs ... ..	116	A Modern Short Wave Receiver... ..	151
The Midget Reinartz Receiver ... ..	117	My Broadcasting Diary ... ..	159
What Valves Shall I Use ? ... ..	122	Off the Beaten Track ... ..	163
The "Skyscraper" ... ..	123	Advice For Inventors ... ..	167
Radio Abroad ... ..	133	In Our Test Rooms ... ..	168
My Five Valve Set ... ..	135	The Problem of Blind Spots ... ..	172
Aerial Efficiency ... ..	137		

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This circuit enables anyone with an electric light installation to dispense entirely with high-tension batteries. The running cost is extremely low, whereas a constant and reliable H.T. supply is always available.

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# Marconiphone and STERLING Radio Components

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- 1 Marconi U.5 Rectifying Valve.
- 1 Sterling Non-Pong Valve-holder.
- 2 10-mfd. and 1 2-mfd. Mansbridge Condensers.
- 1 Marconiphone Smoother Choke.
- 2 Lamp Sockets.
- 2 8-Candle Power Metal Filament Lamps.
- 6 Terminals.
- 1 Ebonite Panel.

*PUBLICATION No. 446 contains particulars of the construction of this unit, together with a circuit for D.C. mains. Copy sent on request; please mention "Modern Wireless."*

**THE MARCONIPHONE COMPANY, LTD.**

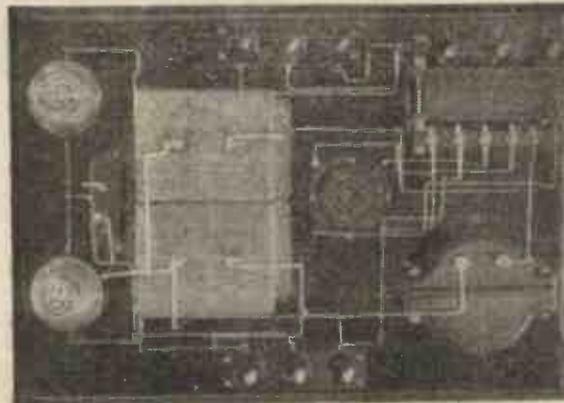
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**MARCONIPHONE POWER TRANSFORMER**



For use with Marconi U.5 Rectifying Valve. Price .. 35/-

**MARCONIPHONE IDEAL CHOKE**  
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**STERLING MANSBRIDGE CONDENSER.**

For use where large values of capacity are required, i.e., to stand pressures up to 3,000 volts. Supplied in capacities from .1 mfd. to 10 mfd. .. 2/8  
 .2 mfd. .. 2/8  
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**MARCONI TYPE U.5 VALVE.**

Incorporates a double electrode system in one bulb, thus providing rectification of both halves of the A.C. wave...30/-



THIS  
for  
THAT



### No. 1 of a Great New Wireless Journal

At the beginning of February will be published No. 1 of a great new wireless journal called "The Elstree Radio News," which will carry on the magnificent traditions these laboratories have built up for star set designs and research articles.

We cannot tell you at present all the good things that will appear in the first issue, but there will be two new Radio Press star sets, one for three and the other for five valves.

This journal is only for valve users, and it cannot be obtained on the bookstalls. In spite of its generous size, excellent printing and paper, and blue print supplements, the journal is absolutely free. Send your name and address and test certificate cut from an S.T. valve box to "Elstree Radio News," c/o S. T. Ltd., 2, Melbourne Place, London, W.C.2, and you will obtain free a year's subscription.

Remember that the information and designs which will be published in the "Elstree Radio News" are exclusive and will relate the doings of Elstree.

John Scott-Taggart, F.Inst.P., A.M.I.E.E., will edit this journal, which will probably be published quarterly.

The cost to you is nothing. S.T. Ltd., by cutting out the middleman and selling direct to wireless dealers, are able to give the most generous service of any valve manufacturer.

Act now before it is too late!

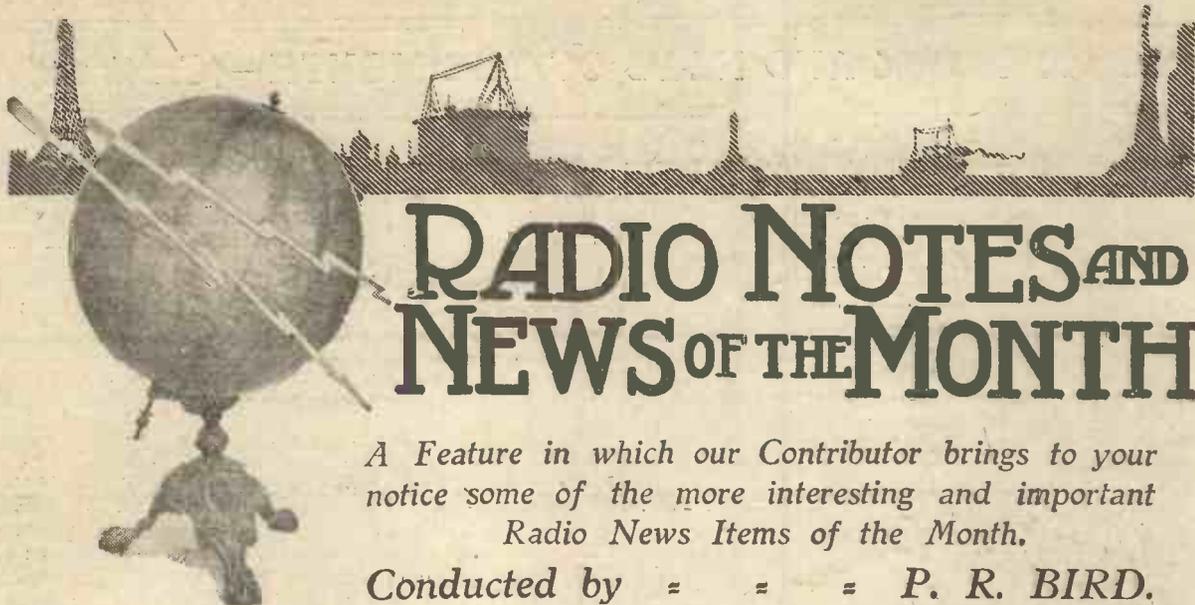
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2-VOLT.	4-VOLT.	6-VOLT.
S.T.21 (H.F.) 0.1 amp. ... 14/-	S.T.41 (H.F. and Det.) 0.1 amp. ... 14/-	S.T.61B (H.F. and Det.) 0.1 amp. ... 14/-
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S.T.23 (Power) 0.15 amp. 18/6	S.T.43 (Super Power) 0.25 amp. ... 22/6	S.T.63 (Super Power) 0.25 amp. ... 22/6

NOW AVAILABLE!—S.T.61a (Res. Cap.), 0.1 amp. Amplification 37 ... .. 14/-

N.B. The S.T.61 is replaced by S.T.61B, which has identical characteristics but sells at only 14/-. This makes S.T. 6-volt valves as cheap as the 2 volt.





# RADIO NOTES AND NEWS OF THE MONTH

*A Feature in which our Contributor brings to your notice some of the more interesting and important Radio News Items of the Month.*

Conducted by = = = P. R. BIRD.

**The Downfall of Daventry**  
 SO many interesting wireless developments were recorded during January that one of the most interesting of all passed practically unnoticed. I refer to the Downfall of Daventry. At one time Europe's premier station, 5XX is now a back number. So far as high power goes, Langenberg, in the Rhine-Ruhr district, has leapt far ahead, leaving poor old 5XX away amongst the "also rans."

**High Power on Low Wavelength**

In putting up the new Langenberg station, the Germans not only increased the power used for broadcasting to an unprecedented degree, but they courageously brought down the super-station's wavelength to well below 500 metres. Consequently it is not necessary to have special large coils for this station, but it can be tuned in when using a 50-turn aerial coil.

Relays from Cologne or Muenster are frequent, but if you listen long enough on 468.8 metres you will hear the announcer say "Herr ist der Deutsche Rhein und Ruhr Sender zu Langenberg."

**India's Broadcasting Service**

Mr. Eric Dunstan, not long since chief announcer at 2LO, and now Manager of the new Indian Broadcasting Co., arrived in Bombay early last month. He hopes to have the first Indian station operating in Bombay before midsummer.

His pleasant "dark-brown" voice won him a host of friends here and we wish him all the best

in the ticklish job he has undertaken.

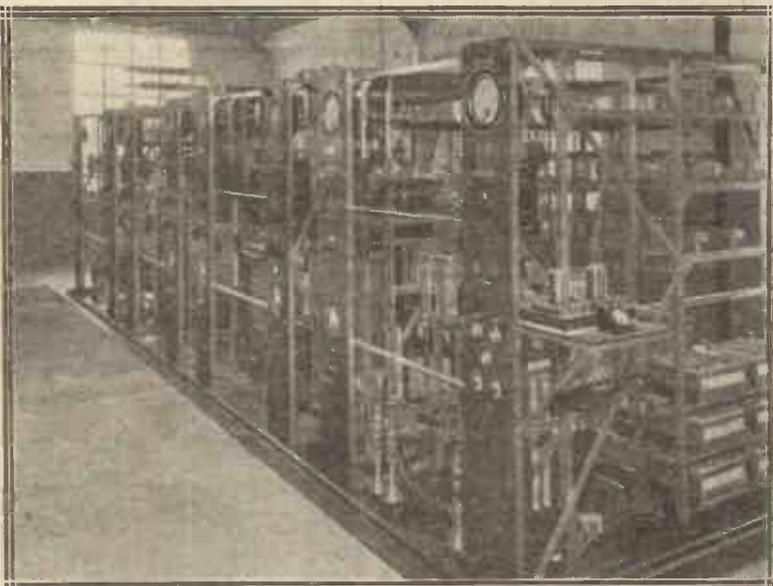
**Sleuths to track Oscillators**

They say that the P.O. secret service sleuths are now out after oscillators. Driving past your door in their own plain vans, they will twist and twiddle their concealed

Watson—they will pounce on the programme spoiler and make an example of him.

**The Transatlantic 'Phone**

Last month I prophesied plenty of ether-excitement during 1927. In the very first week of the New Year the transatlantic wireless



The transmitting panels at the Bodmin Beam station, which is now operating a very successful service.

frame aerials until they solve the mystery of the whereabouts of the squealing set. All that these radio detectives listen for is the howl of the Hound of the Basket-Coils, and—sooner or later, my dear

telephone service was inaugurated, linking London and New York.

The spectacular significance of this success caused such a stir that by now everyone is heartily sick of the topic. But nevertheless,

RADIO NOTES AND NEWS OF THE MONTH—(Continued)

January 7, 1927, will always live in history as the day when Uncle Sam and John Bull got on the phone to each other—to the admiration of the rest of the world.



Mr. E. H. Shaughnessy, Assistant Engineer-in-Chief of the P.O., who is in charge of the new transatlantic radio telephone service.

during 1927, with regional stations for providing alternative programmes all the time, we ought to be hearing the tests shortly. Daventry has been named as the likeliest starting point for the tests, which will take place on the ordinary broadcasting wavelengths (probably round about 400 metres); moderately high power will be used, which means that the strength of transmission will be a cross between the full power of 5XX as now used on 1,600 metres, and that of 2LO.

**Admiralty and Amateurs**

“Short wave wireless is now used very largely in long distance naval communications,” says the Admiralty—rather naively—in an announcement regarding the *Renown*. It is hoped that throughout the whole voyage of the Duke and Duchess of York to Australia, the vessel will be in touch with this country on short waves, and amateur transmitters are requested not to call the *Renown* “as it will be impossible for their calls to be answered.”

Last year the American Navy

vessel he was on toured the globe. Now that our Admiralty admit to short wave interests, perhaps they will follow this precedent. (I said *perhaps!*)

**“Record” Transmissions**

It's odd how progress in wireless helps along other inventions, isn't it? Artistes recording for the gramophone, for instance, do not have to face a recording-room nowadays, but can sing in the theatre to which they are accustomed, to an invited audience, whilst a concealed microphone picks up the sound and passes it along a line to the gramophone company's recording room miles away. In this way the whole “atmosphere” of the theatre is transferred to the wax. I hear that the Columbia Co., are very pleased with their experiments in this direction.

**Listening-in while Looking-out**

Swift success attended the efforts of the *Daily News* to organise a fund for providing wireless sets for British lighthouses and lightships. Subscriptions rolled in, and

**A South African Eavesdropper**

One amusing aspect of the wonderful new service is that on the first day some of the London-New York conversations were picked up by a chap away in Johannesburg.

You wouldn't call that being absolutely private, would you?

**Radio on Air Route to India**

The giant multiple-engined aircraft flying on the new air route to Egypt and India—on the trail blazed by Sir Samuel and Lady Hoare—are fitted with 150-watt wireless telegraph-telephone sets. On these new sets it has been arranged that the generator that provides power for all the aeroplane's lights should also work the wireless. A newly designed, automatic, constant-speed propeller maintains a constant voltage for the machine, over an air-speed range of anything from 60 to 130 miles.

**5XX on 400 Metres**

If the British Broadcasting Corporation is going to give us an improved system of distribution



The receiving station at Houlton, Maine, U.S.A., which receives the wireless telephone messages from Rugby.

picked on an amateur short-wave worker, gave him a good set, some gold braid, and a commission, and encouraged him to tickle up his pals in the U.S. whilst the

readers of this enterprising daily now have the distinction of having provided wireless for all the patients of the London hospitals and all the lonely watchers of the coast!

# The "WANDERER" FIVE

The Set specially designed,  
built and described for  
"MODERN WIRELESS,"

By

**JOHN UNDERDOWN**



OR listening to distant stations I have for some time been using a five-valve super-heterodyne receiver working on a frame aerial. With such a set, however, there is always the feeling that the advantages of a good outdoor aerial are being wasted. On the other hand the fact that there are generally only two tuning controls to manipulate, and the employment of a frame allows of the set being utilised to full advantage, where an ordinary aerial is not available, is strongly in the favour of the super.

## Frame or Outdoor Aerial

To obtain the advantages given by a good aerial, to retain simple tuning and yet to have a receiver which may be used on a frame if desired, have been my objectives in designing the set about to be described.

The superhet previously mentioned utilised five valves only.

During the last three months I have, therefore, tried a number of five-valve circuits consisting of one to three high frequency amplifiers, a detector valve and from three to one note-magnifiers. Of these

arrangements for long range loud-speaker work I have found the 2H.F., detector, and 2L.F. combination to be most generally satisfactory. It is true that three H.F. valves gave greatest range, the other two being utilised as detector and transformer-coupled amplifier respectively, but I consider two L.F. valves are necessary for really good volume for dancing, or for a very large room, and on this score, as well as that of simplicity of adjustment, I have chosen the Q.V.2 circuit given in the theoretical diagram.

## Selectivity and Stability

Since provision has been made for employing a frame, this being connected across A<sub>1</sub> and E sockets, it was considered unnecessarily expensive to incorporate a screened coil for the aerial circuit, and a single coil-holder, in which a Lissen X or similar type of coil may be inserted when working on an outside aerial, is employed. With the former type of aerial coil the aerial lead is joined to A<sub>2</sub> and the flex-lead from this point is connected to one of the side terminals of L<sub>1</sub>, giving the so-called "aperiodic" arrangement.

This gives a good degree of selectivity, and since the two split-primary H.F. transformers are

screened does not introduce unwanted couplings giving rise to instability.

The well-known and well-tried split-primary transformer system of coupling is incorporated, as it does not require double variable condensers and stabilising resistances, thereby making it a simple matter to tune the two stages simultaneously. This is effected by means of C<sub>2</sub> which is a double-gang, 0.005 condenser, of which the two halves may be separately adjusted to balance out slight differences in the H.F. transformers, inequalities due to differences in wiring, etc., the condensers finally being locked when both H.F. valves are tuned by adjustment of a single dial.

We have therefore only two main tuning controls, namely, that of C<sub>1</sub>, tuning the aerial coil and that of C<sub>2</sub>, which simultaneously tunes both H.F. valves.

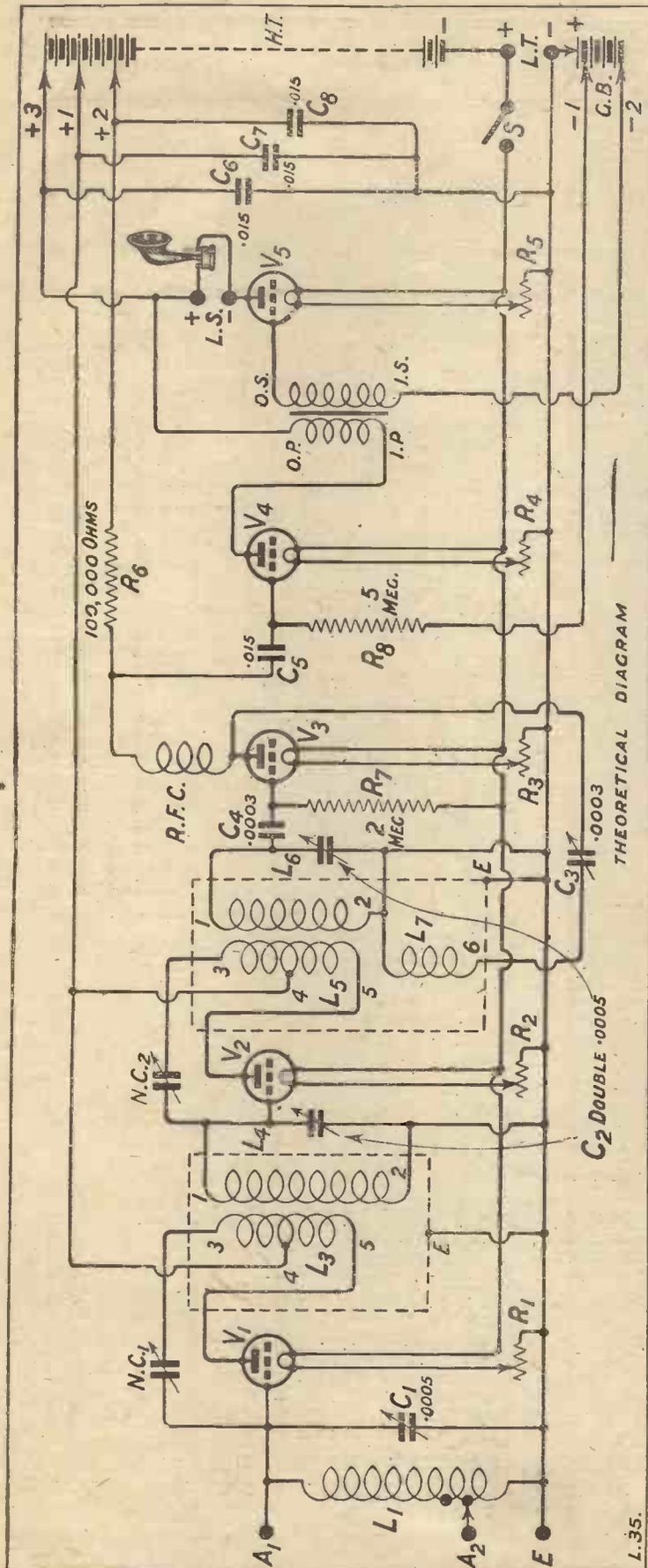
## Simplified Tuning

C<sub>2</sub> is the reaction condenser and, except on the weaker transmissions, may be left set at some intermediate position, this holding satisfactorily for a wide wave-band with the Reinartz reaction system employed, so that we have a receiver in which tuning is simplified as compared with that of the superhet,

## COMPONENTS REQUIRED

One Panel, 18 in. by 7 in by 3/16 in.  
One Cabinet to take the above Panel and Baseboard 16 in. deep.  
One .0005 Double Gang Variable Condenser.  
One .0005 Square Law Condenser.  
One .0003 Variable Condenser.  
Two Screens and Six-pin Coil Bases.  
Five Baseboard Mounting Rheostats.  
Five Valve Holders.  
Two Single Coil Holders,  
One 100,000 ohms Anode Resistance.  
Two Indigraph Dials.  
Two Neutralizing Condensers.

One .0003  $\mu$ F Fixed Condenser.  
One .015  $\mu$ F Fixed Condenser. (Mansbridge type).  
Three .015  $\mu$ F Fixed Condensers,  
One Second Stage L.F. Transformer.  
One Two megohm Gridleak.  
One .5 megohm Gridleak.  
One "On and Off" Switch.  
Four Terminals.  
One 3 in. square Ebonite Panel.  
Three Sockets.  
Four Plugs.  
Quantity of "Glazite" wire and 20 gauge tinned Copper flex.



## THE "WANDERER" FIVE (Continued)

but which at the same time, by utilising an outside aerial, will give better ranges for a given number of valves.

The selectivity obtained is, of course, not quite so high as that of super, but for all practical purposes leaves very little, if anything, to be desired. For example a powerful station, presumably Leipzig, although I have not caught the actual announcement, five or six metres higher in wavelength than 2LO, has been obtained at good loud-speaker strength without serious interference from the latter source, the test taking place 12 miles south-east of the London station. Some idea of the range of the set will be obtained when it is stated that the Dundee local news has been heard at good loud-speaker strength.

### Reaction for Maximum Range

To obtain maximum range and selectivity, smooth control of reaction is essential, and the Reinartz method employed will be found particularly helpful here. With this system a radio frequency choke is required in the plate circuit of the detector valve and instead of incorporating one of the standard types available I have used a plug-in coil. This arrangement is, I consider, to be preferred to the former method, since separate coils may be utilised for the lower and upper broadcasting bands respectively, which gives a smoother control of reaction than is otherwise obtainable.

Incidentally, when the first H.F. valve is correctly neutralised oscillation of the detector valve will not energise the aerial and cause interference to other listeners.

It will be observed that cumulative grid rectification is employed, the reason for this being that it requires no adjustment in use. At the same time, with a correctly designed and operated L.F. side, the quality is excellent.

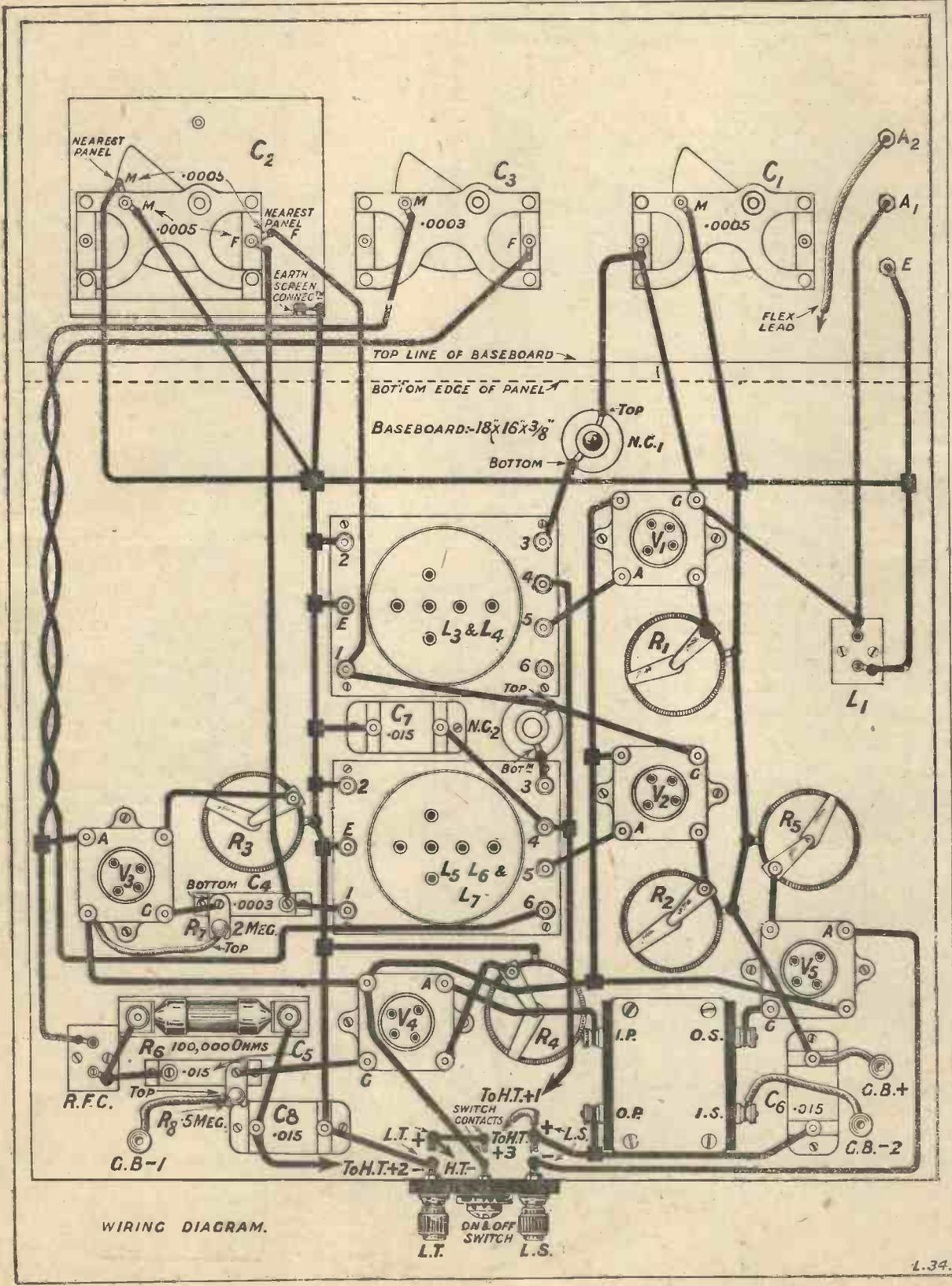
### Economising Baseboard Space

For the detector valve I prefer to use one of the high  $\mu$  types followed by resistance coupling. This allows of quality reproduction being obtained.

In the anode resistance holder a resistance of the order of 100,000 ohms has been chosen instead of higher values, such as 500,000 ohms, which give greater amplification, but may negative this effect by making reaction control tend to be floppy.

In the second note magnifier position, a small power valve of medium impedance being employed in the  $V_4$  holder, a suitable transformer can be used without tending to sacrifice quality. Since this

THE "WANDERER" FIVE—(Continued)



THE "WANDERER" FIVE—(Continued)

generally gives a greater step-up in amplification than a further resistance stage; this form of coupling is used between  $V_4$  and  $V_5$ .

A single condenser to tune both H.F. stages and the use of screened coils here allows of a very compact layout, as will be appreciated from the photographs and wiring diagram.

Arrangement of the Components

The panel arrangement is simple almost to the point of severity. On the left-hand side, reading from top to bottom, are the three sockets  $A_2$ ,  $A_1$ , and E. Into the latter the earth lead is connected when working on an outside aerial, and in this case the aerial lead is plugged into the socket  $A_2$ . When a frame is substituted its two sides are connected to  $A_1$  and E respectively and no coil is required in the  $L_1$  coil socket.

The two slow motion dials seen on the left and right-hand sides of the panel tune the aerial and H.F. circuits respectively, whilst the ordinary dial in the centre is for reaction control.

The two screened-coil bases will be seen near the centre of the baseboard in front of the reaction condenser, viewing the set from the

back. The aerial coil, to a side terminal of which the flex lead from  $A_2$  is joined, is placed towards the right-hand side near to its tuning condenser  $C_1$ . The other plug-in coil seen in front of the double-gang condenser is the radio-frequency choke. Little need be said as to the position of the other components, since their locations will be gathered from inspection of the wiring diagram.

Since the major number of the components are mounted directly upon the wooden baseboard by means of two or more woodscrews, the construction of the set should present but little difficulty even to the inexperienced constructor.

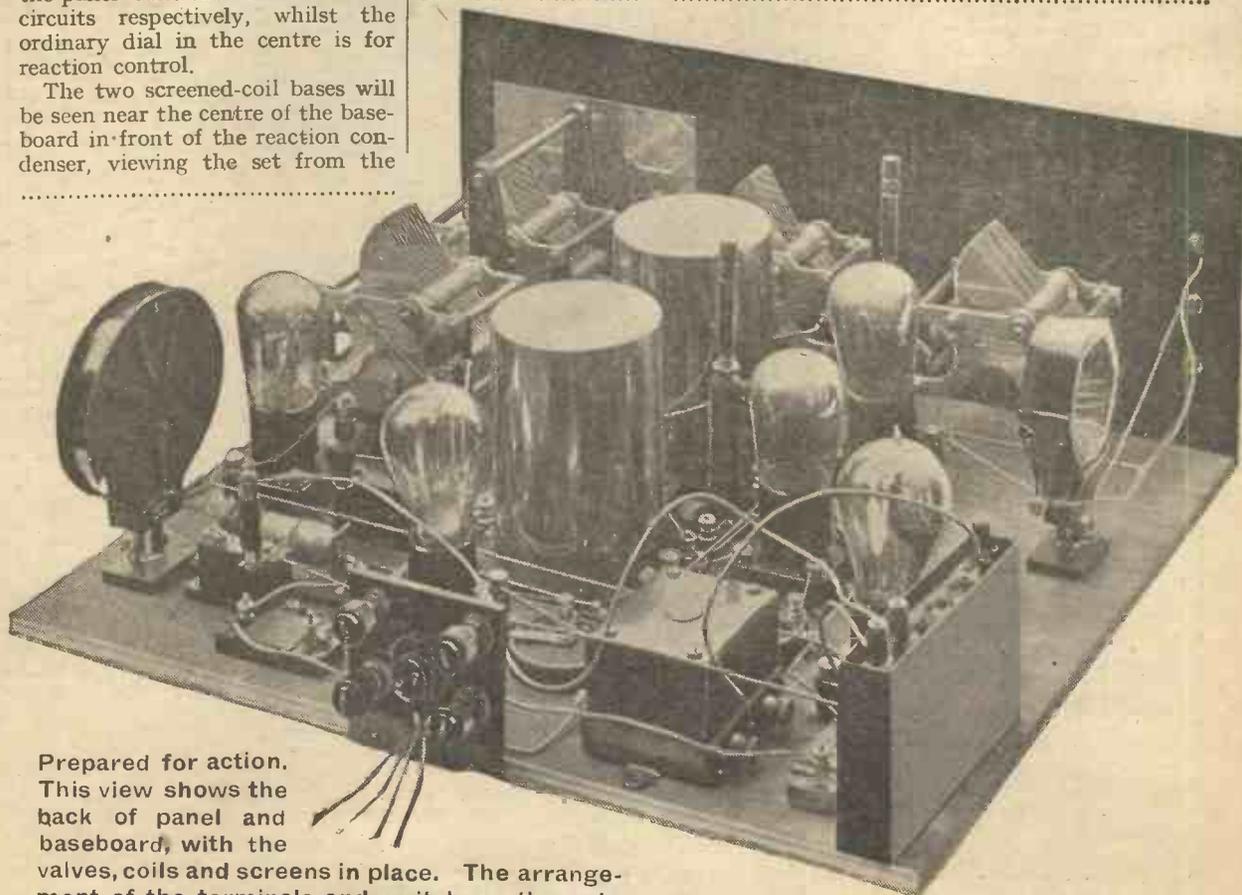
Method in Mounting

The best procedure to adopt is to mount the three tuning condensers, the three sockets, and the Indigraph slow-motion dials on the panel for a start. Then the panel may be held against the baseboard, whilst the position for the

metal support for  $C_2$  is determined. The supporting arrangement may then be screwed into place, when it becomes an easy matter to fix the panel, with its three condensers, to the baseboard by means of wood screws. When the panel is in place the rheostats, valve-holders, etc., can be affixed.

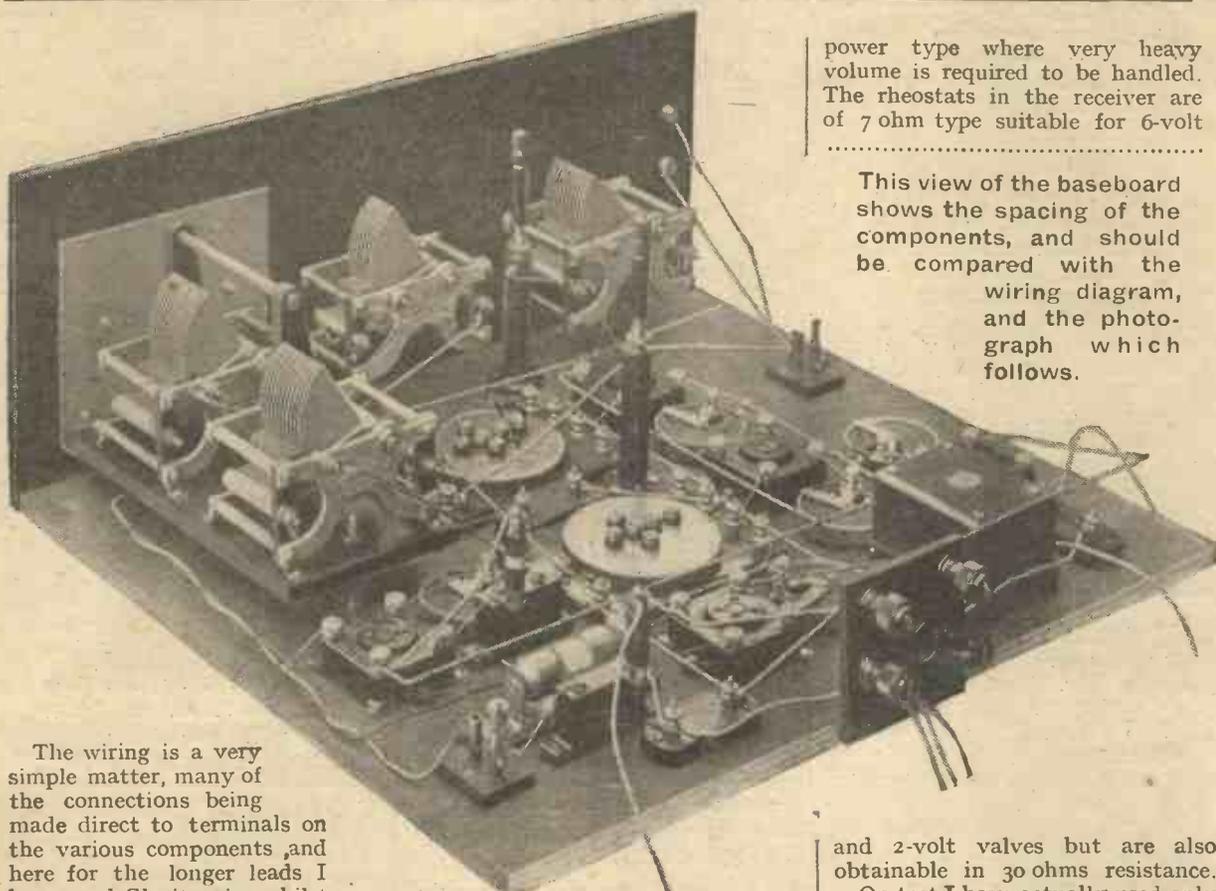
The Sub-Panel

To the centre of the back edge of the baseboard a sub-panel is screwed. This is three inches square and on it are mounted the filament "On and Off" switch and four terminals. The left-hand pair are for the L.T. connections, whilst the two on the right are for the loud-speaker, the upper ones in each case being negative. No terminals are used for the H.T. connections, as for this purpose four leads are taken directly from the set, being brought out through a half-inch diameter hole in the lower portion of the sub-panel.



Prepared for action. This view shows the back of panel and baseboard, with the valves, coils and screens in place. The arrangement of the terminals and switch on the sub-panel and the hole for flexible leads, are clearly shown.

THE "WANDERER" FIVE—(Continued)



power type where very heavy volume is required to be handled. The rheostats in the receiver are of 7 ohm type suitable for 6-volt

This view of the baseboard shows the spacing of the components, and should be compared with the wiring diagram, and the photograph which follows.

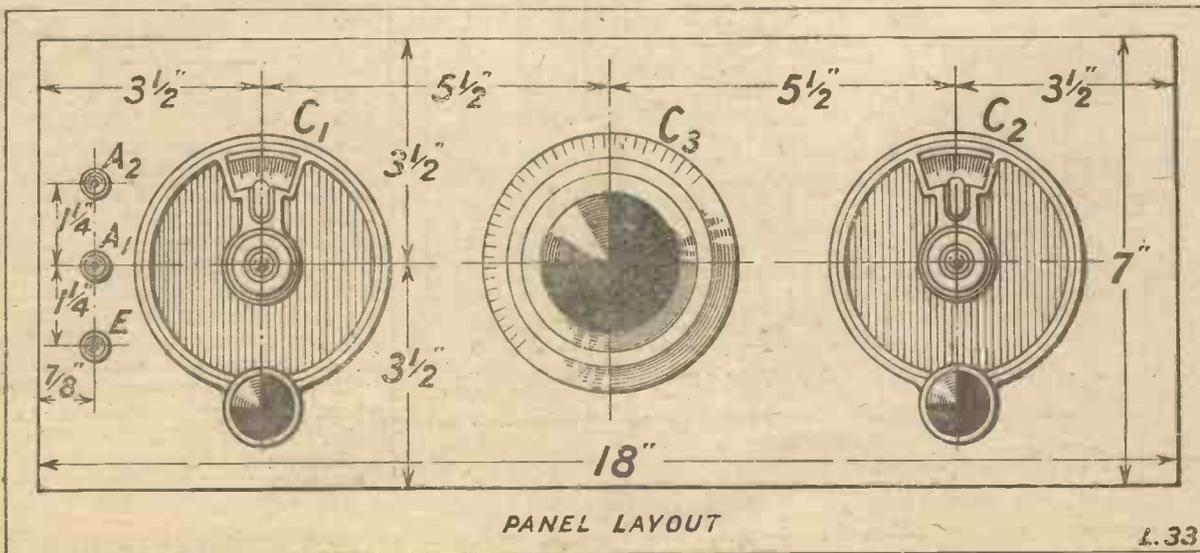
The wiring is a very simple matter, many of the connections being made direct to terminals on the various components, and here for the longer leads I have used Glazite wire, whilst for the shorter it will be found both easier and quicker to employ 20 or similar gauge bare tinned copper wire. For the leads to the H.T. battery rubber covered flex is to be advised.

For use in the receiver three

valves of fairly high amplification and high impedance type are to be advised for the first three positions,  $V_1$  should be of small power type and  $V_5$  may be of similar or of super-

and 2-volt valves but are also obtainable in 30 ohms resistance.

On test I have actually used only 6-volt valves, having employed three S.S.9's, ST 61's, DE5B's, and DE8HF's with excellent results in the first three positions. For  $V_1$  and  $V_5$  I have used two B4's, DE5's, SS4's and one ST62 and 63 respectively. Other valves with



L. 33.

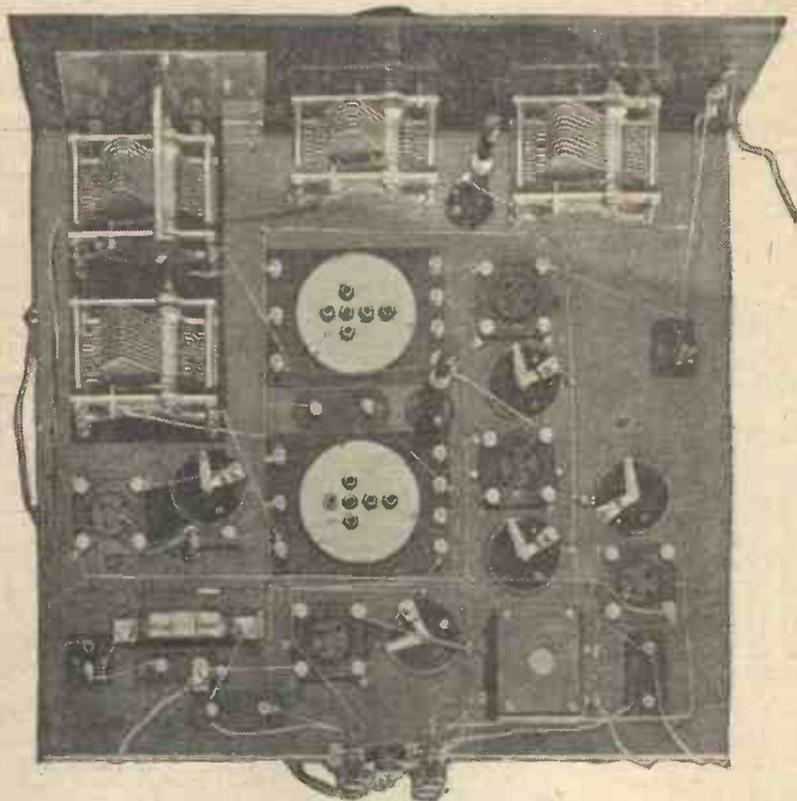
**THE  
"WANDERER"  
FIVE**  
(Continued)

similar characteristics will, of course, prove equally suitable.

On the H.F. valves a voltage of the order of 90 is generally satisfactory, for the detector between 45 and 90 volts, whilst on the note-magnifiers 100 to 120 volts is to be advised. For grid bias  $1\frac{1}{2}$  volts for  $V_4$  and  $7\frac{1}{2}$  or 9 for  $V_5$  is satisfactory. A useful empirical rule to know here is that the grid bias voltage required with a given value of H.T. may be obtained by dividing the H.T. voltage by twice the amplification factor of the valve concerned.

**Coils and Chokes**

Having arrived at this stage a few words on the subject of coils is called for. For the aerial coil  $L_1$  utilising an outside aerial, a No. 60 Lissen X, or similar coil, will be required for the lower broadcast-range, and in conjunction with this coil two split-primary H.F. transformers are necessary. Here I have tried Peto-Scott



Looking down on the baseboard. Not only are the relative positions of the components shown, but from this photograph the constructor will see how the sockets, etc., are "faced" to shorten the wiring.

transformers, and also two made by Messrs. Burne-Jones and by the London Electric Wire Co. Any

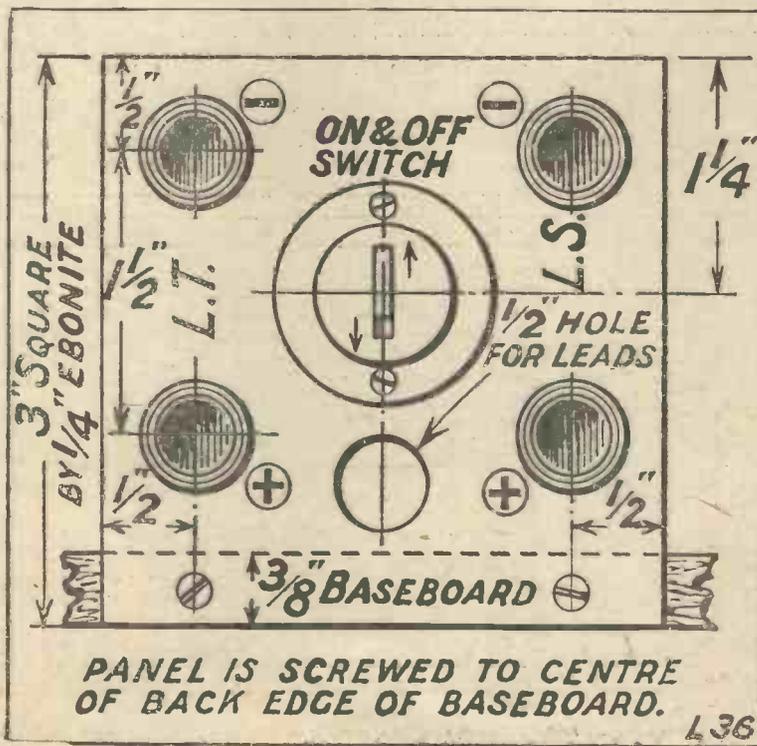
of the standard split-primary coils should satisfactorily serve here. For the radio-frequency choke a plug-in coil of No. 250 or larger size should prove suitable for the lower wave band, but for Daventry reception a larger size, such as No. 400 or 500, is to be advised. In actual practice I have found a Gambrel I satisfactory for both ranges. For 5XX, etc.,  $L_1$  should be a 250X and the H.F. transformer should be of the 1000-2000 metre type.

**Preliminary Tests**

On completion of the wiring, suitable valves should be inserted, the L.T. battery should be connected and it should be determined that all valves light correctly.

Next join the negative H.T. lead to the negative tapping of the H.T. battery, join all H.T. positive leads together and apply 3 or 4 volt H.T., when, if the filament brilliancy remains unchanged, all is probably in order and the correct H.T. voltages may be applied. The above test should be made with coils, etc., in place in the receiver.

Connect the receiver to aerial and earth in the normal manner and with the first H.F. valve extinguished by placing its rheostat



# THE "WANDERER" FIVE—(Concluded)

in the "off" position tune in the local station. Once tuned to maximum strength or  $C_1$  and  $C_2$ ,  $C_3$  being at zero, *i.e.*, with its vanes all out, the first neutralising condenser N.C.<sub>1</sub> should be adjusted till signals are reduced to a minimum.

Now light  $V_1$  and extinguish  $V_2$ , when N.C.<sub>2</sub> may be adjusted.

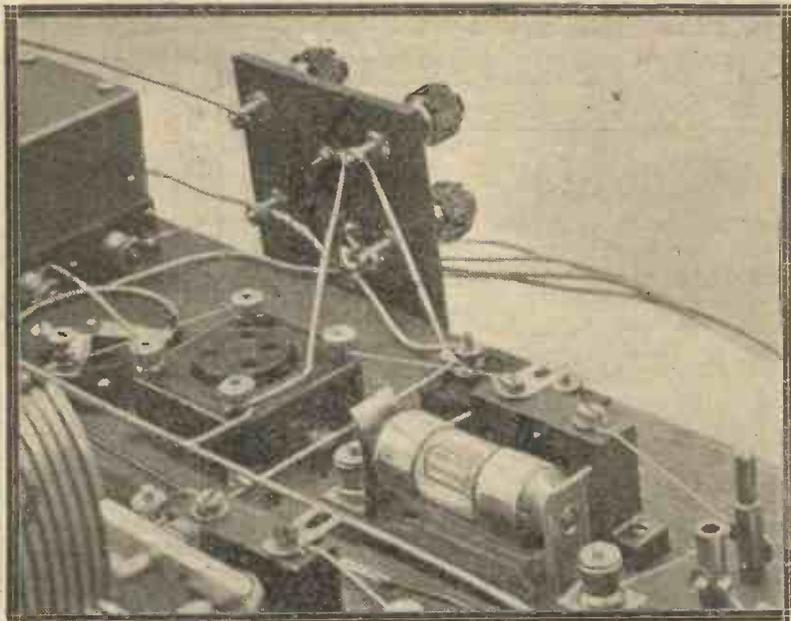
Balancing is a matter of trial and error. First tune in a transmission somewhere about the middle of the  $C_2$  scale, and leaving  $C_1$  set, slack off with a screw-driver the coupling between the two halves of  $C_2$ . Now slightly alter the position of the condenser remote from the panel and retune on the  $C_2$  dial, noting whether signals are stronger and tuning sharper.

## An Evening's Test

This operation should be repeated, only very slight adjustment being made each time, until a satisfactory balance is obtained.

Tuning is sharp, so the procedure to adopt is to advance  $C_1$  by a degree at a time, whilst varying  $C_2$  through several degrees on either side of the same reading as  $C_1$ . When  $C_1$  and  $C_2$  come into tune the usual slight rushing should be heard.

Of the 30 or 40 stations tuned on the loud-speaker during an



The wiring of the sub-panel. Reference to this photograph will facilitate the final stages of construction.

evenings' test, to hear a call sign was the exception rather than the rule. Among the stations definitely identified were Newcastle, Cardiff, Bournemouth, Glasgow, Dundee, and Birmingham, Hamburg, Madrid, Munster, Frank-

furt, Breslau, Rome, Toulouse, Barcelona and Oslo. On the longer waves Daventry, Radio-Paris Hilversum and several unidentified transmissions were obtained. On a frame 2LO, at 12 miles, gave uncomfortable volume for the average room.

## WIRING INSTRUCTIONS

L.T. positive terminal to lower switch contact and to H.T. negative flex lead.

Upper switch contact to filament terminal of  $V_4$  valve holder, to filament terminal of  $V_3$  valve holder and to upper end of the 2 megohm gridleak; to positive terminal of the  $V_4$  valve holder, to positive terminal of  $V_5$  valve holder, and to the positive terminals of  $V_2$  and  $V_1$  valve holders.

L.T. negative terminal to right-hand terminal of  $C_8$ , to side terminals of  $R_4$  and  $R_3$ , to E. and 2 of  $L_5$   $L_6$   $L_7$ , to left-hand side of  $C_7$ , to E, and 2 of  $L_3$   $L_4$ , to both, moving vanes of  $C_2$ , to Earth screen of  $C_2$ , to moving vanes of  $C_1$ , to E socket, to plug of  $L_1$ , to the side terminals of  $R_1$ ,  $R_5$ ,  $R_2$  and to one terminal of  $C_6$ . From this latter terminal the G.B. positive flex lead is taken.

Lower filament terminal of  $V_1$  valve holder to upper terminal of  $R_1$ .

Lower filament terminal of  $V_2$  valve holder to other terminal of  $R_2$ .

Other terminal of  $R_5$  to other filament terminal of  $V_5$  valve holder.

Other filament terminal of  $V_4$  valve holder to other terminal of  $R_4$ .

Other filament terminal of  $V_3$  valve holder to other terminal of  $R_3$ .

A1 to socket of  $L_1$ , to G. of  $V_1$  valve holder, to fixed plates of  $C_1$  and to the upper contact of N. C. 1.

Grid of  $V_2$  to upper contact of N.C.2, to 1 of  $L_3$   $L_4$ , and to fixed vanes of  $C_2$  nearest panel.

3 of  $L_3$   $L_4$  to lower contact of N.C.1. 3 of  $L_5$   $L_6$   $L_7$  to lower contact of N.C.2.

Grid of  $V_3$  to left-hand terminal of  $C_4$  and to bottom end of  $R_7$ . Right-hand terminal of  $C_4$  to 1 of  $L_5$   $L_6$   $L_7$ , and to the fixed vanes of  $C_2$  remote from panel.

Grid of  $V_4$  to right-hand terminal of  $C_5$  and to lower end of  $R_8$ .

Grid of  $V_5$  to OS.

A of  $V_1$  valve holder to 5 of  $L_3$   $L_4$ .

A of  $V_2$  valve holder to 5 of  $L_5$   $L_6$   $L_7$ .

A of  $V_3$  valve holder to socket of R.F.C. and to the fixed vanes of  $C_3$ .

Moving vanes of  $C_3$  to 6 of  $L_5$   $L_6$   $L_7$ .

Plug of R.F.C. to left-hand terminal of  $R_6$  and to  $C_5$ .

A of  $V_4$  valve holder to IP.

A of  $V_5$  valve holder to upper loud-speaker terminal (L.S.—)

Right-hand side of  $R_6$  to left-hand terminal of  $C_8$ , from which latter point the H.T. +2 flex lead is taken.

4 of  $L_3$   $L_4$  to 4 of  $L_5$   $L_6$   $L_7$  and to right-hand side of  $C_7$ . From 4 of  $L_5$   $L_6$   $L_7$  H.T. +1 flex lead is taken.

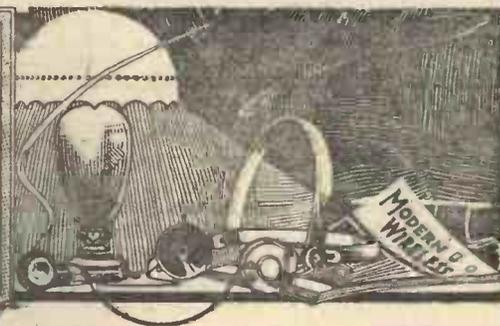
Lower terminal of  $C_6$  to OP, to lower loud-speaker terminal (LS+) and to H.T. + 3 flex lead.

From upper end of  $R_3$  G.B. neg. 1 flex lead is taken. G.B. neg. 2 flex lead is taken from IS.

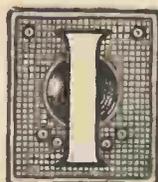
From the A2 socket a flex lead is taken to a tapping on  $L_1$ .

# A WORD TO OUR READERS

By THE EDITOR.



## Change of Control of "Modern Wireless."



It was not possible in the January issue of MODERN WIRELESS to make more than a brief announcement concerning the change of proprietorship of MODERN WIRELESS and, incidentally, the *Wireless Constructor*, and *Wireless*, the twopenny weekly. These three journals, as my readers know, were recently published by the Radio Press, Ltd., but they have since been acquired by the Amalgamated Press, Ltd., and the January issue of MODERN WIRELESS was the first to be published by the new proprietors.

Owing to the fact that when the change of proprietorship was made very little time was left to get the January issue of MODERN WIRELESS to press, it was not possible to include a few remarks which, as Editor of this paper, it is necessary for me to make for the benefit of readers and advertisers.

### The Technical Queries Service

MODERN WIRELESS will continue to be published as a high-class monthly, and the *Wireless Constructor* will also retain its characteristic features which have made it such a great favourite with the home constructor. *Wireless*, the twopenny weekly, has been incorporated in *Popular Wireless*.

Many of the old contributors to MODERN WIRELESS will continue to write for this journal under its new proprietorship, and the same applies in the case of the *Wireless Constructor*; in addition, the scope of the Queries Department has been generally enlarged in order to offer unrivalled facilities to those amateurs who wish to have their problems dealt with by the technical staff of this journal, the *Wireless Constructor* and *Popular Wireless*.

The Queries Department for all three papers is now under the direction of Mr. G. P. Kendall, B.Sc. Mr. G. V. Dowding has been appointed Technical Editor of MODERN WIRELESS, in addition to the similar post which he holds on the staff of *Popular Wireless*. Mr. Percy W. Harris, M.I.R.E., has been appointed Editor of the *Wireless Constructor*, and thus resumes his control of a paper which, under his original editorship, proved so very successful in the past and which will undoubtedly prove even more successful in the future.

### A Fair Field and No Favour

With regard to the receiving sets described from time to time in all these three journals, we wish to point out for the benefit of our many friends who advertise with us that a policy of "a fair field and no favour" has been adopted with regard to the use of component parts, etc.

We had at one time considered the possibility of publishing constructional articles without mentioning the names of any specific components used, but unfortunately this was found impracticable. Consequently, we shall endeavour to carry out our usual policy, as in the case of *Popular Wireless*, of publishing constructional articles which do not show undue favour to any one particular manufacturer.

### Our Testing Department

There are, for instance, many makes of low-frequency transformers on the market. So long as any one of those particular low-frequency transformers pass a certain test in our Technical Department, and consequently convince us that the components are of fair value and technical efficiency and can be recommended to the public, we shall use them in turn in the various receiving sets con-

structionally described in MODERN WIRELESS, the *Wireless Constructor*, and *Popular Wireless*.

In every case, however, we shall endeavour to offer to our readers a variety of choices when giving a list of components for building any specific set, in order that we may adhere as closely as possible to the policy which we have always firmly believed in, viz., that of "a fair field and no favour."

We would point out that a special Technical Testing Department at the offices of these journals at The Fleetway House, Farringdon Street, London, E.C.4, is already equipped to test sets and components received from our advertisers. Such apparatus should be addressed to: "The Technical Test Department" at the above address, and it should be expressly stated whether a review and a report are wanted for publication in one, two or all three of the wireless journals published by the Amalgamated Press, i.e., MODERN WIRELESS, the *Wireless Constructor* and *Popular Wireless*.

### Protecting the Purchaser

We should like to inform our readers that all such apparatus received is tested with the primary object of ascertaining whether the component or set under notice is suitable for the needs of the amateur. If it passes that test and is reported on favourably, the reader may rest assured that that component is a satisfactory one and can be recommended.

In conclusion, we can but assure all our readers that under the new proprietorship MODERN WIRELESS will still maintain the best traditions of its original founder, Mr. John Scott-Taggart, and that every endeavour will be made to provide readers with the very best obtainable in matters relating to the hobby of radio.

# DEVELOPMENT OF THE BEAM

A short account of the Rise and Improvement of SHORT WAVE DIRECTIONAL SIGNALLING

BY SEXTON O'CONNOR.



THE earliest attempts to secure directional effects in the transmission of wireless signals were, somewhat natur-

words, the distance AB between the ends of the reflector must be at least several times the wavelength of the radiated energy if any pronounced directional effect is to be secured.

At a time when signalling was

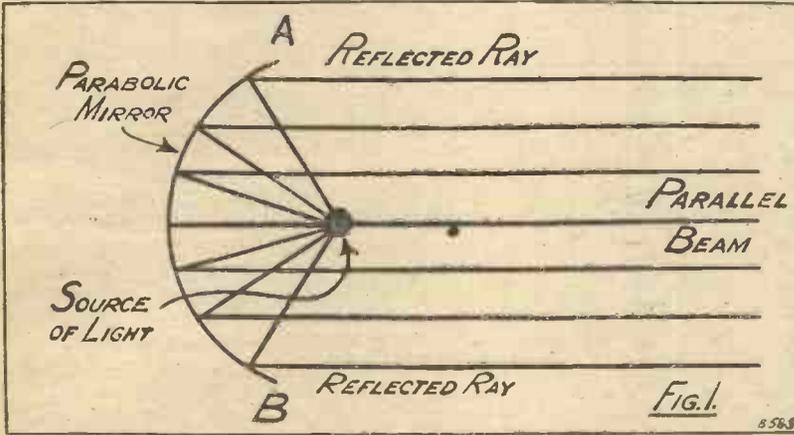
usually carried out on wavelengths in the neighbourhood of 1,000 metres, this condition was fatal. It was obviously not practicable to construct screens of the size required.

The last few years have, however, witnessed a revival in the use of short-wave energy. When employing wavelengths, say, of the order of 10-25 metres, it is possible to construct screens of such a size as to be capable of confining the waves to a definite path.

### Wireless Beacons for Ships

Instead of using a continuous metal sheet as a reflecting surface, it is found that a series of vertical wires, erected in parabolic formation behind the main oscillator, will serve the same purpose.

The beacon stations erected at Inchkeith, South Foreland, and elsewhere are built on this plan. They send out a rotating "beam"



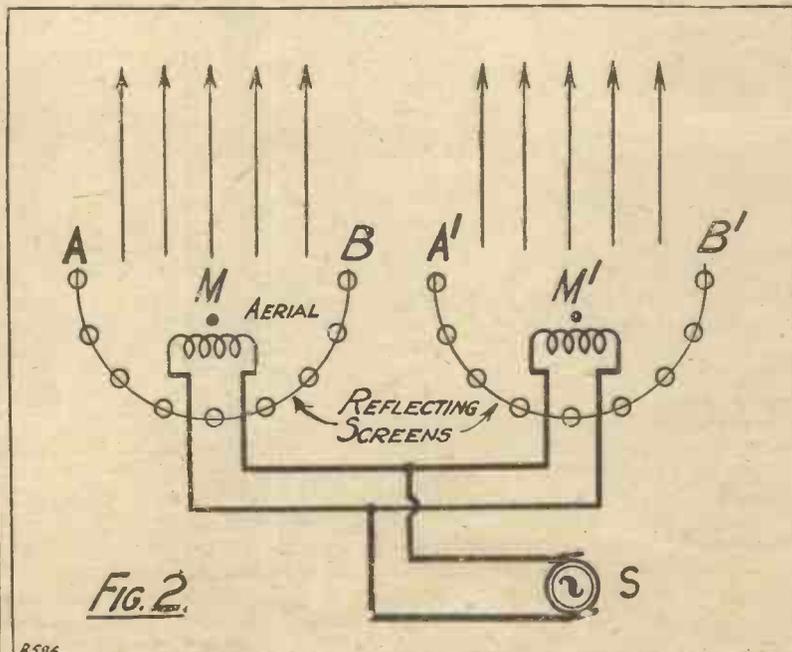
ally, based upon the use of a curved sheet-metal reflector, placed behind the aerial with the object of concentrating the ether waves into a more or less parallel path.

In the case of extremely short-wave radiation, such as light, this method is perfectly sound. A parabolic mirror will, for instance, concentrate the rays from a source of light placed at its focus into a parallel beam, as shown in Fig. 1.

### The "Mirror" Effect

A good conducting surface reflects wireless waves in much the same way as silvered glass reflects light, so that in theory a parabolic "mirror" made of metal should have a similar effect upon the waves radiated from a transmitting aerial.

In practice, however, the degree of concentration depends upon the ratio of the size or "aperture" of the mirror to the wavelength of the rays to be reflected. In other



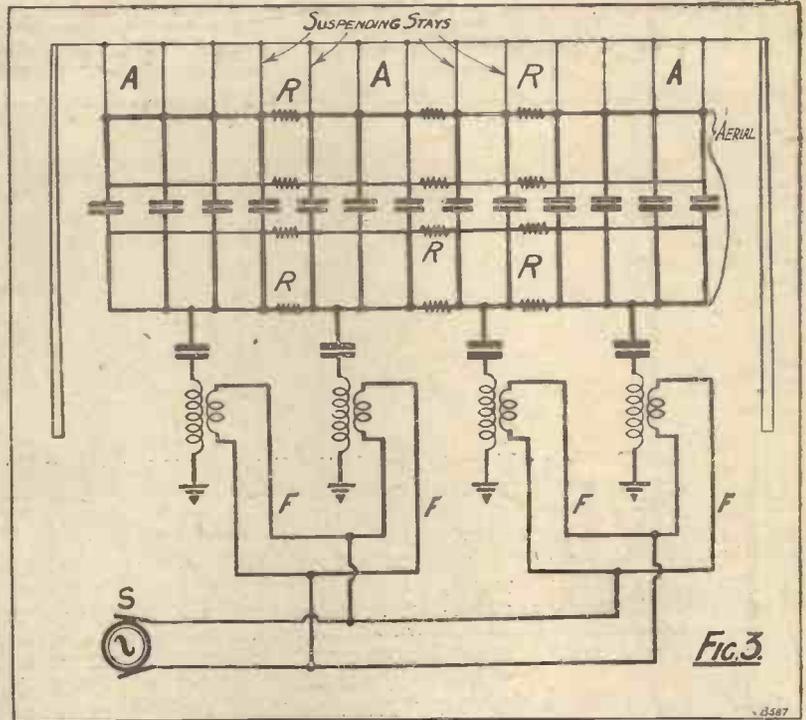
**DEVELOPMENT OF THE BEAM—(Continued)**

of signal energy from which any ship within range can ascertain its precise bearings. The advantage of such assistance is particularly obvious in foggy weather, when the ordinary lighthouse is rendered practically useless.

**Swinging the Beam**

In order to allow the signalling beam to be swung around the horizon, the parabolic reflector system is mounted on a revolving platform, the main oscillating aerial being located at the focus of the reflecting network. As the platform is rotated, a series of fixed contacts on its base operate automatically to transmit Morse signals corresponding to the various points of the compass.

Parabolic reflectors of this type are not, however, best suited for long-distance transmission. As previously explained, the wider the "aperture" of the screening system, the more pronounced in



theory is the directional effect secured. Unfortunately, a limit is soon reached in this direction,

because the outer wires become too remote from the main oscillating aerial to act effectively as reflectors.

In order to overcome this objection, Mr. C. S. Franklin has recently suggested the use of a series of separate parabolic reflectors, such as  $A B A_1 B_1$ , placed in the same line so that their axes are parallel, as shown in Fig. 2. Each reflector has a central oscillating aerial  $M$ , fed in phase from a common source of high-frequency oscillations  $S$ .

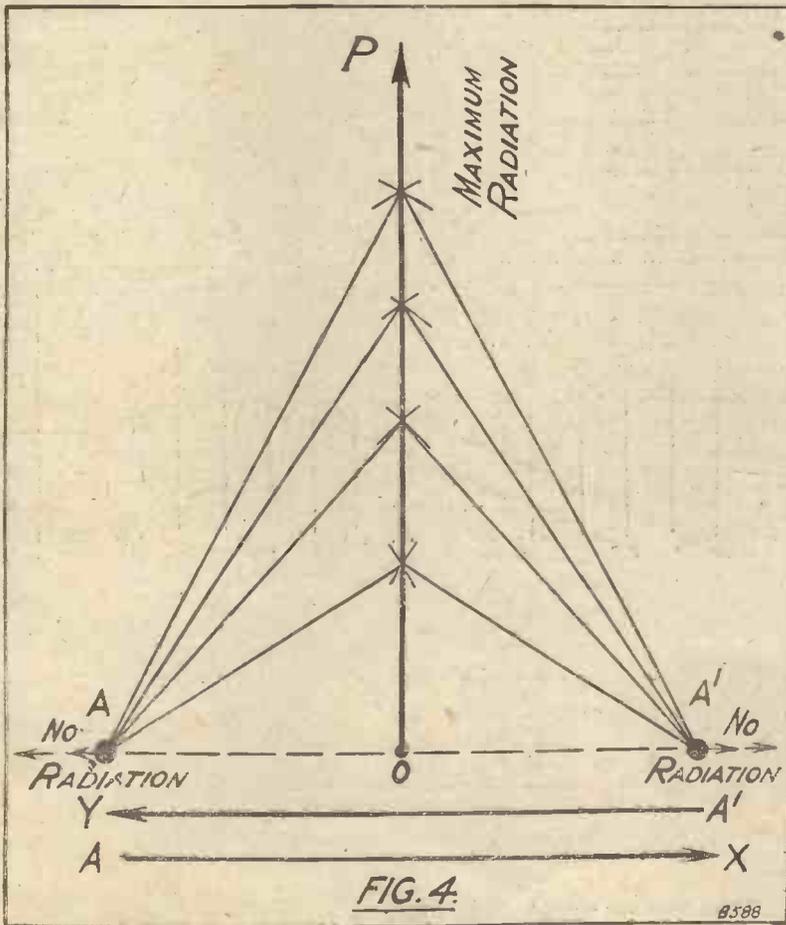
**Aerials in Line**

By employing a number of such reflectors in line, it becomes possible to transmit a definite "beam" of waves in a given direction, the concentration of which is proportional to the combined apertures of all the reflectors, without any loss in efficiency.

The individual wires forming the reflecting system are each tuned to the transmitted wavelength. They are, approximately, half a wavelength in height, and the whole system may be mounted above the ground in order to transmit a true "space" wave for long-distance work.

In comparatively high-powered "beam" signalling, such as that used for transatlantic work, the single aerial oscillator backed by a parabolic reflector is now replaced by a "bank" of energised aerials arranged in a straight line and backed by a similar straight-line network of reflecting aerials.

The arrangement is indicated



## DEVELOPMENT OF THE BEAM—(Continued)

diagrammatically in Fig. 3, which shows the radiating system only. The reflector consists of a similar network of "idle" wires arranged approximately, a quarter wave-length behind the main network.

The aerial wires are connected together at the top and bottom as shown, the whole network being suspended from an overhead cable slung between side-masts. Each

a concentrated beam at right angles to the plane of the network. By placing a similar idle network behind the first, the back radiation is intercepted and reflected forwards to strengthen the outgoing waves in the desired direction.

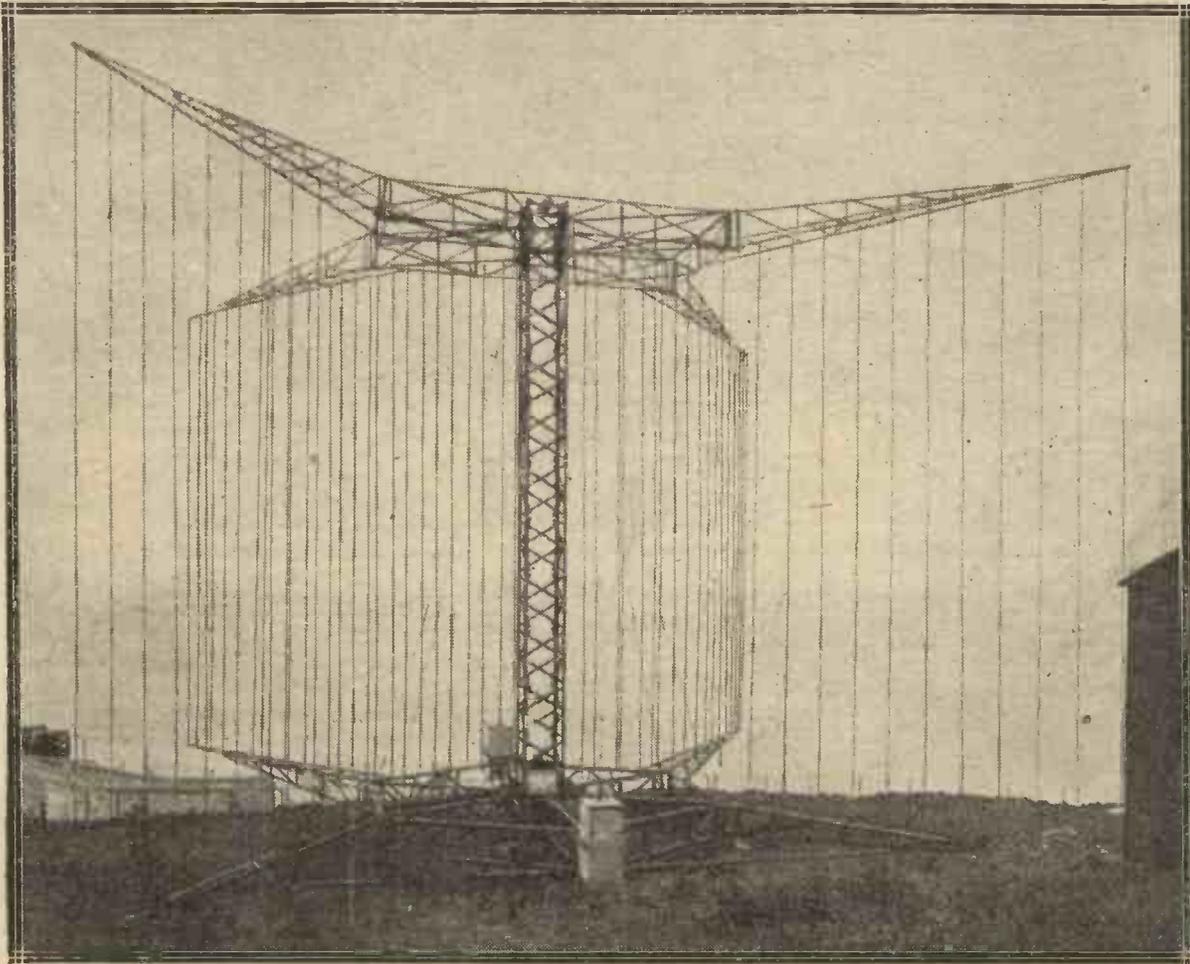
### Narrowing the Beam

In order to prevent any tendency of the system to oscillate in the

used in the Canadian beam service is limited to approximately eight degrees.

### How Waves are Concentrated

It may be asked why the aerials do not radiate laterally, *i.e.*, towards both sides, as well as at right angles to their plane. This can be answered by considering the effect of any two aerials spaced apart by



A Wireless "Beacon," showing the reflecting network of the "beam" transmitter.

vertical wire is divided by a central condenser, so that it actually comprises two oscillators, an upper and a lower, coupled together by capacity. The radiating wires are energised by a system of feeders from the power house containing a high-frequency source S.

The effect of such an aerial system is to create a "current sheet" from which ether waves are radiated in

horizontal direction, *i.e.*, across the network, damping resistances R are introduced into the lateral binding wires, as shown.

By making the total width of the aerial network several times the length of the transmitted waves, the radiated energy can be restricted to a very small angle. Senatore Marconi has, in fact, stated that the spread of the waves

half a wave-length and energised in the same phase.

In Fig. 4 the two aerials A A<sub>1</sub> are separated by half a wave-length. If they are energised by currents in the same phase, the direction of maximum radiation will clearly lie along the centre line O P at right angles to the plane A O A<sub>1</sub>.

This is so because all points  
(Continued on page 187).

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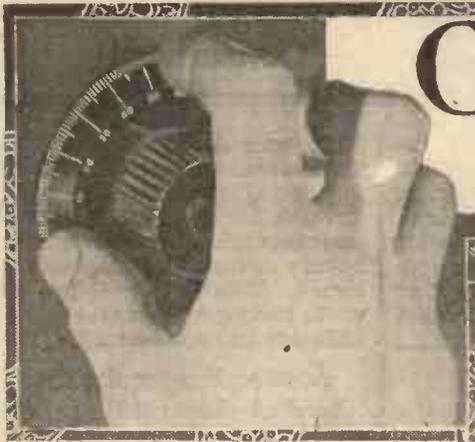
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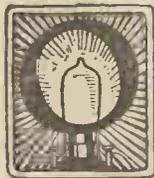
# POPULAR WIRELESS

Every Thursday at all Newsagents. **3<sup>d</sup>.** Buy it regularly.



# Condensers in Cascade

By G. V. DOWDING, Grad. I.E.E.  
(TECHNICAL EDITOR).



**F**TEN it happens that special circuits demand components having special values. For instance, the Armstrong super-regenerative circuit necessitated the use of peculiarly large coils (1,250

the ones in which they were originally used.

And even those amateurs who build quite straightforward sorts of sets accumulate numbers of surplus parts. Now, although I am not going to suggest that uses can be found for everything in the "junk box," I am going to show how many components on the "reserve list" can be made to go on "active service" and do useful work.

I am sure that many amateurs do not realise the possibilities of

not necessarily the selectivity that is going to enable real "DX" to be accomplished.

But a .001 mfd. variable condenser placed in series with a .001 mfd. fixed condenser is as good as a .0005 mfd. variable condenser from a tuning point of view. Actually the maximum capacity across the two will be .0005 mfd., and so the desired zero to .0005 is available. (Fig. 1.)

## A Problem Solved

Similarly the amateur who has two or three .0005 mfd. variable condensers on hand need not buy a .0003 mfd. variable for use in a special hook-up. He can place a .00075 mfd. fixed condenser in series with one of his .0005 mfd. variables and at once he has the desired range of capacities from zero (which isn't really zero, of course!) to .0003 mfd. Similarly a .0003 mfd. variable is to all intents and purposes a .0002 mfd. variable if it has a fixed condenser of .0006 mfd. placed in series with it. (Fig. 2.)

You see, the capacity of any two condensers in series is always less than the capacity of the smaller condenser. The two capacities multiplied by each other and then divided by the two same capacities added together is the simple rule of two condensers in series. Take one of .0003 mfd. with the .0006 mfd. fixed condenser in series. Ignoring the noughts for the moment, we

$$\text{get } \frac{3 \times 6}{3 + 6} \text{ or } \frac{18}{9} \text{ which is } 2.$$

Put the noughts and decimal point back and we arrive at .0002 mfd., and solve the problem of what to do with a surplus .0003 mfd. variable when our set demands one of .0002 mfd.

## A Scheme with Possibilities

Similarly, if you are building a set and discover at the last moment that a fixed condenser of a certain value is necessary, and that one such is "non est," then you should search around among your spares to see if two or even three condensers

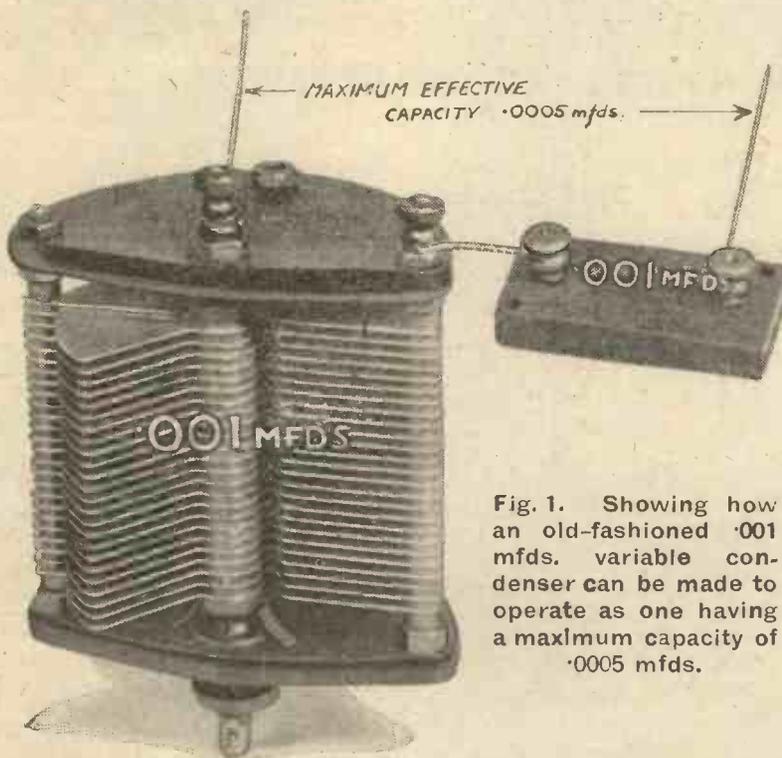


Fig. 1. Showing how an old-fashioned .001 mfd. variable condenser can be made to operate as one having a maximum capacity of .0005 mfd.

and 1,500 turns), while the original Flewelling hook-up called for .006 mfd. fixed condensers and so on.

The amateur who conscientiously tries out most of these circuits accumulates a number of components which do not appear to be of any use for any other circuits than

"pairing." For instance, .00r mfd. variable condensers are right out of fashion these days. They are, for most purposes, quite obsolete. It has been generally realised that that value is too high and that the "selectivity" which merely brings in and loses two or three stations within a degree or two on a dial is

## CONDENSERS IN CASCADE—(Continued)

can be used together to produce the desired capacity.

Two .006's in series will give .003 mfd. Another fixed of .002 mfd. capacity in parallel will bring the joint capacity up to .005 mfd., because capacities in parallel is merely a matter of simple

positive and cause serious distortion. If instead of one .01 mfd. fixed condenser two .02 mfd. in series were used, both would have to be faulty before such trouble could occur. The risk is therefore halved. And there are many other cases where it is equally as useful

Thus both do lighter work, and therefore stand less risk of "breaking down," and, further, both have to break down or develop leaks before a short circuit is imposed on the battery across which they are connected. This is especially well worth bearing in mind when mains' units are under construction.

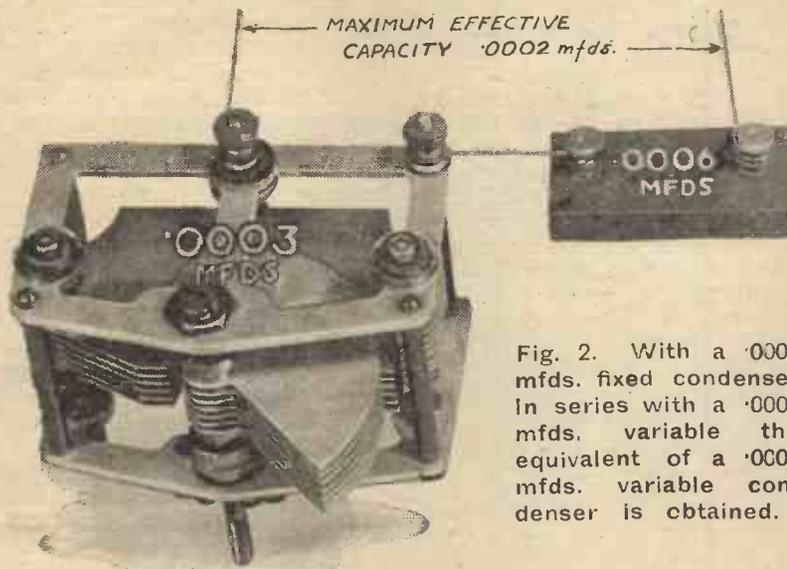


Fig. 2. With a .0006 mfd. fixed condenser in series with a .0003 mfd. variable the equivalent of a .0002 mfd. variable condenser is obtained.

### Another Danger Avoided

In some circuits if the vanes of a variable condenser touch or are shorted by extraneous means, the H.T. is shorted and deafening noises caused in the 'phones or speaker. (Fig. 6.) The risk of such an occurrence can be obviated by placing a fixed condenser in series with the variable condenser. The larger the fixed condenser, the less will be the reduction in the effective capacity. For instance, a fixed condenser of .001 mfd. in series with a variable of .0005 mfd. produces a capacity of .00033 mfd., and this is a considerable reduction. But a fixed of .1 mfd. in series with the same variable produces an effective capacity of .000497 mfd., which is such a small decrease that it is for practical purposes quite negligible. In fact, it is not only possible but highly probable that most of your variables in themselves differ much more than this from their stated capacities!

And placing a fixed condenser in series with a variable does not cause the minimum capacity to be

addition. If two .006's and a .002 are arranged and can function as a .005 mfd. fixed condenser, you will see that the artifice of paralleling and "seriesing" has endless possibilities. (Fig. 3.)

### Safety in Numbers!

It is quite fascinating endeavouring to obtain certain specific capacities with a handful of awkwardly valued fixed condensers; it's much more intriguing than crosswords!

And don't forget that from a practical point of view two fixed condensers in series or parallel are every bit as efficient as only one giving the desired capacity; in fact, in many cases it is distinctly advantageous to employ two fixed condensers in series instead of just the one. In many circuits a fixed condenser acts as a "buffer" to direct current. Take, for example, the condenser used in the grid circuit of a resistance-capacity coupled L.F. amplifying valve. (Fig. 4.)

If this fixed condenser "leak" it is going to allow the H.T. plus to leak on to the grid, make it

to use two fixed condensers in series.

Not that I wish to prove that constructors should never use single condensers or that these components are generally untrustworthy! But when condensers are subjected to heavy voltage pressure, such as, for instance, when they are connected across H.T. batteries (see Fig. 5), two in series have each to stand against but half the voltage that would be the burden of one alone.

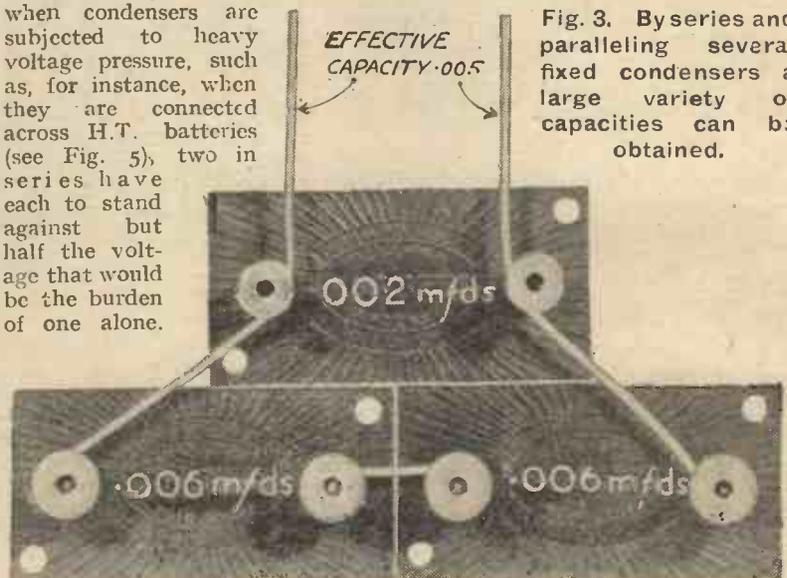
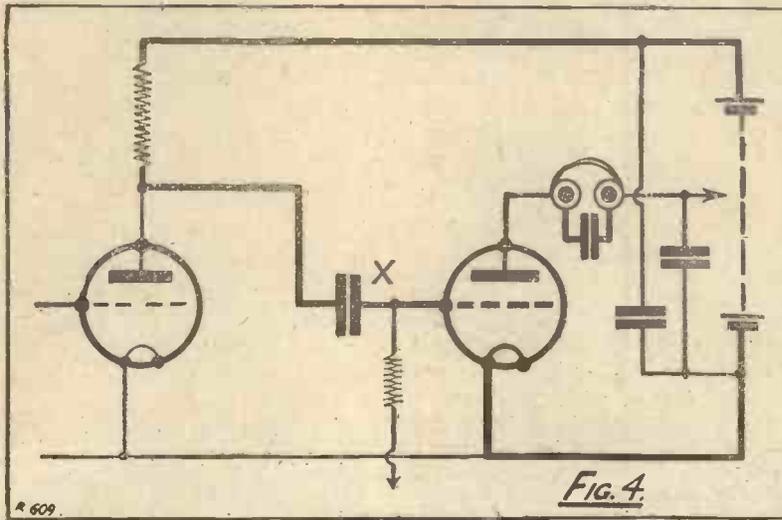


Fig. 3. By series and paralleling several fixed condensers a large variety of capacities can be obtained.

CONDENSERS IN CASCADE—(Continued)



necessary calculation. Proving how useful a thorough knowledge of "pairing" condensers can be, let me instance a personal experience. Some time ago I was testing a new circuit in which it was stated that a variable condenser of .00025 mfd. was essential. Personally I considered that either a .0002 mfd. or a .0003 mfd. would have been perfectly suitable, but in fairness to the designer of the circuit I decided that I would rigidly adhere to that .00025 mfd.

An Example

But it so happened that I had no variable of this capacity on hand at the moment, so I calculated awhile and then used a .0003 mfd. variable connected in series with two fixed condensers in parallel. The individual capacities of these two fixed were .0005 mfd. and

higher. On the contrary, it will be lower, for if you remember the rule is that the capacity of two condensers in series is always lower than the smaller individual capacity.

But if a fixed condenser is connected across a variable in order to obtain higher effective capacities, it should be remembered that the minimum then obtainable must be something above the value of the fixed condenser.

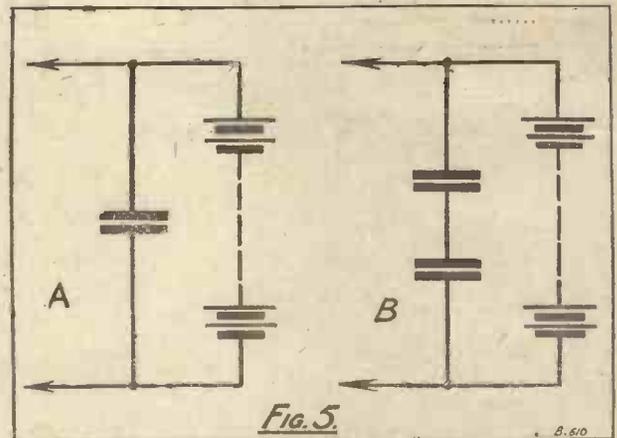
Supposing a .0002 mfd. fixed is connected across a .0003 mfd. variable, the maximum capacity obtainable will be .0005 mfd., but the minimum will be the normal minimum of the variable plus .0002 mfd.

Mathematically the two rules are:—

Condensers in parallel ; the

resultant capacity equals the sum of the individual capacities.

Condensers in series: the sum of the reciprocals of the individual capacities equals the reciprocal of the resultant capacity. The reciprocal of a value is that value divided into one. Thus the reciprocal of .0005 is  $\frac{1}{.0005}$ . But in .0005; the case of only two condensers in series the simple rule previously mentioned covers the



.001 mfd., and this gave me the .0015 mfd. which was necessary to produce the .00025 mfd.

In order to discover the capacity required in series with a condenser to produce a certain effective

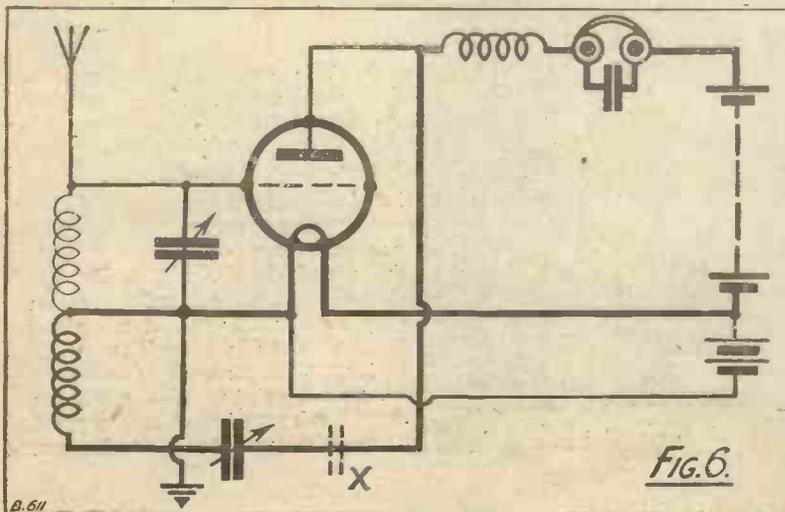
capacity, the rule is  $\frac{1}{x} = \frac{1}{K_1} - \frac{1}{K_2}$  when  $K_1$  = the desired capacity and  $K_2$  = the capacity of the variable or fixed condenser of known value.

A simple example will make this clearer. Supposing we have a variable condenser of .0005 mfd. maximum capacity on hand and we desire it to function as a .0002 mfd. variable.

$\frac{1}{x} = \frac{1}{.0002} - \frac{1}{.0005}$  We can dispense with the noughts for a moment

$\therefore \frac{1}{x} = \frac{1}{2} - \frac{1}{5}$ , and giving them a

(Continued on page 121).



By  
**NORMAN EDWARDS,**  
 M.I.R.E., M.R.S.L.,  
 F.R.G.S.,  
 Editor of  
 "Modern Wireless"  
 and  
 "Popular Wireless"

# "DX" HINTS FOR NEW AMATEURS



THE critics of broadcasting deprecate long distance reception, or DX work as it is called, on the grounds that although stations can be tuned in the quality of reception is generally very poor, and consequently any good music received from, say, a German, or other distant station, is apt to be distorted and interfered with.

### Distance—or Quality?

There are other critics, however, who ignore the quality of distant

reception and claim that the great advantage of a powerful receiver is that it enables them to pick up distant stations and therefore gratify a passion for receiving a great number of stations at great distances.

The average listener, however, who has a powerful receiver and who is not particularly interested in the technique of wireless, is chiefly concerned with the reception of distant stations because such reception offers him a bigger variety of entertainment. Consequently, although he does not get a thrill at receiving, say, some obscure and distant American broadcasting station, purely because it is an obscure and distant

station, if he succeeds in getting that station at good signal strength and at reasonable clarity, he is very pleased because he is thus able to enjoy a programme different in many respects from the programmes transmitted by the B.B.C.

But for the amateur the greatest pleasure in DX reception is just the fact that these distant stations can be tuned in, quite apart from any variety in the programme which they offer.

### The Keynote of Success

The successful tuning in of distant wireless stations is often made more difficult by fading and "jamming" but, leaving out these, a good deal of the lack of success which attends the efforts of many amateurs to tune in distant stations may be set down to the complication of their receivers and, in the main, to the multiplicity of the controls they employ in such receivers.

Simplicity is the keynote of successful distant reception and an amateur who has, say, a five-valve set, the tuning panel of which is smothered with controls, is less likely to succeed as a DX amateur than the amateur who, with, say, the same sort of receiver, has reduced the number of controls to the very minimum.

### Simplifying the Controls

The controls on, for instance, an ordinary five-valve receiver, need not exceed three:—

1. Aerial tuning.
2. The condenser tuning the first and second high-frequency coupling, and
3. Reaction adjustment.

With such controls, the tuning in of distant stations is simplified.

But when an amateur incorporates three or four, or even five tuned circuits with individual controls in his receiver it is not an easy matter to tune in a distant station, even although a wave meter may be at hand to assist.

Another point which the DX fan should take notice of is the great value of slow motion condensers. It will be found that if the ordinary

(Continued on page 178).



Community Singing by Football Crowds. The engineer adjusting controls at the Craven Cottage Ground whilst the turnstiles were clicking for a Reading v. Fulham match.



# The Midget Reinartz Receiver

In designing this set the author has aimed at compactness and neatness as well as maximum efficiency. The design is also modern—and the constructor will have no fault to find with this extremely fine little receiver.

By A. S. CLARK.



As will be gathered from its title, the primary object in designing this set has been to keep it small, compact and neat. When it is taken into account that it has Reinartz type reaction control, and therefore two variable condensers are required, and that there are no external coil-holders, it will be realised that the panel size (9 in. by 6 in.) is quite small.

Do not think however, that in obtaining a "midget" design, efficiency has been sacrificed at all, since a perusal of the results obtained will show that the set is probably better than most single valve receivers.

### Modern Design

On inspecting the photographs and circuit, it will immediately be apparent that modern design has been very carefully adhered to. No swinging reaction coil has been employed, and one of the efficient, modern 6-pin coils has been utilised. Again a fixed resistor is incorporated, and jack switching is used to turn the set on, so that it is only necessary to insert the telephone plug to put the set into operation.

It was not found possible to use straight-line-frequency condensers because their particular shape makes them require more room than was available. This will not be found a drawback, since square-law type condensers with a vernier

are mounted on the panel, while the four battery terminals are mounted on a strip of ebonite at the back of the baseboard. This strip fits into a slot cut in the back of the cabinet, so that all battery

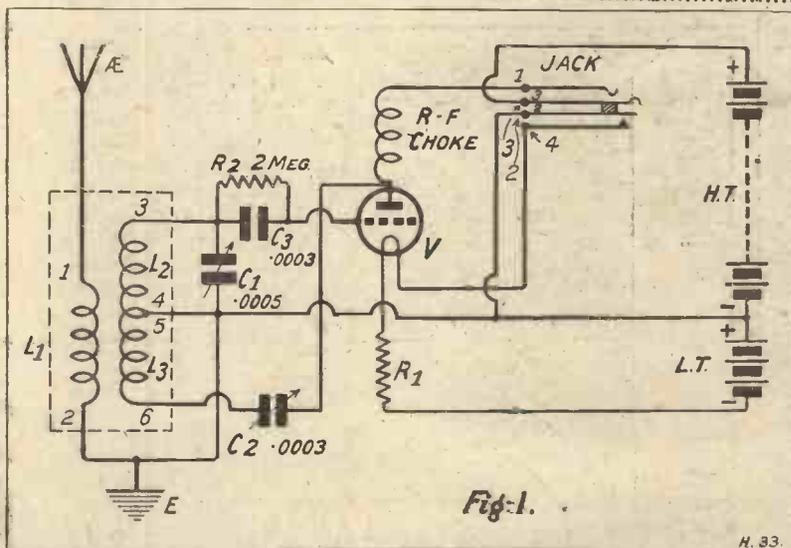


Fig. 1.

H. 33.

movement are employed thus making fine tuning an easy matter. The aerial and earth terminals leads are kept conveniently out of the way. A section of the top of the cabinet

## COMPONENTS REQUIRED

- Panel 9 in. by 6 in. by 1/4 in.
- Cabinet for same with baseboard 9 in. by 8 in. by 3/8 in.
- Six-pin coil mount.
- Reinartz coils for same.
- One .0005 variable condenser, Low-loss with slow-motion drive.
- One .0003 variable condenser, Low-loss with slow-motion drive.
- Two insulated terminals marked "Aerial" and "Earth."

- Four ordinary terminals on ebonite strip 4 in. by 2 in. by 1/4 in.
- One .0003 fixed condenser with grid-leak clips.
- Two megohm grid-leaks.
- Fixed resistor and base.
- H.F. choke.
- Valve-holder (anti-microphonic).
- One single filament control telephone jack.
- One telephone plug.
- Glazite wire, fixing screws, etc.

**THE MIDGET REINARTZ RECEIVER—(Continued)**

is made to open like a lid for the insertion of valves, fixed resistors and coils. The latter are obtainable for either Daventry or the lower wave-band, so that it is a simple matter to change from the local transmission to the high-powered station.

**Easy to Make**

There is every reason why this receiver should appeal to the beginner, or to those who are about to construct their first set. It is extremely easy to make and also inexpensive, and when it is made, it is easy to operate and there is very little likelihood of mysterious faults occurring which are difficult to cure. But although it is simple,

many broadcasting stations apart from the local one and Daventry may be received on it. The constructor of the "Midget Reinartz Receiver" can therefore indulge to a certain extent in the sport of the "multi-valve merchant," viz., that of searching for distant stations.

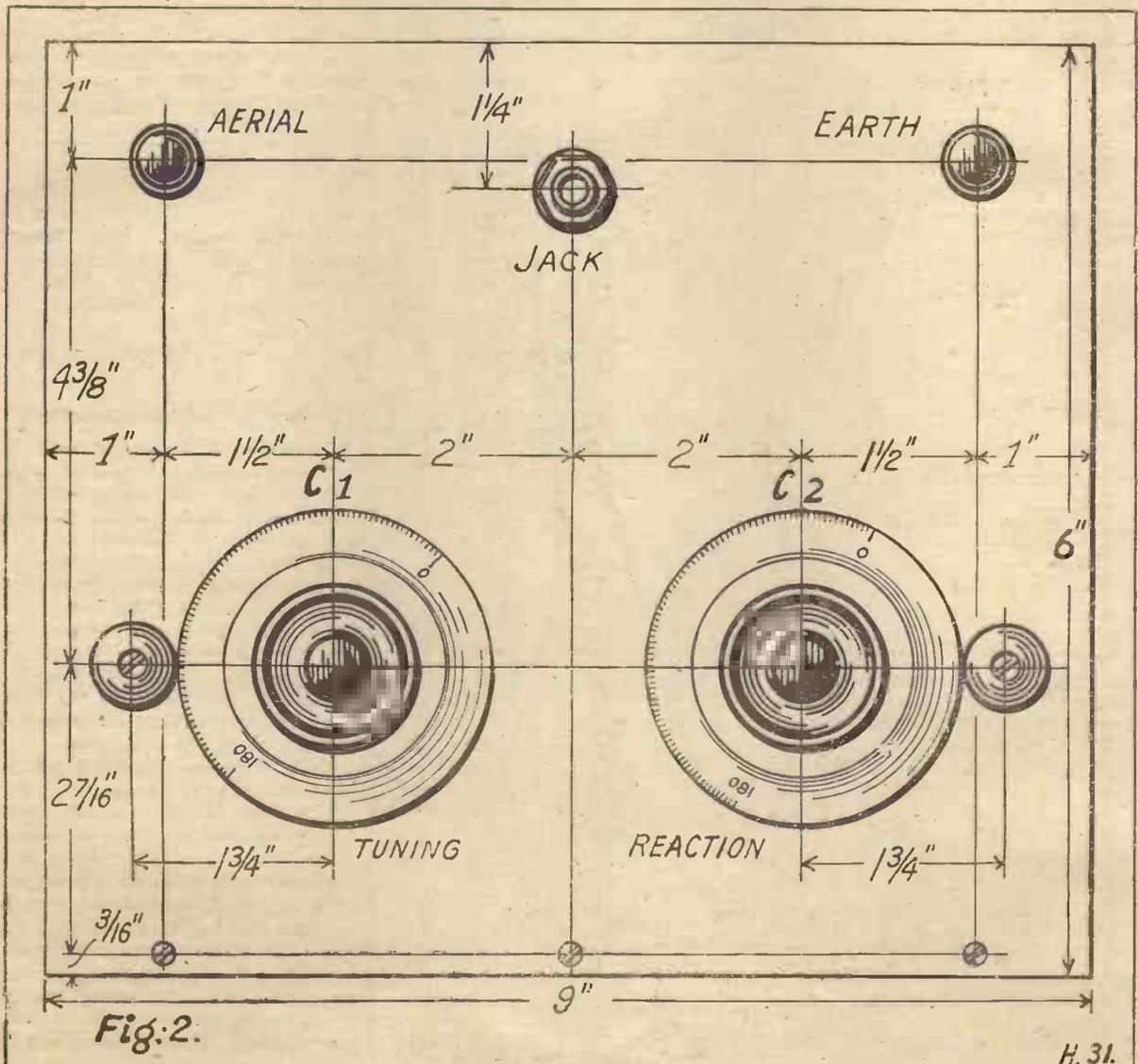
A theoretical diagram of the circuit employed is shown in Fig. 1. It will be seen that it is a well tried one which has often proved its worth. The semi-aperiodic aerial coil,  $L_1$ , makes tuning sharp enough to receive broadcasting, other than that from the local station, while this station is working.

The three coils, which are shown inside the dotted line, are all included in the 6-pin coil, and have

a fixed coupling relative to each other. The small numbers round this dotted line correspond to those on the coil base itself, and are given in order to make it easy to follow the circuit in relation to the actual receiver. The filament resistance  $R_1$  is the fixed resistor, and no value is given against it since it is necessary to get one to suit the particular type of valve that is chosen.

**The Choke Coil**

The R.F. choke is a rather important component, and must therefore be a good one. Its function is to prevent the high-frequency component of the plate current going through the telephone circuit,



# THE MIDGET REINARTZ RECEIVER—(Continued)

and so getting to earth without going through the reaction condenser  $C_2$  and the reaction coil  $L_3$ . It is necessary for this choke to have a higher impedance for reception of Daventry than for reception on the shorter wavelengths; so that although a choke may be suitable for the local station, it may prevent a reaction effect being

obtained on the long waves. This is often the cause of poor results being obtained on Daventry, so that if a make of choke other than an "Efesca" is used, make sure that it has thoroughly been tried out on the higher waveband. You will thus avoid disappointment in the reception of Daventry.

A list of the components required

to build this receiver will be found elsewhere in this article. (Any component that is known to be of good quality may be utilised with satisfactory results.)

A screen has not been employed since it is only sometimes useful for a single valve set when the aerial is situated right in the shadow of the local station. It would also be an unnecessary expense, because there are no circuits to cause trouble by unwanted couplings which makes it immaterial if the field of the coil does spread a little.

### Constructional Details

When all the components required have been gathered together, the constructional work may be commenced. First of all it will be necessary to do the drilling. In Fig. 2 a diagram of the front of the panel is given, and dimensions are shown for all the centres at which holes are required.

The back of the panel should be marked out in accordance with these dimensions with a scribe, and the points where holes are to be drilled, centre-punched. Before drilling the large holes for the main spindles of the variable condensers and for the jack, a small hole should be drilled. This will help the large size drill to go through the panel easily.

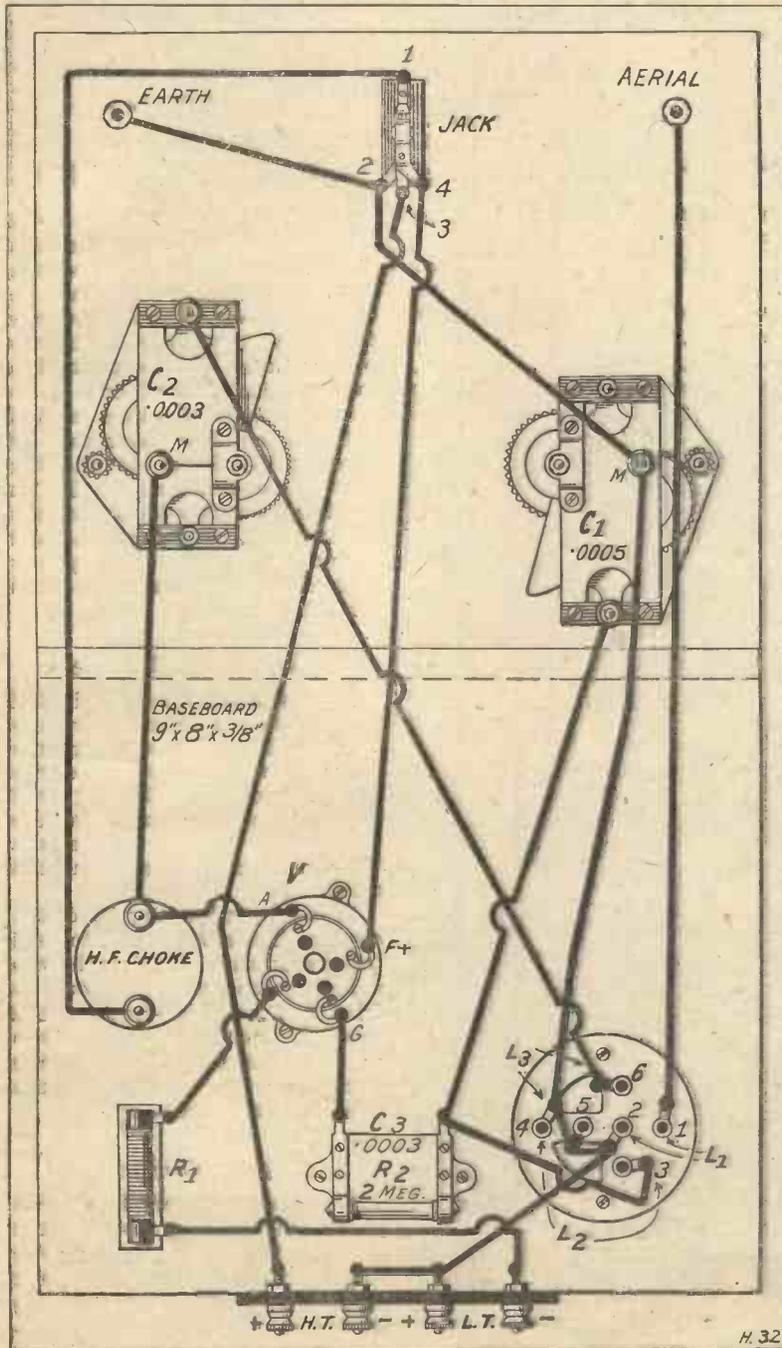
### Mounting the Components

When the drilling is finished, the components which go on the panel are mounted, and the panel then fitted into place in the cabinet together with the baseboard. The next step is to fix the panel and terminal strip to the baseboard with wood screws, after which the complete assembly may be removed from the cabinet.

The components which go on the baseboard can now be fixed in accordance with the positions shown in the back of panel diagram.

It is only necessary to follow the relative positions of the components fairly carefully, but the positions of the soldering tags of the valve-holder and of the coil-socket should be just the same. These are put a certain way round in order to simplify the wiring, to which attention may now be turned.

Before any wires are actually fixed into place, it is best to heavily tin all points at which wires are to be attached. The necessary wiring



**THE MIDGET REINARTZ RECEIVER—(Continued)**

is shown in the Fig., and the wiring is also given in tabulated form below.

The photographs of the back of the panel will be found very useful when wiring. Care should be taken

made joint may give endless trouble, and a little patience in getting the wiring neat will be amply repaid by the appearance of the completed set.

If desired, a finishing touch may

distant reception. Any general purpose or detector type of valve may be used, and when ordering the fixed resistor it is best to state the type of valve to be employed and also the voltage of the battery

**WIRING INSTRUCTIONS**

Join Earth to contact 2 of jack ; contact 2 of jack to moving plates of C1, to contacts 2, 4 and 5 of coil-holder, and to LT+ ; LT+ to HT-  
 Contact 4 of jack to F+ of V.  
 Contact 3 of jack to HT+.  
 LT- to one side of R1.  
 Other side of R1 to F- of V.  
 Aerial to contact 1 of coil-holder.

Contact 3 of coil-holder to one side of C3 and R2, same side of C3 and R2 to fixed plates of C1.  
 Remaining side of C3 and R2 to G of V.  
 Contact 6 of coil-holder to fixed plates of C2.  
 Moving plates of C2 to A of V, and to one side of HF choke.  
 Other side of H.F. choke to contact 1 of jack.

to see that all the wires clear such things as the condenser plates, valve and coil. The wiring may seem a little tedious when you are anxious to get the set finished, but do not hurry it however, for a badly

be given to the set by adding panel transfers.

Very few accessories are required. A good pair of telephones are needed, and the more sensitive they are, the better will be the

on which it is to be run. A 60-volt high-tension battery will be found ample. Personally I found that best results were obtained on distant stations when using a valve of the .06 type with a very low plate voltage. For reception of the local station I used one of the ¼ ampere type of valves with 60 volts on the plate and with a low value grid-leak of .5 megohm. With this arrangement it was possible to work a loud-speaker at fair strength. This cannot however always be expected, unless you are situated within a few miles of the local station.

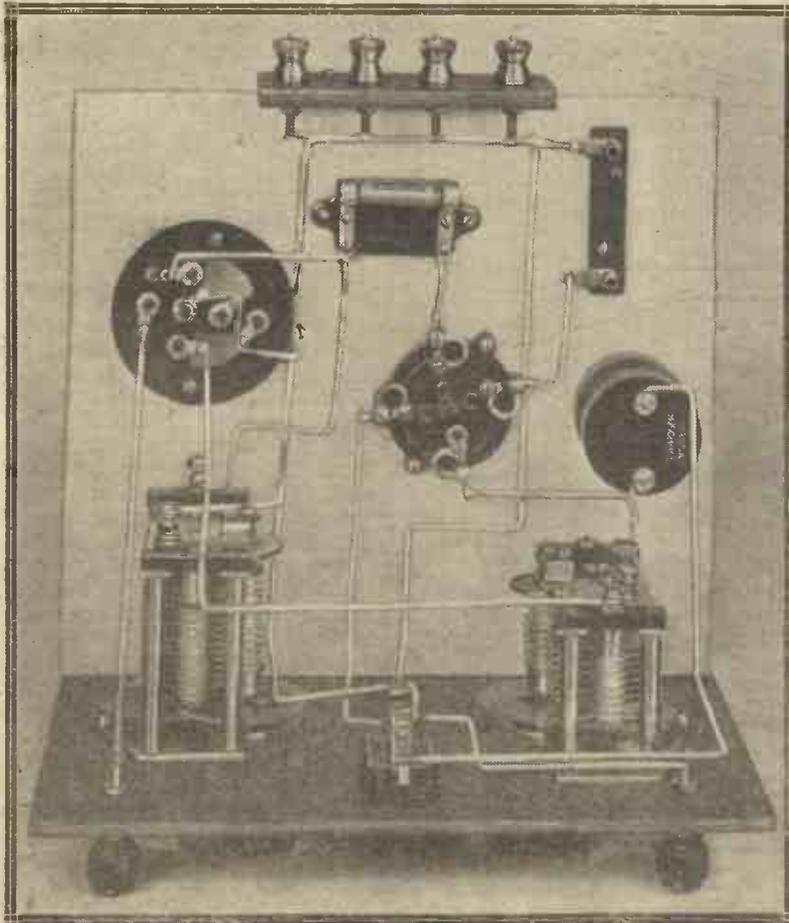
**Simple to Operate**

As has already been intimated, the operation of the set is very easy. The one chief point to remember is that the set is most sensitive when it is just off the oscillating point. Keeping it at this point necessitates moving the reaction condenser at the same time as the tuning condenser.

It is no good trying for distant stations if the set goes into oscillation suddenly. If this is the case, a high value grid leak should be tried and the high-tension value reduced. Tuning was found to be so sharp that the slow motion control on the tuning condenser was absolutely necessary.

**Results Obtained**

It was not necessary to have the set all but bursting into oscillation to bring in distant stations while the local one was working. Although 2LO is only about 8 miles away its background on other broadcasting stations was not sufficient,



Looking down on the baseboard. The relatively simple nature of the connections will be seen clearly from this illustration.



# WHAT VALVES SHALL I USE?

By KEITH D. ROGERS

As there are over three-hundred different types on the British market to-day, readers will welcome this informative article upon the choice of valves.



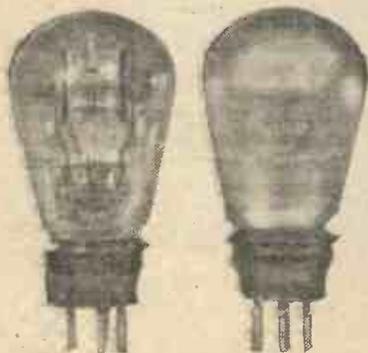
**NUMBER** of constructors who otherwise make a successful job of their sets spoil the whole affair by employing valves

not suited for the positions they occupy in the particular receiver. It is rather like building a first-rate car and then trying to run it on paraffin to expect a well-designed wireless receiver to operate satisfactorily when "any old" valve is placed in the sockets. It is true that results can usually be obtained, especially on the more simple receivers, but how much better it would be if a little thought and care were exercised before the final choice of the valve or valves was made?

### Valves for "M.W." Sets

For the benefit of the constructor of sets described in this issue of MODERN WIRELESS I propose quite briefly to discuss the various receivers from the point of view of the valves which they require.

Let us take the 2-valver entitled the "Skyscraper," and which is designed for DX work. Here we have an H.F. valve—neutralised—followed by a detector operating on the anode bend system of rectification and in whose plate circuit is merely the impedance of the phones.



A useful 6-volt valve for H.F. purposes—the DE5B.

Let us take this valve first. It will be realised that as the impedance in its plate circuit is quite small it will be advisable not to use a valve of too high impedance and magnification factor, even though this would perhaps seem desirable owing to the fact that anode bend rectification is required. Too high a  $\mu$  would mean distortion in this case, and so a compromise should be made. A valve of about 15–25,000 ohms impedance will be quite high enough as regards impedance, and if the magnification factor is a moderate one it should provide a curve suitable for lower bend rectification. Such a valve is the S.P.18 G, which has an impedance of 17,000 with a fairly high  $\mu$ —namely 15—while other valves that could be used would be the PM1 H.F., SS2 H.F., ST21 of the two volt class and DE5B, DFA4, ST61, B4, H.F., DE8 H.F., among the 6 volters. Of those taking 4 volts perhaps the PM3 and ST41 would be among the best.

### H.F. Valves

As regards the H.F. valve, any good valve suitable for neutro-dyned circuits can be used, such valves as the DE8 H.F., DEH612, DE5B, DFA4, ST61 among the 6 volters being eminently suitable. Similar valves of the 2-volt or 4-volt class should be used if these L.T. voltages are preferred, suitable valves being the ST21, Cossor Point 1 (red), DE2 H.F., SP18G and the ST41, DE3B, SS3H.F., and B5 H. among the 2 and 4 volt classes respectively.

Readers who make this set are advised to keep on the lines indicated or they may be disappointed with the results obtained and may find difficulty in neutralising if they use an unsuitable H.F. valve. After all, the valve is one of the most important features in the set, and as such should be given due consideration.

The short wave receiver by Mr. E. T. Simmonds speaks for itself

and does not need any lengthy explanation. The valves stated by the designer should be used, especially in the case of the detector, which is a most important factor in the function of this circuit. The L.F. valve can be any power valve—I do not advise the use of a "super-power" type, just the ordinary 6,000–10,000 ohms class of L.F. valve proving most satisfactory.

### The Midget Reinartz

Another set that should be carefully fitted with a valve is the Midget Reinartz one-valver which, while not being what one could call



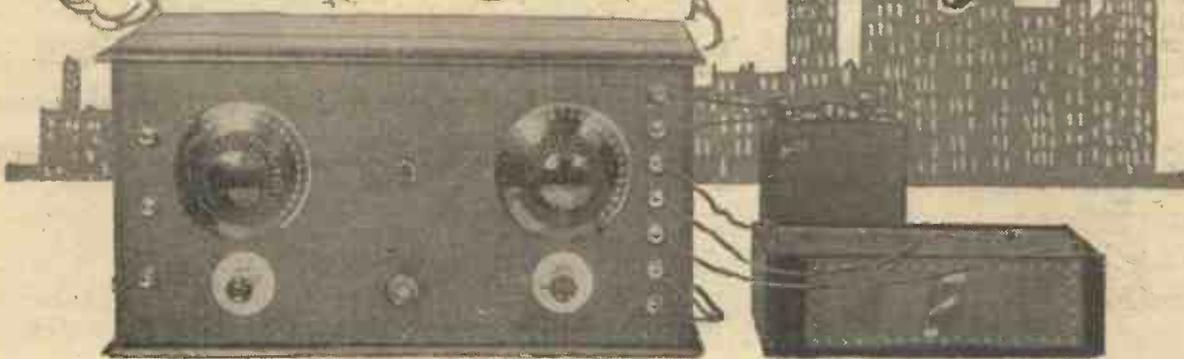
Two L.F. valves. The bright emitter C.A.C., and (right) the Stentor Two, a useful last stager.

critical, nevertheless will give all the better results if a little discrimination is shown in the choice of the valve to be employed.

I have found the DE5B class to be hard to beat in this circuit, though the DE5 and similar valves could be used. A moderately high impedance and high magnification valve is best, however, and suitable six volters are DE5B, DFA4, ST61, B4H, etc. Similar 2-volt valves are the PM1 H.F.,

(Continued on page 184).

# The Skyscraper



WHILE a preliminary test of this two-valve set was being carried out between the hours of 8 and 9 p.m., over thirty stations were "logged" on the phones. Twenty of these were at such good strength that with the aid of a two-valve L.F. amplifier they easily operate a loud-speaker.

The test took place  $5\frac{1}{2}$  miles from 2LO, on an ordinary suburban aerial, 30 ft. high and rather badly screened. 2LO was, of course, operating at the time, but no trace could be heard of it until 15 metres above or below its wavelength.

## Special Coils

As these stations were received with the copper lined cabinet (described later in this article) but without the use of "reaction," it would perhaps be well to explain first how such excellent results were made possible.

The Set Designed, Constructed, and Described Specially for "Modern Wireless" by  
**G. V. COLLE**  
(*Experimental Staff*).

The success of the set was mainly due to the use of two specially wound coils, arranged to provide a high degree of selectivity, and the employment of two valves possessing high magnification factors.

Regarding the former components, the aerial coil and the secondary of the H.F. transformer were both wound with 27.42 Litzen-dracht wire.

The aerial coil is tapped at the 10th and 20th turns from the "earthed" end of the winding, so as to reduce the damping in the grid circuit of the H.F. valves. It was found in actual practice that

the greatest selectivity and freedom from interference from the local station were possible with the aerial lead joined to the lower tapping (A1) (See Fig. 1). Connecting the aerial to the 20th turn, (A2) tapping resulted in a slightly greater volume from 2LO when tuned to that station, but a loss in selectivity.

## The H.F. Transformer

The primary of the H.F. transformer is wound with No. 38 S.W.G. S.S.C. copper wire on small pieces of ebonite (See Fig. 2), so to isolate it from the secondary.

This was done to reduce any capacity-coupling effects that might occur between the windings. Between the turns of the primary is wound the neutrodyne coil; owing to the fine gauge of wire employed (No. 38), satisfactory coupling between the two coils could only be obtained in this manner.

Even here, however, the turns are spaced, so as to reduce capacity and exclude the possibility of

## COMPONENTS REQUIRED

One Cabinet 16 × 8 × 7 $\frac{1}{2}$  in. deep.  
One Panel 16 × 8 ×  $\frac{1}{4}$  in. (approx.) with baseboard.  
Two .0005 S.L.F. variable condensers with vernier movements.  
Two Anti-phonie valve holders.  
Two Filament rheostats, 30 and 15 ohm.  
Two .5 mfd. fixed condensers.  
Two Paxolin formers 3 in. diameter, 3 $\frac{1}{2}$  in. long.  
Fifty yards 27/42 ( $\frac{1}{4}$  lb. approx.) Litz wire.  
Ten terminals W.O. type.  
Two 1 $\frac{1}{2}$  volts dry cells (small type) (Ever Ready, etc.)

One L.T. and H.T. on-off switch.  
One Neutrodyne condenser.  
Four Brass spindles 3 $\frac{1}{2}$  in. long, screwed 2BA for  $\frac{1}{4}$  in. at each end.  
Twelve feet of copper foil 8 in. wide (but 6 in. width will do).  
One sheet of copper, 7 $\frac{3}{16}$  in. × 7 $\frac{3}{8}$  in. ×  $\frac{1}{32}$  in. thick.  
Half gross of  $\frac{1}{4}$  in. brass brads  
Reel of No. 20 S.W.G. tinned copper wire.  
Four lengths of Glazite.  
Wire, screws, transfers, etc.

THE SKYSCRAPER—(Continued)

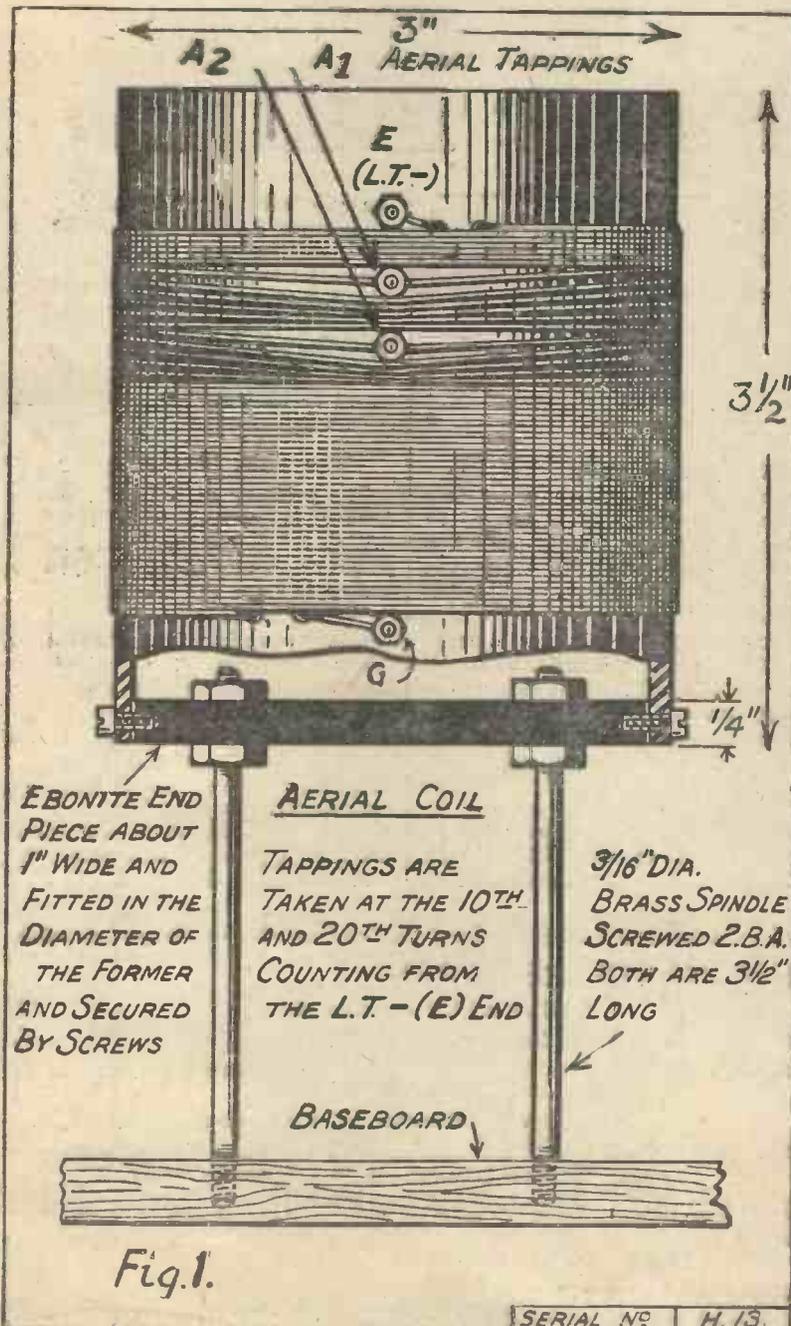
adjacent turns short-circuiting together. Both the primary and neutrodyne coils are wound at the L.T. end of the secondary.

In the coils mentioned, a certain unavoidable loss of energy occurs, due to the comparatively small primary on the H.F. transformer and the low tapping points on the A.T.I.

The effect can be likened to that in an ordinary loose coupled-aerial circuit, where two coils, primary and secondary, are utilised. If a 60 turn coil is used for the secondary and 35 turns for the primary, the former coils being tuned, we can adjust the variable condenser to bring in the local station at a certain volume, which we will call  $R_{10}$ .

The movement of the variable condenser over which the station can still be heard will be perhaps 90 degrees.

By removing the 35 turn primary coil and substituting one of 25 turns, we can now hear the station (by retuning) at  $R_8$  strength, but now only over 40 degrees. Fitting a 20 turn coil in place of 25 turns may give us tuning over 25 degrees with a diminution of strength to  $R_7$ .



Satisfactory Valves

Fitting still smaller primary coils of say 15 to 10 turns will result in tuning within finer limits but at slightly weaker signal strength ( $R_4$  to  $R_6$ ), so that we are forced to compromise and fix the primary coil at a number of turns that gives the greatest volume consistent with sharp tuning.

It was this fact that finally decided the size of the primary on the H.F. transformer used in this set. The tapping points on the aerial coil were also decided in a similar fashion, except that instead of employing smaller primaries, it was tapped experimentally at various points directly on the winding.

The valves decided upon were the Osram DE8 H.F. in the H.F. position, and a DE5B as detector. Very good results were obtained with an Osram DE5B in place of the DE8 H.F.

Among the two volt valves the SP18G gave excellent results.

The volume given by these valves was extraordinary. Properly biased, they gave a sufficient volume from the local station to operate a loud-speaker without the aid of L.F. amplifiers, although of course such amplification is necessary on distant stations.

Neutralising

The reader should therefore bear in mind that even with the losses involved in the coils, the output of this set, when employing the valves specified above, is far in advance of the majority of H.F. and Det. sets (using reaction).

As yet no mention has been made of the sensitivity of the set or how it is made to detect weak signals.

It will be observed from the theoretical circuit that the H.F. valve is neutralised to stabilise it,

THE SKYSCRAPER—(Continued)

and it is the neutrodyne condenser that is made the "reaction" control. Its setting is very simple.

When the set is first connected up it will tend to oscillate. The neutrodyne condenser is then roughly adjusted until oscillations cease and the two variable condensers are "set" for the local station, using the "verniers" on them for final adjustment. When this has been done, the filament of the H.F. valve is turned off and the neutrodyne condenser rotated until the signal has disappeared. The filament resistance can then be turned on and the local station will again be heard at a good strength. To obtain reaction, it is only necessary to turn the condenser outwards until a slight hiss is heard in the phones. If everything is O.K. and the condenser is one of the McMichael type, it should only be necessary to give it half a turn to get the desired effect.

Smooth Reaction

The "reaction" effects obtained by such means are delightfully smooth. The degree of oscillation remains perfectly constant over the whole tuning range, which extends from approximately 180 to 550 metres.

Many readers may be wondering at this stage why the anode bend principle of rectification is applied instead of the leaky grid method. A grid leak and condenser were tried in the first place, but they tended to introduce serious distortion.

Perfectly pure reproduction was obtained with 3 volts negative grid bias with 48 volts H.T. on the detector, and 1½ volts negative grid bias and 188 volt H.T. on the H.F. valve.

Totally Screened

Regarding the latter, it is not advisable to use an H.T. voltage below 100, owing to the fact that as the voltage is raised (up to about 150) so can the volume and selectivity be improved.

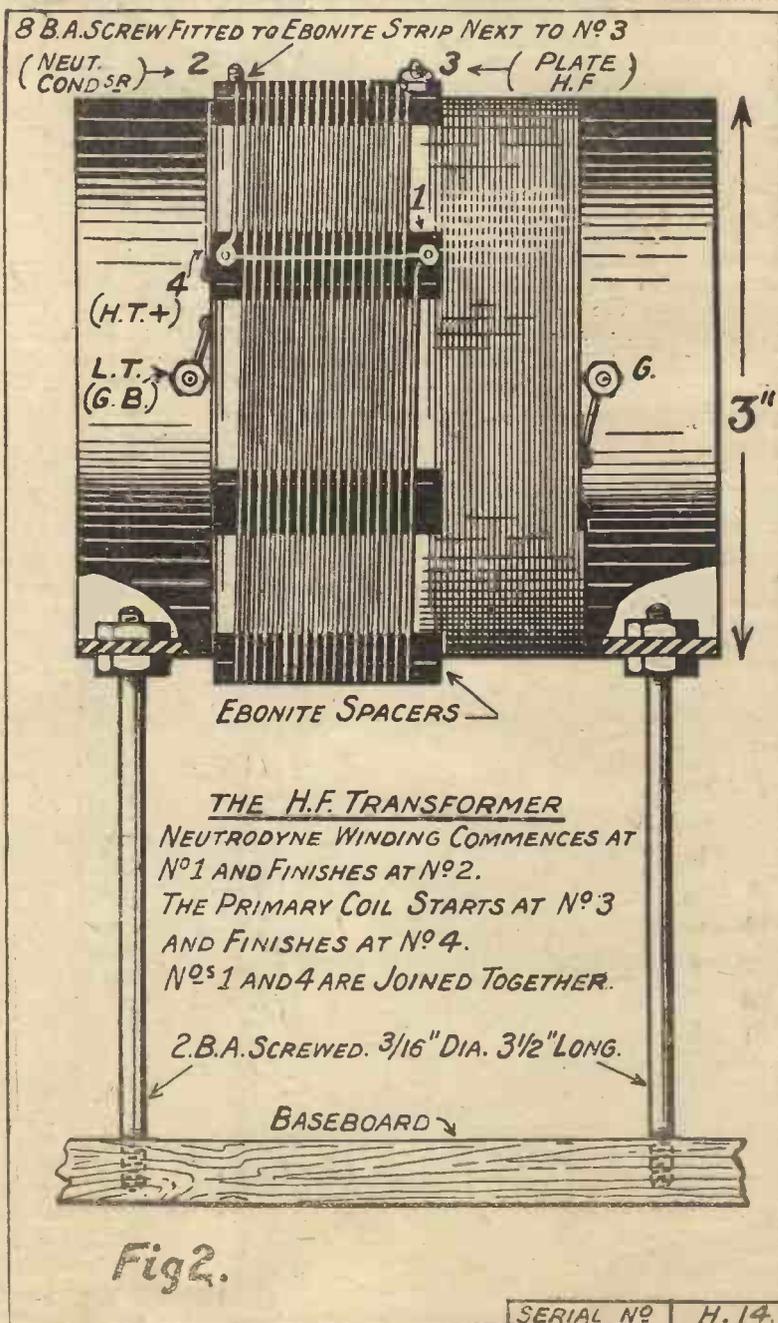
Curiously enough, the filament controls of the valves were not at all critical, it being possible to turn them round their scales quite an appreciable distance before affecting volume. Their control did not interfere with selectivity, but if the H.F. rheostat was turned down very low a weak signal would "vanish."

A 30 ohm rheostat is employed on the H.F. side with a 15 ohm rheostat for the detector.

A modification of design could be made if the constructor so wished, by the substitution of fixed resistors in place of the rheostats, but the writer prefers to use rheostats in a set of this nature, especially where the detector valve is concerned. Although not essential to good

operation, a rheostat somehow gives one the feeling that it is possible to get the utmost out of the set, especially when using a small receiver.

At his own residence, 5½ miles from 2LO, the writer has been so impressed by the importance of preventing direct "pick-up" by the coils that he considered totally screening the whole set would be



**THE SKYSCRAPER—(Continued)**

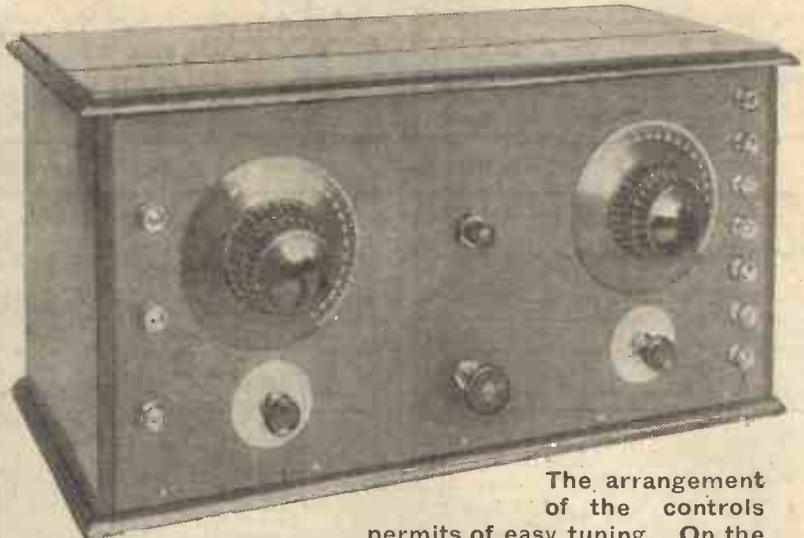
necessary to make absolute the elimination of powerful interference.

Accordingly the cabinet was lined top, sides and back with copper foil (.002 in. thick) and the wooden baseboard and the back of the ebonite panel treated similarly, the whole being joined together and "earthed."

**Constructonal Details**

It is only fair to mention that the task of lining the cabinet and set with copper foil is not an easy one, but it does not require much skill to do it, although plenty of patience is necessary. The end undoubtedly justifies the means.

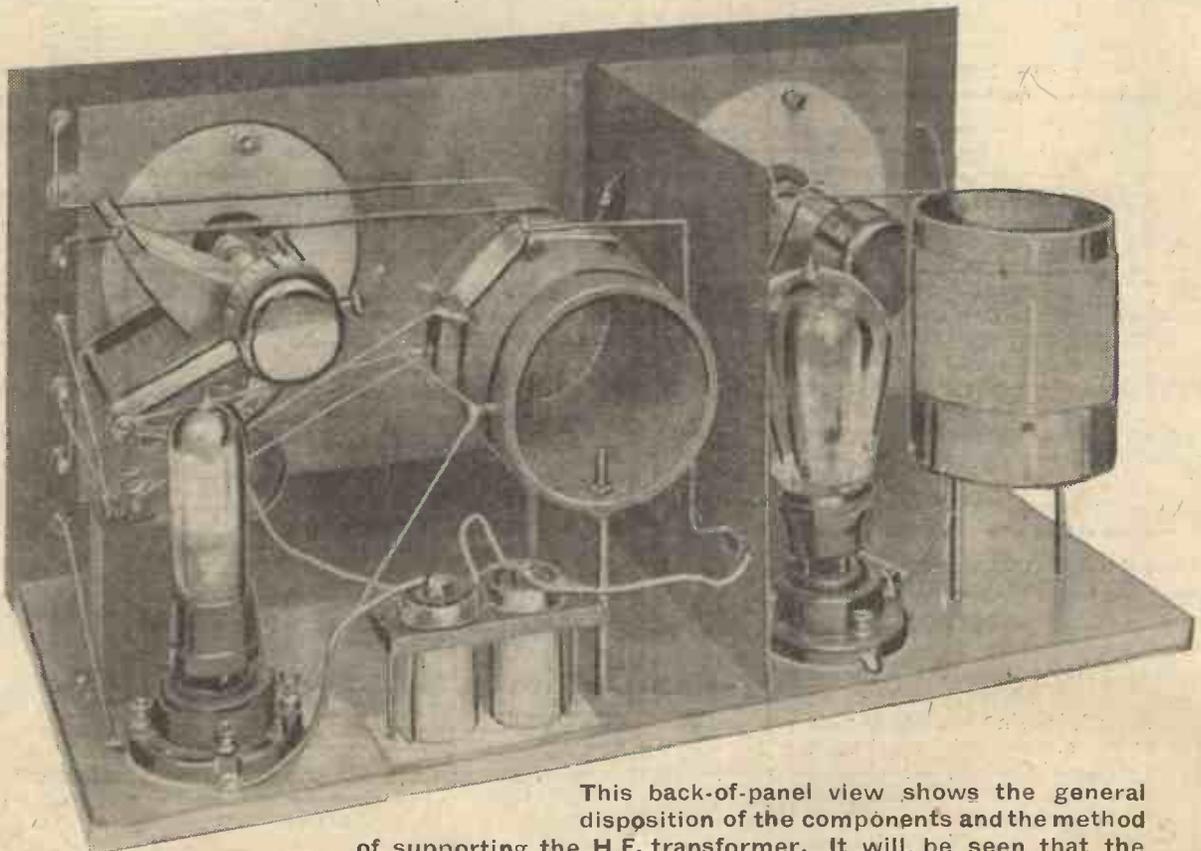
Construction of the set can be commenced by filing the ebonite panel until it makes a good fit with the front of the cabinet and seeing that the baseboard slides in easily. The panel can then be drilled according to the drilling lay-out. Now mark on the baseboard with a pencil the words "Top," and near the front of the cabinet



The arrangement of the controls permits of easy tuning. On the right, the terminals (reading from top to bottom) are L.T.+ , L.T.- , H.T.- , H.T.+ (1) , H.T.+ (2) , and phones.

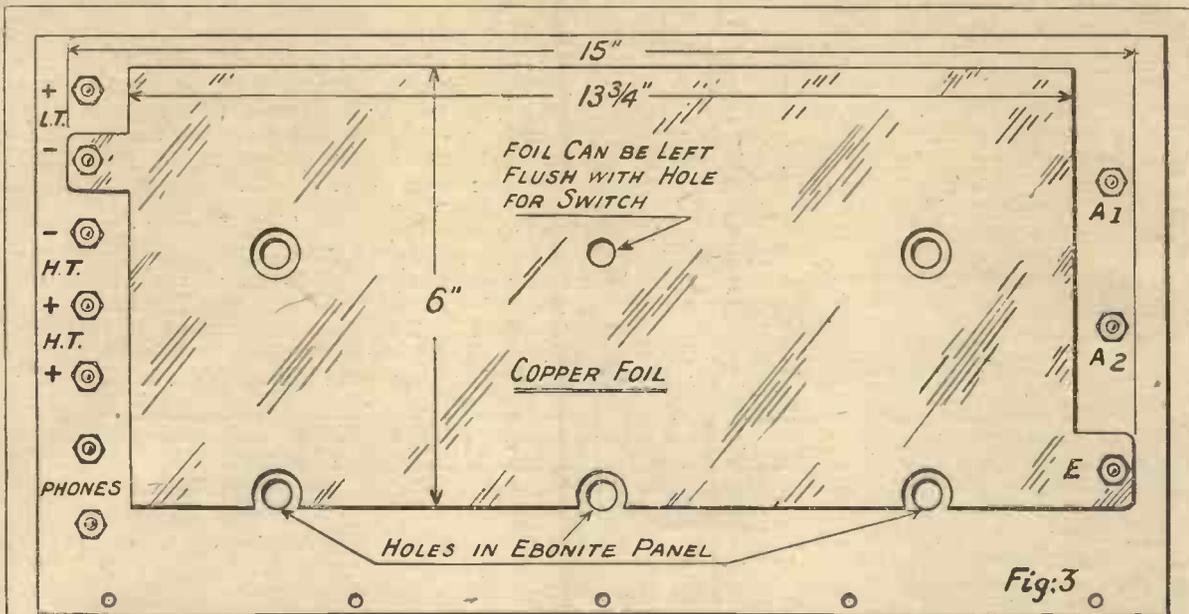
"Front." (This is to ensure that no error is made when the baseboard is covered with copper foil.)

It is also advisable to mark the back of the panel, after drilling, in a similar manner. As the copper



This back-of-panel view shows the general disposition of the components and the method of supporting the H.F. transformer. It will be seen that the copper foil is connected to the L.T.- terminal, and is held in place by the condenser earth-plates.

THE SKYSCRAPER—(Continued)



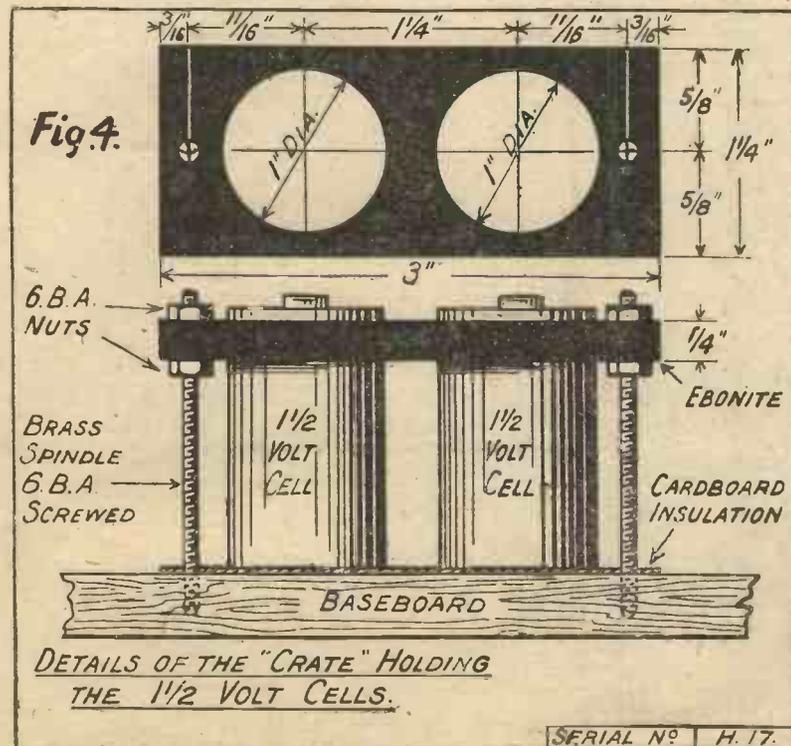
SHOWING HOW THE COPPER FOIL FOR THE BACK OF PANEL IS CUT TO THE NECESSARY SHAPE

SERIAL NO. H. 15

foil will doubtless be in a roll (usually 6 in. wide), the necessary length for covering the back of

the panel can be prepared as per Fig. 3. Great care should be exercised in

the cutting of this foil as it must not touch any terminals or components other than those marked. Actually, the foil should be cut away for at least  $\frac{1}{8}$  in. around the holes that will hold the rheostats, variable condensers, neotrodyne condenser, and all the terminals except the bottom right-hand one (earth) and the second from the top, on the left (L.T.-). It can be held in place by means of the earthing plates on the variable condensers, the two terminals mentioned, the copper screen that goes between the two coils, and the ebonite portions of the rheostats.



DETAILS OF THE "CRATE" HOLDING THE 1 1/2 VOLT CELLS.

SERIAL NO. H. 17.

Fixing the Foil

All these components can therefore be mounted as soon as the foil is cut to the required size and shape, and should be tested by means of a lamp and battery for any short circuit that may arise.

Having completed this portion of the mounting, the covering of the baseboard with the copper foil can then be taken in hand. For ease of working, the foil can be held in place by means of brass brads, a little shorter than the thickness of the wood ( $\frac{1}{4}$  to  $\frac{1}{8}$  in. long). To present a neat appearance, the brads can be arranged at intervals of 1 in. round the edge

THE SKYSCRAPER—(Continued)

of the baseboard and about  $\frac{1}{8}$  in. from the edge.

The operation of driving the brads "home" can be facilitated by marking lightly the position of the holes with a pencil and ruler, and punching the points marked with a sharpened nail, so that the brads can easily be inserted without forcing them through the foil itself. After doing this part of the work, the covering of the inside of the cabinet can be undertaken.

A good plan would be to line the two sides and back with one com-

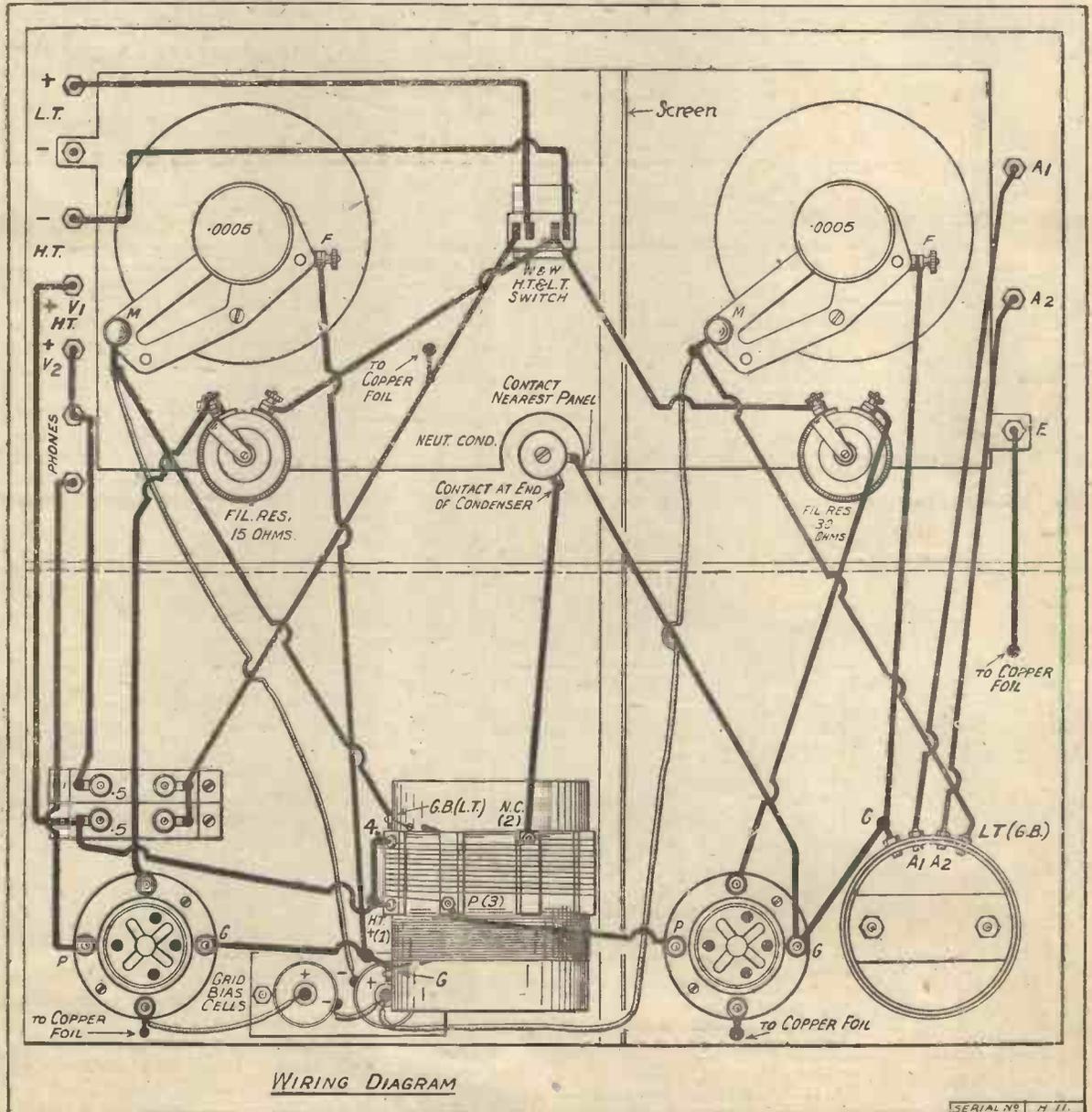
plete length of foil, and a piece approximately 36 in. long can be cut from the roll. If foil can be procured 8 in. wide, so much the better, but if not, a piece 6 in. wide can be used and a further strip of the same length but  $2\frac{3}{8}$  in. wide made to overlap it  $\frac{3}{8}$  in. The point to remember, however, is that the back and sides must be completely covered, together with the lid, and also the top part permanently fixed to the sides of the cabinet.

After the copper foil has been

nailed in place (it should also be tacked in the centre of its areas so as to avoid bulging) the various portions can be soldered together at definite points and a wire taken from them to the earth terminal on the set.

The Copper Screens

When the lining is completed, the baseboard can be inserted as well as the panel, and while holding the former firmly against the bottom of the cabinet, the panel can be screwed to it. Both should



# THE SKYSCRAPER

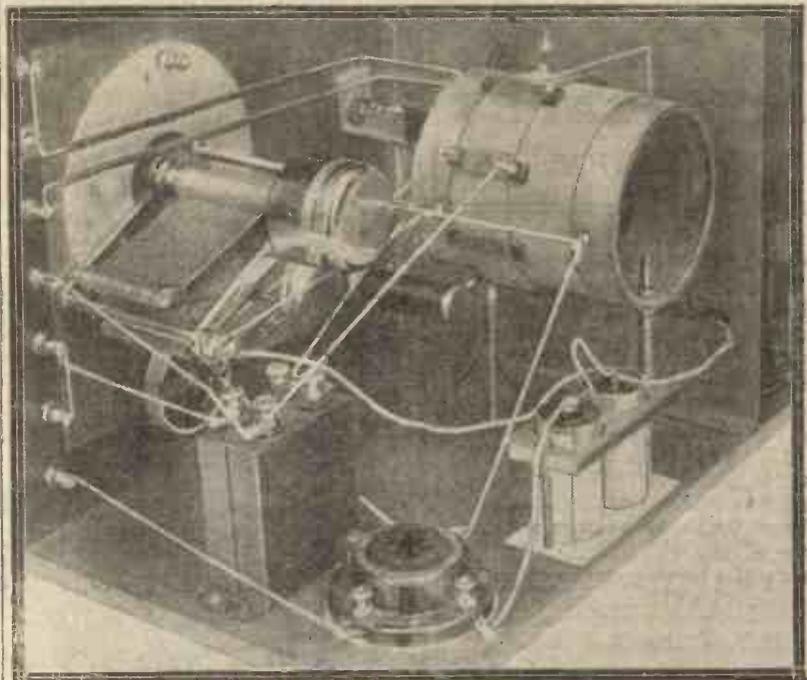
(Continued)

then be removed and the copper screen that isolates the coils fixed in position. Looking at the back of the panel, with the baseboard nearest to you, the copper screen will be fixed immediately to the right of the on-off switch and the neutrodyne condenser.

Two discs of cardboard, slightly larger in diameter than the bases of the valve-holders, can next be cut, and after fitting these to the undersides of the latter, the whole can be screwed to the baseboard in the position indicated on the photographs.

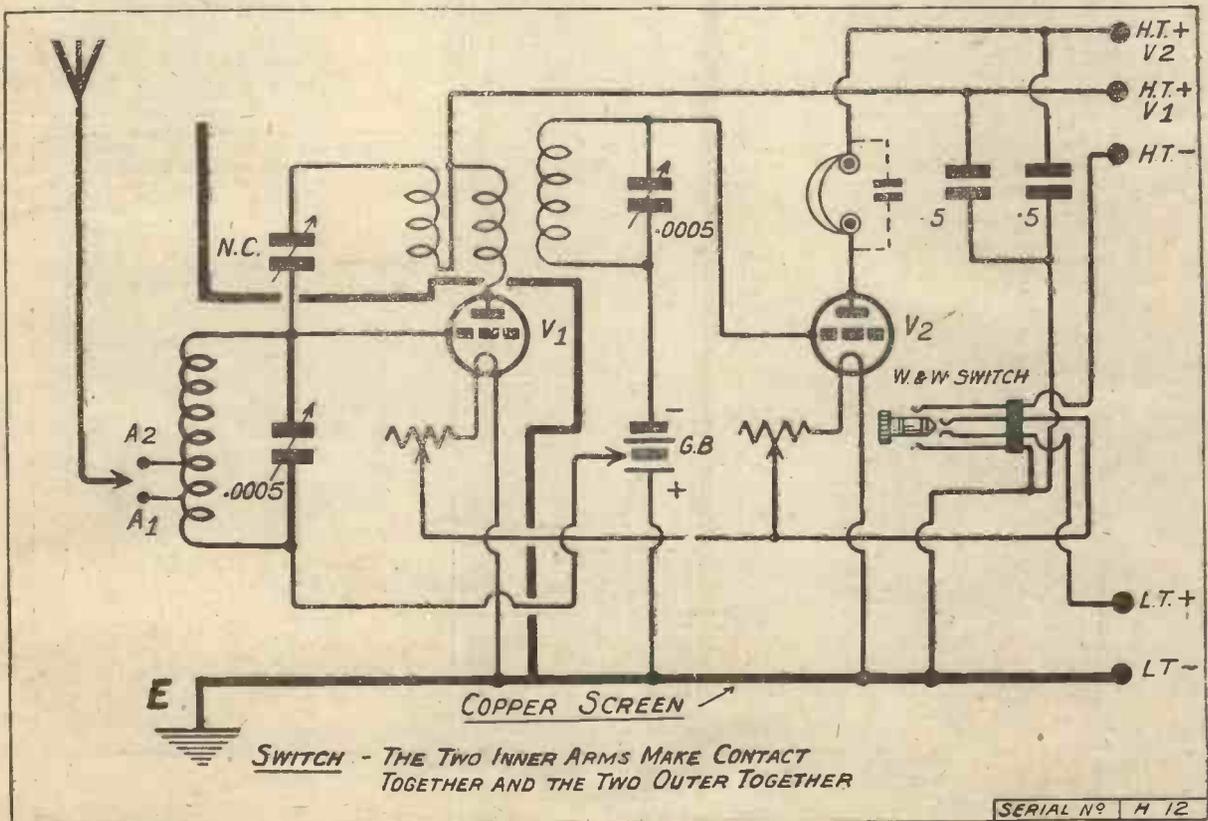
### Winding the Coils

The plate-sockets of both valve-holders should face towards the left of the baseboard and the tags of the filament sockets, nearest the back edge, bent down and soldered to the copper foil. Both the .5 mfd. fixed condensers can be screwed direct to the baseboard without need of insulating them.



A view of the detector end of the panel and baseboard. Note the position of the large fixed condensers and the insulation covering the wires over the variable condenser.

The coils are wound on two "Paxolin" formers, 3 in. in diameter and 3½ in. long. Both are wound in the same direction with 65 turns of the Litzendraht wire. The wire occupies exactly 2 in. of the length



# THE SKYSCRAPER

(Continued)

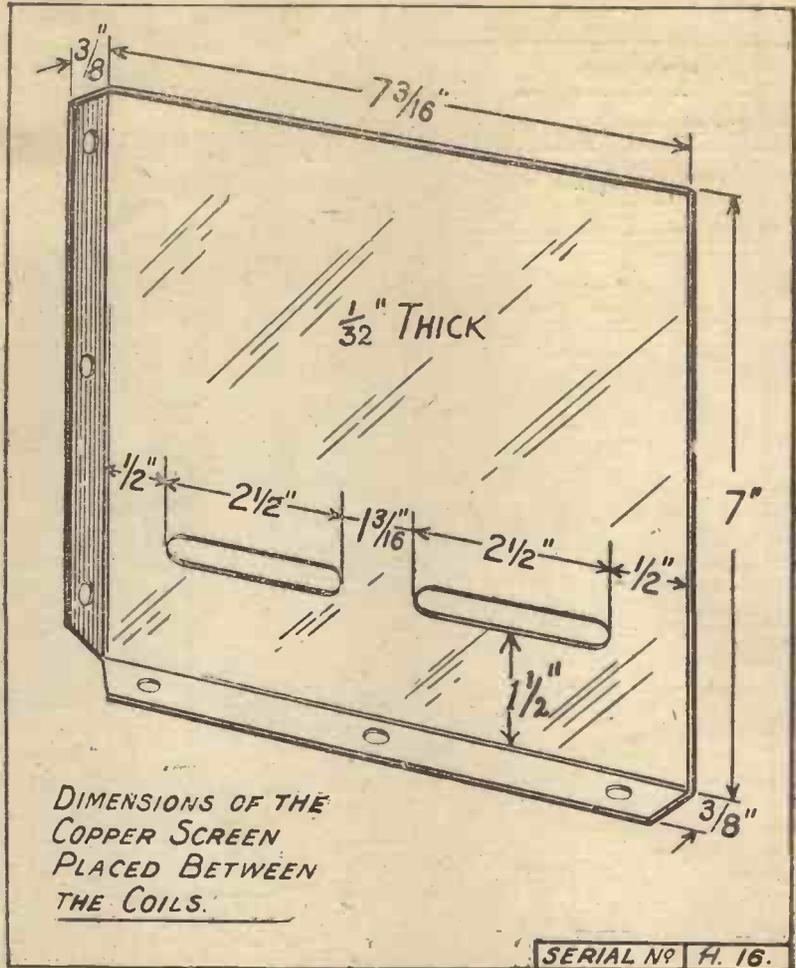
so that  $\frac{1}{4}$  in. can be left on either side of the formers. The ends of the wires can be taken through two small holes and soldered to two 8B.A. screws passed through from the insides of the formers in each case. It will be found that after removing the silk covering of the wire, each of the strands is enamelled. This covering, however, can be removed with fine sandpaper or the edge of a blunt knife. It is important that none of the 27 strands is broken during the process or the efficiency of the coils will be impaired.

### H.F. Primary Winding

As the aerial coil is tapped at the 10th and 20th turns, the last 20 turns of this coil should be left unwound and the wire bared at the respective tapping points, as it is wound on. Both the tappings can be joined to 8B.A. screws passed through the former from the inside and locked in position by 8B.A. nuts.

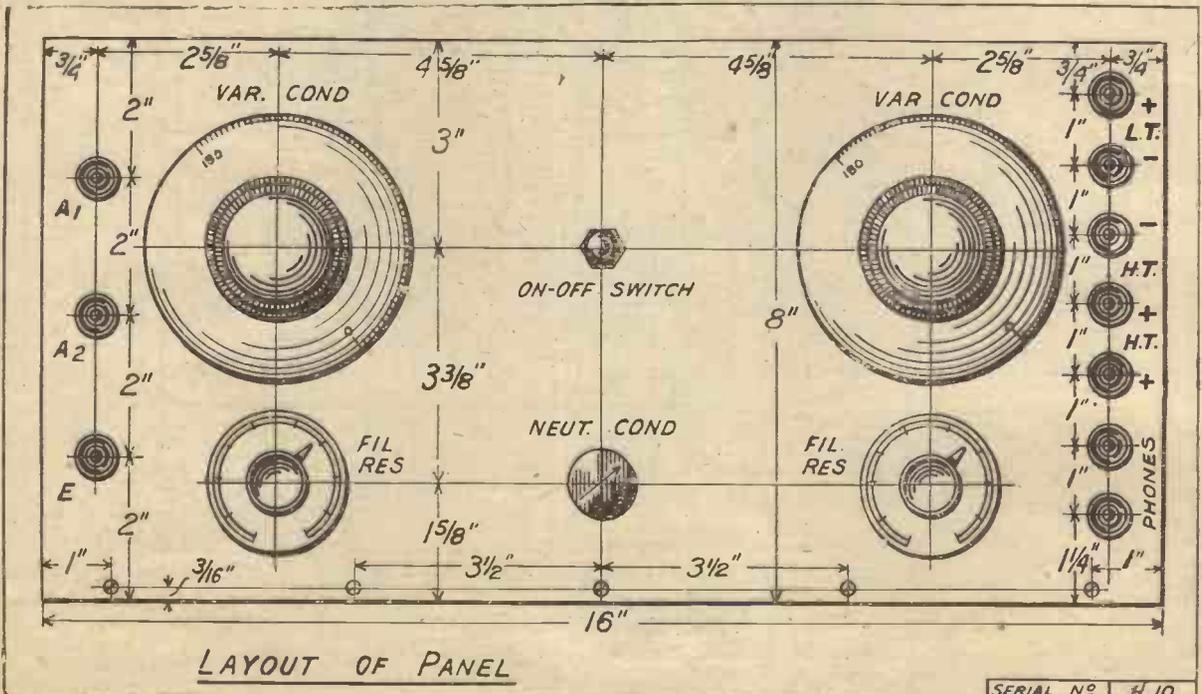
To complete the H.F. coil, it is necessary to wind on the primary and neutrodyne coils.

Eight pieces of ebonite  $1\frac{1}{2}$  in. long,  $\frac{1}{8}$  in. thick and about  $\frac{1}{4}$  in. wide, must next be procured. These



can be cut from an ebonite tube  $1\frac{1}{2}$  in. long, 3 in. in diameter and having a wall thickness of  $\frac{1}{8}$  in.

The tube, if used, will be cut along its length in  $\frac{1}{4}$  in. strips. These pieces of ebonite are fixed



# :: THE :: SKYSCRAPER (Continued)

at equal distances around the untapped H.F. coil, directly over one end of the 65 turns.

Before doing so however, it is necessary to fix 8 B.A. screws in the ends of two of them (one on each) and two screws of the same type in another strip, as shown on the "close-up" photograph of the coil.

The ebonite strips are then mounted as described and can be held in position by rubber bands or thin wire while the turns are being wound on.

### The Final Stages

No. 38 S.W.G. S.S.C. wire is employed, and after winding a few turns round No. 1 screw, take it over the ebonite strips in the same direction as the 65 turns (secondary); 14 turns are required, and these must be spaced 16 to the inch, the end of the wire being joined to screw No. 2.

Commence the second winding (neutrodyne) at Screw No. 3 (the one next to No. 1) and wind on 14 turns in the spaces between the first winding, so that  $\frac{1}{2}$  in. is left between adjacent turns. The

*Log of stations received with a 2-valve L.F. amplifier attached. All receivable on set alone but only on phones. Tuesday, 14/12/26. 8 p.m. to 9 p.m.*

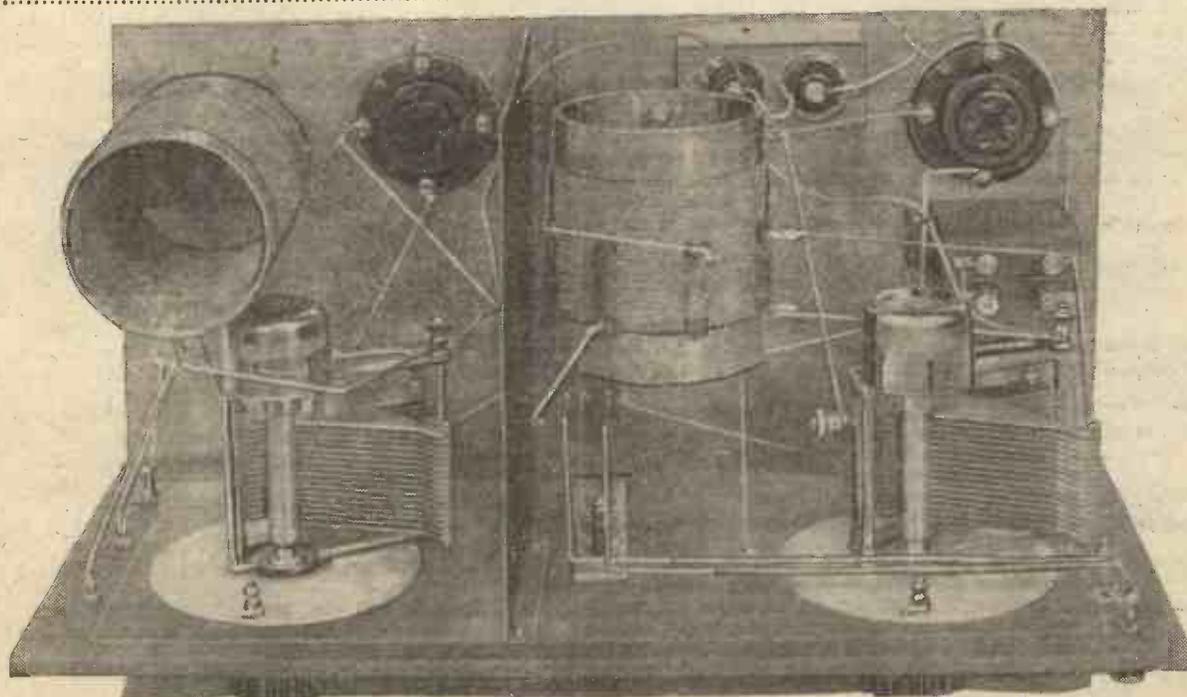
Station.	Wavelength.	A.T.C.	H.F.C.	Remarks.
—	—	0	29	L.S. jammed.
—	—	3	31½	L.S. jammed.
—	—	7	31	Faint L.S.
Karlskroma	196	9½	37½	Good L.S.
Kiel	211.9	20	44½	L.S.
Montpellier	215.1	22	46	L.S.
Luxembourg	217.4	27	49	L.S.
Helsingborg	235	36	52½	L.S.
Munster	241.9	38	59½	Good L.S.
Bradford	254.2	50	70	L.S.
—	—	51	71½	L.S.
Cassel	272.7	57	74½	L.S. but jammed.
Radio Cataloma	277.8	62	77	L.S. bad hum.
—	—	65½	81½	Faint L.S. jammed.
Radio Lyons	291.3	69½	83½	Good L.S.
Edinburgh	294.1	73½	86½	Faint L.S. jammed.
Liverpool	297	74	87	Phones.
Belfast	306.1	75½	88½	Faint L.S.
Newcastle	312.5	78	91	Good L.S.
Bournemouth	326.4	84	95	Good L.S.
Cardiff	353	86	98	Good L.S.
London	361.4	100	114	Very good L.S.
Madrid	375	113½	120½	Good L.S.
Toulouse	389.6	116	123	L.S.
Frankfurt	394.7	118½	125½	Good L.S.
Glasgow	405.4	122	128½	L.S.
Berne	411	123½	130½	L.S.
Rome	422.6	130	135½	Good L.S.
—	—	137½	142	L.S. jammed.
Brussels	487	145	148½	L.S.
Birmingham	491.8	146½	151	L.S.
Meana (Radio Madri- lena)	500	150½	153½	L.S.
Radio Wien	517.2	152	155½	Good L.S.

end of the second winding will be connected to screw No. 4, which faces No. 1.

All the ends of the wires can next

be bared and soldered to their respective screws, Nos. 1 and 4 being joined together and to + H.T. V<sub>1</sub>.

Owing to the fragile nature of



Looking down on the baseboard from over the panel. This view shows the spacing of the components relative to each other and to the screen.

THE SKYSCRAPER—(Continued)

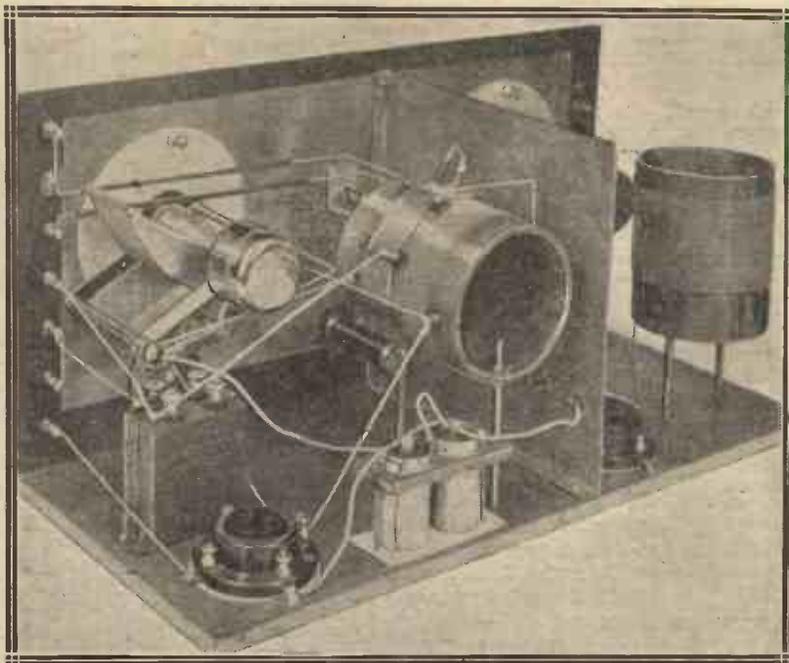
the 38 gauge wire it is advisable to lightly shellac it where it passes over the ebonite strips, as this will prevent the turns moving and touching together.

The Bias Battery

When this has been done, both coils can be mounted on the baseboard, each by two pieces of brass-rod,  $3\frac{1}{2}$  in. in length,  $\frac{3}{16}$  in. in diameter and screwed 2B.A. at each end for a distance of  $\frac{3}{4}$  in. The aerial coil, being fixed in an upright position, must have a strip of ebonite 1 in. in width arranged across its diameter at the bottom of the former. The two brass supports should be first screwed into the baseboard  $1\frac{1}{4}$  in. apart, and 2B.A. clearance holes drilled in the ebonite strip fitted in the aerial coil. (See Fig. 1.)

The H.F. transformer is mounted in a similar manner, except that as it is fixed down horizontally, there is no need for the ebonite strip in its former, the brass rods being fitted  $2\frac{3}{4}$  in. apart, their top ends being passed through the Paxolin former. A sketch of this coil and its supports is shown in Fig. 2.

Finally, there only remains the grid cells to be fitted. As it can be seen from Fig. 4, they are mounted in a small ebonite "crate," which is screwed to the



The manner in which the tin foil has been cut away from the neutrodyne condenser is shown clearly in this back-of-panel photograph.

baseboard. If the outside of these cells are of bare zinc it is essential that they be carefully insulated from the copper foil, otherwise they will be short-circuited. Like the

valve holders, they can be insulated by a piece of cardboard, with side pieces to prevent the zincs touching the brass supports.

(Continued on page 189)

WIRING INSTRUCTIONS

One side of each rheostat should be joined to one filament socket of its respective valve holder.

Remaining sides of the rheostats joined together and to the right-hand inside contact of the W and W switch.

Left-hand inside contact of the same switch (which makes contact with the right-hand inside contact) to the + L.T. terminal.

Right-hand outside contact of switch to the -H.T. terminal. Left-hand outside contact of switch to the copper foil on panel and to one tag of each of the '5 m.f.d. fixed condensers.

Remaining filament sockets of the valve holders are joined to the copper foil on the baseboard, which in turn is connected to the earth terminal.

Carbon (positive) of the left-hand  $1\frac{1}{2}$  volt cell to the copper foil on baseboard.

A1 terminal to the tapping on the aerial coil at the 10th turn (tap nearest L.T. (G.B.) connection) (see Fig. 1).

A2 terminal to the 20th turn tapping.

Fixed vanes of the right-hand '0005 variable condenser to the grid connection on the aerial coil, to the grid socket of the first valve holder and to the contact on the neutrodyne condenser nearest panel.

Remaining side of neutrodyne condenser to connection NC (2) on the H.F. transformer.

LT (GB) contact on the aerial coil to the moving

vanes of the right-hand '0005 variable condenser, to the carbon (positive) of the right-hand  $1\frac{1}{2}$  volt cell by a flexible wire, and also to the zinc (negative) of the left-hand cell.

Plate socket of the first valve holder to the contact P (3) on the H.F. transformer.

+H.T. contact on the H.F. transformer (screws Nos. 1 and 4) to remaining tag of the first '5 m.f.d. fixed condenser and to the +H.T. terminal V1.

Grid socket of the 2nd valve holder to the G contact (secondary) on the H.F. transformer and to the fixed vanes of the left-hand '0005 m.f.d. variable condenser.

Moving vanes of this condenser to the GB (LT) contact (secondary) on the H.F. transformer and to the zinc (negative) of the right-hand  $1\frac{1}{2}$  volt cell by means of a flexible wire.

Plate socket of the 2nd valve holder to the bottom phone terminal.

Top phone terminal to the remaining tag of the 2nd '5 m.f.d. fixed condenser and to the +H.T. terminal V2.

NOTE.—L.T. and the earth terminals are joined together and to the filament sockets of the valve holders by means of the copper foil.

Do not omit to connect the copper foil lining of the case to the earth terminal and carefully solder at definite points all seams in the former.



THE advent of broadcasting has given great stimulus to many neglected inventions, and of these probably one of the most interesting and important is the "telegraphone," which was invented by Monsieur Poulsen, the well-known Danish engineer, some 28 or 30 years ago. This invention consists, very briefly, in using a steel wire or tape upon which to record sounds, just as sounds are recorded upon a gramophone record.

**Pure Reproduction**

Instead, however, of making the sound-waves record themselves by cutting a wavy track in a material

substance, the sound-waves are translated into electrical variations by means of a microphone of some type, and the varying electric current thus produced operates an electro-magnet, under which the steel wire or tape is travelling, and so produces magnetisation of varying character in the wire. When the wire is again run past a suitable electro-magnet system, varying currents are set up in the electro-magnet, corresponding to the varying magnetisation in the wire, and these currents can be amplified up in the usual way by means of a valve amplifying circuit and transformed into sound and so reproduced.

One of the great advantages of this method is that the steel wire, owing to the fact that it can be

wound upon a spool, can be made to occupy a very small space, and a "record" of hundreds of feet in length can be carried in the pocket. A second advantage is that as there is no material contact between the "record" and the recording or reproducing device, the usual "scratch" which is associated with ordinary records is obviated.

**Used at KDKA**

This invention of the telegraphone, as I mentioned a moment ago, whilst being a very interesting scientific achievement, was not thought to be of very great practical use until comparatively recently, in fact, until the days of broadcasting. It has now assumed quite a fresh importance and experiments are in progress in Germany and in America with a view to adapting the telegraphone to the recording of broadcast programmes. Owing to the extreme delicacy of the arrangement, and to the fact that it is electrically operated, it is peculiarly adapted for the reception and recording of broadcast items.

This system has now actually been used for the re-broadcasting of German programmes in America, the wire record being simply carried in a box in precisely the same way as a cinematograph film. At station KDKA of the Westinghouse Electric Manufacturing Company, East Pittsburg, a machine of this kind is installed and I believe the reproduction is so faithful that it is difficult to distinguish it from an actual original broadcast.

**Special Microphone**

It would take too long to give a full account of all the technical details in the arrangement, but amongst other things, a special "condenser-microphone" is used which has been described as a "straight-line frequency microphone" and the same principle is employed for the reproducer so that the reproducer itself might



Two of the specially trained operators employed on the London - New York Radio Telephone Service.

RADIO ABROAD—(Continued)

also be called a "straight-line frequency loud-speaker." The steel wire record suffers from practically none of the inherent drawbacks of the ordinary record and is probably not incorrectly called a "straight-line frequency record" too!

There seem to be immense possibilities for this system and work is proceeding upon it in Germany, principally by Dr. Stille, the chief engineer of the Vox Company, which company holds a considerable interest in the Berlin broadcasting station.

**Heat to be Broadcast ?**

According to Professor Dibble, of the Carnegie Institute of Technology, we are, in the very near future, to have the broadcasting of heat-waves, exactly in the same way as we now have the broadcasting of electrical waves. Before this can be done, however, he points out, scientists must invent instruments which will control the heat-waves and also some form of detector which will pick up the energy and enable it to be amplified. "Transmission of heat by atmospheric conductivity is essential because of the gradual exhaustion of fuel," says Professor Dibble. "The day is not far off when

we shall see huge centralised heating plants broadcasting heat to homes, industries and office buildings. We know that heat travels through space and through solids, and when we once learn how to pick up these waves and control them, heating throughout the world will be revolutionised. Heat broadcasting will mean better health to the public because it will eliminate from the air impurities of present-day heating systems."

The broadcasting station at Madrid is now "on the air" considerably later than most of the other European stations, and may often be heard between midnight and 1 a.m. on a wavelength of 392 metres. The late Madrid programme usually includes dance music as the principal feature.

**Train Telephony**

A German railway official, Ernest Schmitz, has been responsible for much development work in connection with the use of wireless telephony on the German trains. The original trials were mostly made on the Berlin-Hamburg line, and the results have been so

successful that other lines are now being similarly equipped: "Notwithstanding the noise which is unavoidable on a train," says Herr Schmitz, "and in spite of the changing distance over which a three-minute radiophone conversation is carried on, with the train travelling at, perhaps, 60 miles an hour, the audibility leaves nothing to be desired. The connection is made as readily as in the case of an ordinary long-distance call."

**Simple Procedure**

According to Herr Schmitz, it is just as simple and easy to be called up on the telephone whilst travelling on a train as it is to be called on the 'phone by a page-boy in a hotel lounge. A messenger boy, with the legend "Train Telephony Limited" on his cap, passes through the train and announces the telephone calls received at the "radio station." The individual who has thus been called follows the boy back to the wireless compartment, where the call is received in the ordinary way. Similarly, passengers on the train can actually call up people on the ordinary telephone service just as though they were on "dry land."

The station on the train is a combination radiophone and radiotelegraph station. There are three transmitting stations on the Berlin-Hamburg line, one at each of the two cities mentioned, and another one about halfway between.

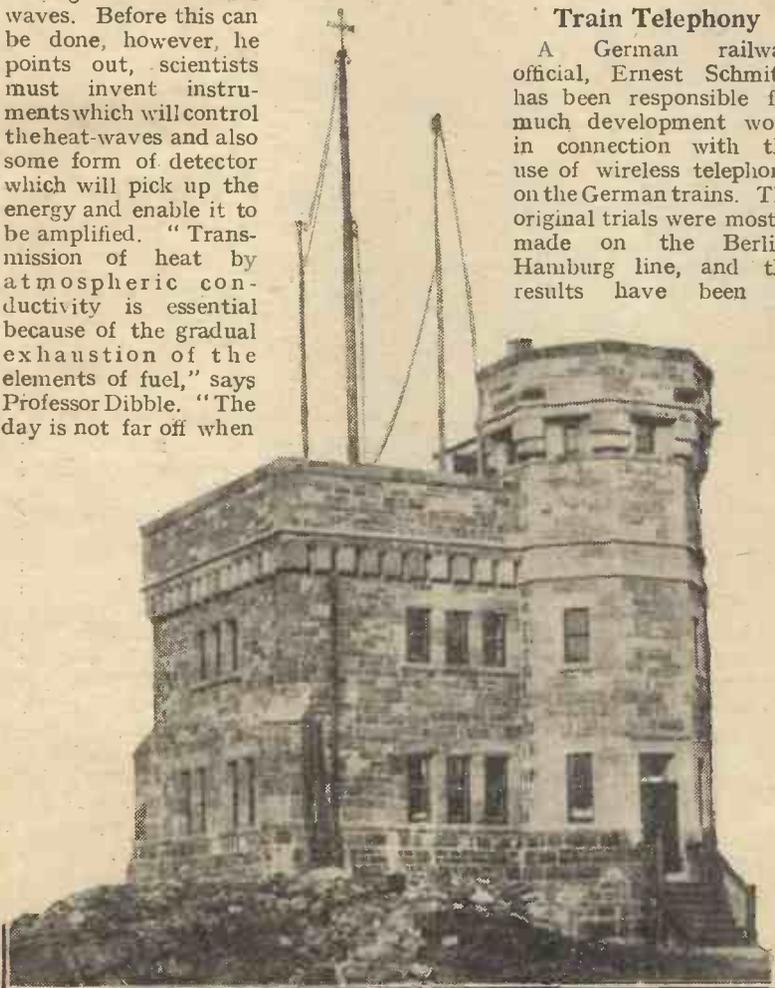
The aerials for transmission and reception on the train are built on the roof of one of the coaches.

**New Low-Power Record**

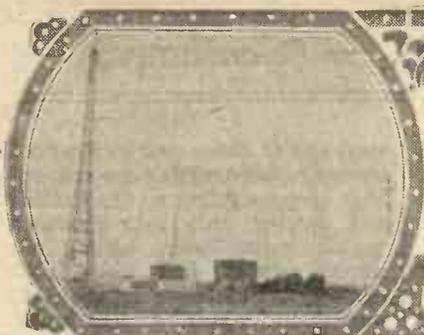
A new record for low-power transmission has been created by an amateur short-wave station (2 GY) at Garden City, New York, this station having carried on two-way communication with station 9CCQ, Braymer, Missouri, using only 0.04 watts in the transmitting valve. Both stations were using ordinary receiving valves and ordinary high-tension batteries for the source of power and the transmission from 2 GY works out at something like 25,000 miles per watt!

One of the American wireless journals has worked out the cost of transmission of messages by this apparatus compared with the rate charged by the power companies. Assuming the cost of electricity at about 5d. per unit, the anode

(Continued on page 180.)



Cabot Tower, on Signal Hill, Newfoundland, where Senatore Marconi received his first transatlantic wireless message 25 years ago.



:: MY ::  
**FIVE-VALVE SET**  
*An Expert's Suggestions*

By CAPTAIN H. J. ROUND, M.C., M.I.E.E.



THE Editor has given me the problem of arranging five valves in what I should consider the best possible way. I do not know why he has fixed on five valves: I do not think it is exactly the right way to start. Due to various commercial and technical reasons in the past we have fallen into this habit of rating sets by the number of valves, and the public has very definitely got into its mind this way of considering sets, but surely the proper way is to consider first of all what one wants to do, and then work the whole problem out in the most economical way, or as an alternative start with a sum of money to be expended, and then get all one can for the money.

**In Earlier Days**

In the days when valves were expensive and unreliable there was

some point in minimising valves, especially when the current consumption was so heavy, but now—valves are cheaper, current consumption is small, and they are the one thing in the set so easy to replace if anything does go wrong that their consideration does not enter so much.

**A Modern Trend**

We started first of all by sweating one valve to the absolute limit. We took a valve, used it first of all as a high-frequency amplifier, rectified the current with a crystal, put reaction in the circuit sending the high frequency backwards and forwards nearly to the oscillation point, and then we asked the indignant valve to still take one more load in the low frequency; and it sometimes violently objected. Then we added one stage of low frequency making the set work a loud-speaker.

Crystals were rather unreliable, so that a step further in the opera-

tion was the replacement of the crystal by a valve rectifier, and then we had three valves doing the job that at least five should have been used for. Sweating every valve to the limit is now bad form, and we seem to be actually asking each valve to do less each year.

Keeping in mind this modern trend and the Editor's demand for five valves, I think I would advise building a circuit in which every valve does the least possible within, of course, limits, and if in the end you want to get more out of your set, arrange it in the first case so that you can add a valve if necessary.

**Sufficient L.F.**

Dividing the receiver up into three sections, high frequency, rectifier, and low frequency; I think that quite sufficient low frequency is obtainable within two valves with resistance coupling, and for the rectifier I should tend to use

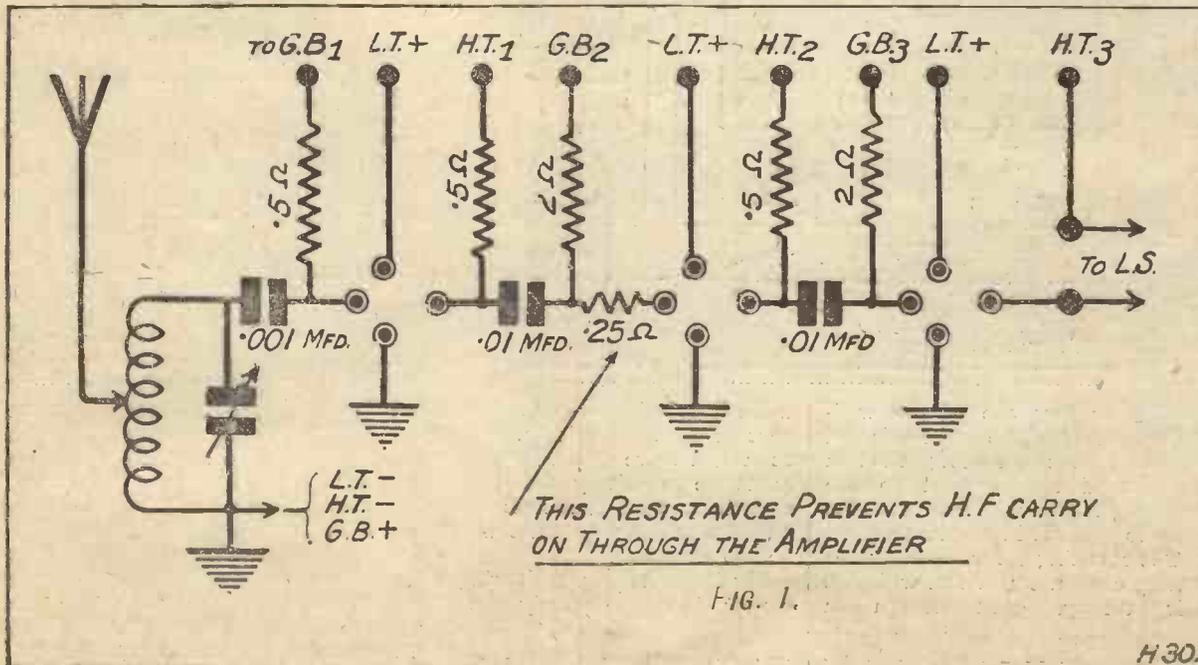


FIG. 1.

H30.

MY FIVE - VALVE SET — (Continued)

one of the high value valves, again resistance coupled, to the low frequency stages and working at the anode bend. On this arrangement so far described I should put at least 160 good volts either obtained from dry cells or from the mains, in any of the well-known ways.

The H.F. Stages

Fig. 1 shows the circuit so far described coupled to an aerial. Such a circuit with these three valves will work up to about ten miles from the local station on a decent aerial and will give practically perfect quality if the minor details of grid bias, etc., are attended to, but this range is hardly enough, and in front of the rectifier I should put two high-frequency stages with

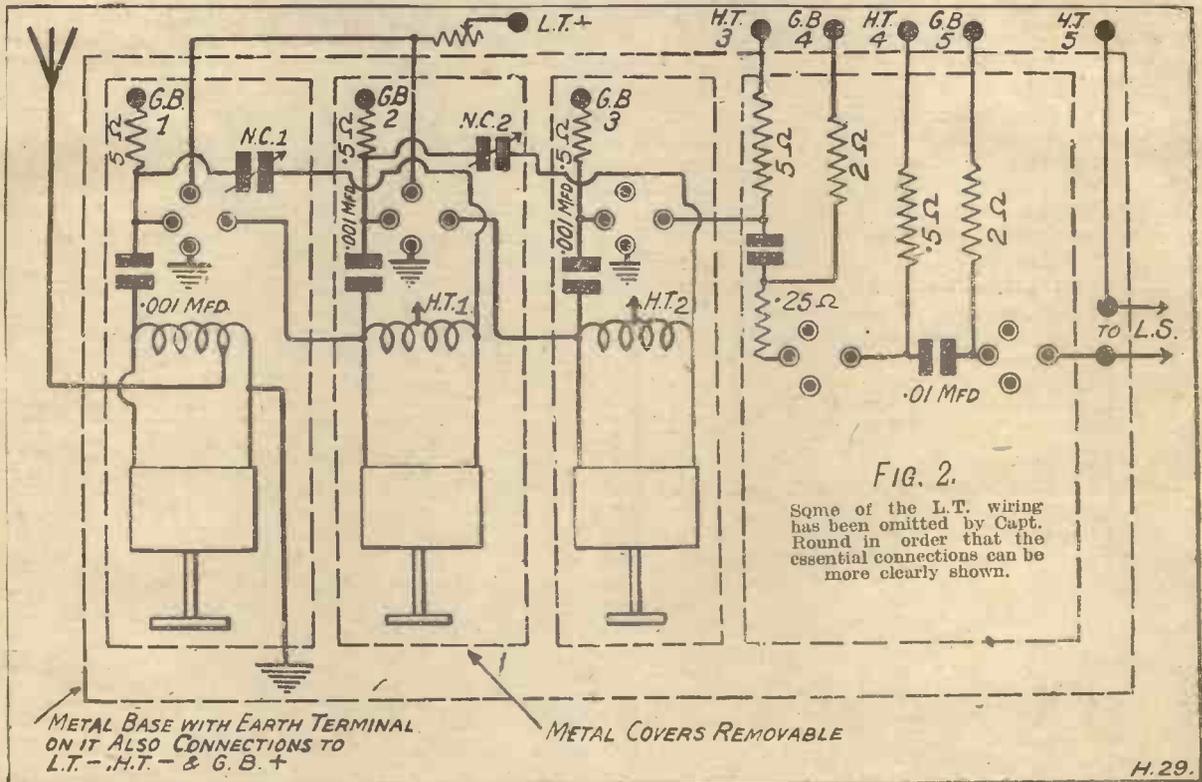
it, would not be too large but would be enough to give programmes from the local station, from Daventry and other long waves, and from several of the stronger Continental stations with a nice strength on the loud-speaker.

Now at any time when greater range or greater selectivity is required it is not difficult to add another stage of high frequency; no more low frequency is really required, but possibly the output valve might be doubled or a larger power valve with more volts used. I think most of the sets in the next year will tend towards the design of something like this arrangement. The over-all current consumption will be quite small, the high tension will not be excessive, but of course

used and to those new to the art I strongly advise adding one stage of high frequency first to the rectifier and getting this into thorough working order before adding the second stage, and then such troubles as oscillation on the short waves—on which subject has a considerable amount been written recently—will be recognised much more definitely, and cured as you go along.

Quality of the Best

I have indicated in the diagrams the method of handling the shielding, the receiver being preferably as much metal construction as possible, but, of course, it can be surrounded with a nice case after it is in working order.



practically any one of the well-known neodyne methods of coupling, but adopting modern practice, I should tend to use shielding rather than setting of the coils to prevent interaction.

The resulting set will have three tuning condensers, which will give fair tuning, good enough in nearly all circumstances. The magnification as I should arrange

will still remain the most expensive part of the set's upkeep. The set as a five-valve receiver combines moderate selectivity and moderate sensitivity with first-class quality and the making up costs will not be too excessive.

My diagrams (Fig. 2) showing this circuit, illustrate merely one way of connecting up the high frequency, but any suitable method can be

No one should imagine that this set is anything like as sensitive as can be produced with five valves if it is built on the principles I mentioned at first—i.e., each valve doing several jobs at once.

It is possibly not as selective as one could make it if reaction is used, but its quality will certainly be of the best, and the construction will be very straightforward.



# AERIAL EFFICIENCY

By L. H. THOMAS



**A**n old saying, fairly well known among wireless experimenters, runs to the effect that "A good aerial and earth are equal to an extra stage of H.F." At first sight this statement may seem a

waves, and the results have been carefully tabulated, with the result that a fair amount of useful and interesting information has been amassed.

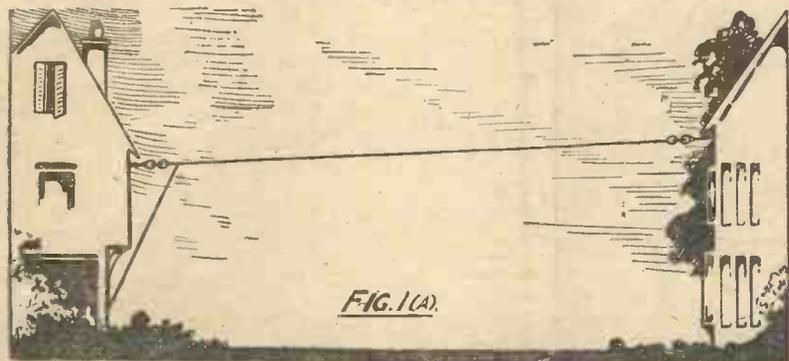
### High Aerials that Fall

The chief lesson learnt seems to be this—that it is even more essential

level, then by all means keep it twelve feet away.

Height, in itself, is sometimes allowed to become a fetish. Several aerials are to be seen in the writer's neighbourhood which have obviously been erected with the one idea of securing the maximum height. There are two which are raised four or five feet above the roofs of houses, but which are absolutely parallel with metal guttering for thirty or even forty feet of their length. In both cases the owners are vaguely dissatisfied with their results, and say, "In spite of my high aerial I can't get on very well." They quite fail to realise that the effective height of their aerials is probably in the neighbourhood of five feet!

To be really efficient an aerial *must* have a low resistance to high-frequency currents. This resistance is not by any means confined to the wire itself, but is also dependent to a great extent upon the surroundings of the aerial. Anything that comes near the aerial is capable of increasing its high-frequency resistance. This includes the walls of the house, the roof and chimneys, trees nearby, other aerials, the mast itself, and—often forgotten—the *inside* of the house, if there is a long lead-in to the set.



little far-fetched, but there are numerous enthusiasts to be found who, after scrapping their first aerial system and erecting a much better one, are only too willing to confirm its truth.

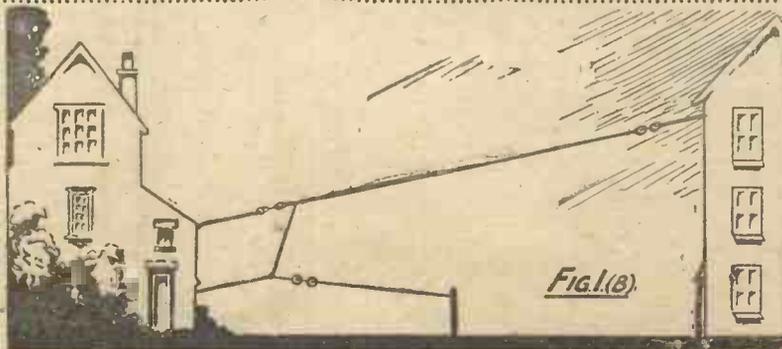
It is possible for nearly every owner of a radio receiver to erect a really *good* aerial, and yet one hears only too often the lament that it is impossible.

### Twenty-five Systems Tried

The writer is probably in as bad a situation for the erection of a good aerial of the "spectacular" variety as anyone could be, yet the results obtainable on a small, but carefully thought out system, are apparently as good as those obtained by many a proud owner of a pair of fifty-foot masts.

Some twenty-five different systems have been tried, both on broadcasting and, in some cases, on short

to keep the aerial well *away* from the house, metal gutters, pipes, etc., than it is to keep it *above* the obstacles. That is to say, that if there is a choice between raising the aerial five feet above the roof and placing it so that it is ten or twelve feet *away* from the roof, although it may be at the same

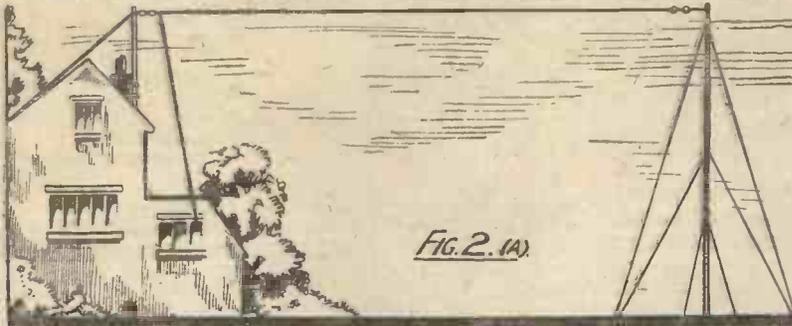


AERIAL EFFICIENCY—(Continued)

Needless to say, the connections to the lead-in tube and the earthing switch must be made with very great care; similarly, if it is possible to keep the horizontal portion and

superior to the other, although *A* is several feet longer. *B* has taken the trouble to keep his aerial well away from the house at the free end—the more important end,

because his lead-in is so close to his wall that quite a slight swinging motion will cause comparatively large changes in capacity, and consequently upset his tuning badly. The writer's first aerial was of this type (i.e., between two houses), and he kept it fully ten feet away from the house at the far end.

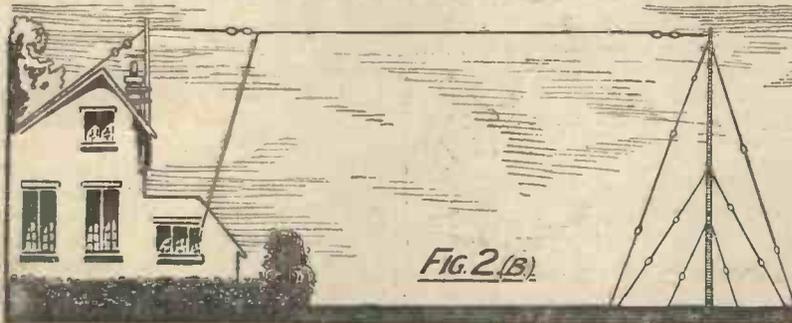


the down-lead in one piece, it should be done. No joint at all is preferable to the best of soldered joints. From the earthing switch the lead to the set must be as short

of course—and also to lead it out well away from his own house. *A*, at the expense of a few extra feet, has increased the resistance of his system considerably by taking

Avoiding a Sharp Bend

Fig. 2 (*A* and *B*) shows two aeri- als that are, at first sight, very similar indeed. The lead-in end is taken to a mast on the roof, and the free end to a larger mast in the garden, both masts being supported by metal stays. Here again *B* has the advantage. For one thing, he has broken his stays into fairly short lengths, by inserting small "egg" type insulators in them. *A* has, in effect, an earthed wire running just below the free end of his aerial, and his results suffer accordingly. Once more *A* will have trouble in windy weather when his lead-in begins to swing; *B* has avoided this at the expense of a few feet, but he has also avoided the bad fault of having a very sharp bend in the aerial. The lead-in should never be brought away from the main portion at an angle smaller than a right-angle, and this angle should, if possible, be greater.



The writer's present aerial approximates to that shown in Fig. 2 (*B*), and although the total length with the lead-in is only sixty-seven feet, gives considerably better results than that shown in Fig. 1 (*B*), which was not only some ten feet lower, but was also

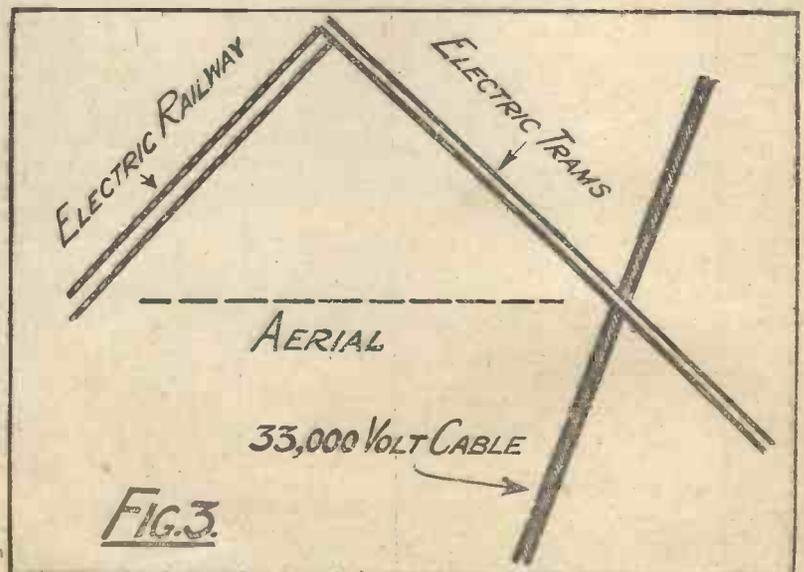
and as direct as possible, for the aerial does not end at the earthing switch!

it very close to the house at the free end, and also is probably unable to "hold" a station in gusty weather

All these theoretical considerations have again and again been borne out in practice, and the writer once took down his "nearly perfect" aerial and erected one which had several "snags," such as an unsoldered joint at the end of the horizontal span, and dirty joints to the lead-in tube. The contrast with the results obtained with the other aerial was painful. During this experiment he learnt the lesson that the outside connection to the lead-in tube should always be "weather-proofed" in some way.

Unable to "Hold" Stations

Fig. 1 (*A* and *B*) shows two forms of aerial commonly used. The owner's house backs on to another row of houses, and instead of erecting a mast he has taken the aerial right across both sets of gardens. The *B* aerial is vastly



## AERIAL EFFICIENCY—(Concluded)

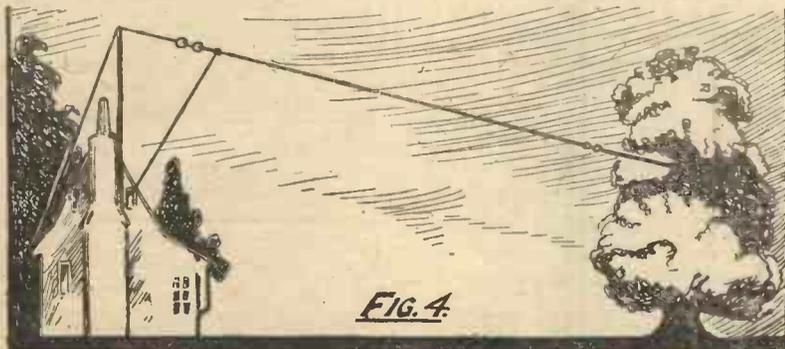
nearer to the house, and also somewhat screened at the far end by the other houses.

### Neighbouring Aerials

As regards such undesirables as telephone wires and neighbours' aerials, the only thing that can be done is religiously to avoid putting up an aerial that is parallel to them, if it is at all close. An aerial has generally to be erected *underneath* telephone wires, if there are any about. In this case it is simply a matter of making the best of a bad job. The writer has not found any serious interference or screening arising from a pair of telephone wires some thirty-five feet away, although when an aerial was pur-

what is undoubtedly the best position for an aerial.

Where the aerial is to be attached to a tree, great care must be taken to make it fast to a branch that cannot sway excessively. It should, of course, be taken as high up as possible, but not to a point which is likely to blow about too much, or the aerial will probably be found in two pieces after a gale. It is again advisable to keep the actual free end of the aerial as far away from the foliage as possible—ten feet or so of rope or wire should always be run out from the tree before the insulator is affixed. Fig. 4 shows a good form of tree aerial; the rope *could* be taken higher up, but the gain in height would be small, and all the steadiness would be lost.



posely erected parallel to them, the results were decidedly poor.

When a very near neighbour has an aerial of any size, it is as well to erect your own on the side of the garden furthest from it, if that is possible. Failing that, it is just as good to erect an aerial which goes diagonally across the garden, thereby avoiding the bad practice of keeping it parallel with the other.

### Unfortunately Situated

Where an aerial is to be erected in close proximity to an electric railway or a line of overhead electric trams, it is almost essential to see that it is at right angles, or as nearly so as possible, to the power line. If it is put up in a direction parallel to the other line serious interference in the form of "artificial atmospherics" is almost bound to result.

In such a situation as that shown in Fig. 3 (actually the position of an unfortunate acquaintance of the writer's!) the dotted line shows

### The Most Desirable Features

The writer's experience has led him to the belief that an aerial should *never* be taken over a tree—it is better to halve the length and make the free end before it reaches the tree. Wet weather will produce a marked falling-off of results, since the tree, when thoroughly soaked, may behave almost as a metallic body connected to earth. That an aerial must be well insulated has been taken for granted.

To sum up, it may be said that the most desirable features in a good aerial are as follows:—

1. Height.
2. Ample clearance from all earthed bodies, and obstacles.
3. Rigidity—i.e., freedom from swaying in a wind.
4. Correct choice of direction with regard to possible sources of interference and screening.
5. Good insulation.

## RUNNING EXTENSION LEADS

**L** OUD-SPEAKER extension leads can be run along picture rails or around the skirting of a room quite neatly by the most inexperienced of amateur electricians, but a nasty little problem has to be faced when it is a question of carrying the leads out of one room into another. True, they can be run round the door jamb or under the door as most doors fit so beautifully that plenty of space for this is available!

But it is at such a point that the wires almost invariably become visible and spoil an otherwise nice little job. The alternative of drilling a hole right through a wall is not to be faced lightly, but it is remarkable what can be done underneath flooring.

### Not a Difficult Task

One only has to watch a workman from the gas company or a professional electrician at work putting in new piping or wiring or inspecting systems already installed to gain an insight into the possibilities that lie beneath the boards. For the most part floor boards come up very easily. And in practically every room there are boards that come up with greater ease than others. These are the boards which the above professionals cunningly replace rather loosely in order to facilitate any of their further operations. And here let us add is the secret of the creaking board which haunts most of our domiciles!

It may sound a big job to many people, but it is really quite easy. The carpet or linoleum can be rolled back and with the assistance of a large chisel a board can be prised up. In some cases it will be found that the dividing wall between rooms extends unbroken right across the rooms under the boards and even under doorways, but in none of the houses where we have explored these regions have we failed to find a convenient hole. But one must keep well away from all gaspipes and electric wires or the authorities concerned will be distinctly peeved.

It is surprising how much space exists underneath the floors. With numbers of sticks tied together we have managed to pass wires under a whole intervening room, but we must admit that we had to negotiate some very awkward beams!



THE hat of Mr. Ambo, when its owner and I met the second time, was not the miniature straw "boater" I had seen before. Mr. Ambo's second hat was for "City Wear," and if ever he really did venture into the City with it he has more pluck than I would admit to his face. Either that—or he is doing it for a bet, for the thing would fit a lad of ten; it is the sort of hat one sees fixed by elastic to the heads of festive beanfeasters in charabancs.

**The Virgin Mind**

I had been thinking a lot about Ambo, because I knew I had struck lucky. "Here," I said to myself, "is the virgin mind. Here is the unscribed wax, the pure gold, the blank page. Here is a bloke all ready for the master hand; innocent of radio, though he has the words and motions pat; as yet unstained with the crimes of the normal radio "fan"; he never yet stole a grid leak as a loan, or let a friend's pet 0-001 (fixed) cling to his sleeve by accident and so be carried off; he has not even his own theory of grid bias. And he is mine! He shall be my *magnum opus*, my disciple, and



"What a magnificent tuber!"

when I give up and take to golf my mantle shall fall upon him." Thus I ruminated. And then Ambo and his little hat came up the front-garden path and did cheap Robey stuff at my door.

Would I step round to 12, The Grove, and have a yarn? I would. Let the good work begin at once, I thought, as I slipped a galvanometer

into my pocket; even thus does the doctor stealthily conceal his stethoscope ere he steps forth to thump thoraxes and gaze benignly upon the tongues of the wicked.

**"A Magnificent Tuber"**

While we paved our way to 12, The Grove, I threw out a few test questions—not snorters, but cunning, just to make sure the patient really needed treatment—such as:

(1) *I have a Res-Cap. coupled "Nighthcap Nine" with 2-volt D.E.'s. Follow that? Good! Now be careful! I insulate the amperes from the ohms and pass the result to the I.P. side of the last transformer, at the same time taking care to put the intervalve chokes up a couple of notches. What result may I expect? Reduce your answer to mhos per kilocycle, show your working and state your reasons.*

(2) *You are supplied with a supersonic kit but find that the shortcircuit is missing. What steps would you take, and (a) Why? (b) How many?*

(Note 1.— $A + B = C$ .)

(Note 2.—*Sailors don't care.*)

As I suspected, a few little queries like these gave him clean away and we walked on in silence. Presently I missed him, and turning round, saw him staring into a greengrocer's shop. I retraced my steps and joined him.

"What's the attraction?" I asked.

He did not answer at once but continued to glare. Then he said in a dreamy voice.

"What a magnificent tuber!"

I glanced at Mr. Junk, the greengrocer.

"That's not a tumour," I said, "It's only a common bump. He fell off Box Hill last Saturday."

Ambo half turned and looked at me with the sort of look the old lady gives you when you jostle her and she thinks you have hooked her purse.

**The Wonderful Specimen**

"Good gracious me," he replied, "what on earth . . . ? I was referring to Mrs. Parker and you start that rot about bumps and boxes. I tell you it's the finest

specimen I have seen since last year's exhibition."

"Mrs. Parker?" I snapped back, "Where is Mrs. Parker? If you let Mrs. Junk even suspect . . ."

"My goodness! Can't you see? That's Mrs. Parker." He pointed to an enormous potato. "A cross between a Patcham's Honeyball and a Traff's Little Wonder. I must get it. I must . . ."



"... wore a pair of headphones and fiddled with a crystal set . . ."

"Ambo," I cried sternly "enough of this hero worship. I you are going to be a radio man you will have to drop the spud trade. Anyway, I decline to listen to your disgusting revelations of the agricultural underworld. If you do not keep Mrs. Parker and the wire-worms out of the conversation I go straight back to *Kia Ora* and get on with my job. I've got a man in Samoa tuning for me in a couple of hours."

**Ambo's Crystal Set**

I guessed that lie would cure him. So we bade adieu to the pride of Covent Garden and walked on to 12, The Grove, which is just a street—houses, lanky dogs, slink-some cats, and women with mangles and husbands who sweat all day at the potato and other trades, coming home at eventide to do miracles of radio.

My first survey of Ambo's wireless den confirmed my previous ideas. The man had spent a moderate fortune—the value of many tons of Mrs. Parkers—on a magnificent collection of instruments, which lay on tables higgledy-piggledy, dusty and tarnished. In an arm-chair sat a little old man, whiskered up to the eyes, who wore a pair of head telephones and

IN PASSING — (Concluded)

fiddled with a crystal set, value five shillings.

"Oh-er-this is my father-in-law, Mr. Twipe," said Ambo, half apologetically. "He likes to use the set when I'm out."

Mr. Twipe rustled his whiskers, but the words he spoke never got through them. I never before had seen a man so badly screened.

"Well, Ambo," I said, "you seem to have a nice select lot of doings here. Let's see some of your sets."

He looked uncomfortable. "That's it," he muttered, pointing to the toy over which the Twipe beard waggled.

"But—man alive!" I said, "that's only a thing to keep the kids quiet. Bring on the super-het and put her through her paces. You ought to hear Moscow and

"I'm afraid that's all there is," replied the miserable man, "and even that doesn't work very well. But I believe I heard a ship working last Easter."

Mr. Twipe Tunes In

Pa Twipe nodded furiously, battered at his face-mat with air-waves which might have been human speech but for the lack of razors, and worked the slider up and down the tuning coil with an air of importance.

"Is he trying to make fire by friction," I asked, "or has he got shell-shock?"

"N-no, old chap. He's tuning, you know. I taught him myself."



"There stood two majestic bottles."

"I see," I replied. "I thought perhaps he was trying to make the crystal oscillate. Now, look here, Ambo! What is all this bunkum? On the one hand we have enough gear to hook-up at least three A1 sets; on the other, this worthy but misguided gentleman with the crystal set. I see he is having another spasm with the slider.

Has he been a trombone player in his less hairy days, may I ask? But let that pass. If you will undertake to remove him—to de-Twipe the set, so to speak—we will get down to business and have some of this jolly old stuff pulling down sigs like one o'clock."

Success Achieved

Ambo, on his mettle, then spoke kindly to the Twipe fellow. I think he told him it was time to have his befo and biscuit. Anyhow, the human furze-bush who had sired Mrs. Ambo tore the telephones out of the jungle, nodded to me, and scuttled off like some curious deep-sea crab.

Then Ambo became another man. Stepping briskly to starboard, he turned his head to me and winked, damply. Then he pressed a button and the Wireless Map of the World swung outwards through 90 degrees and lo! where once stood Asia now stood two majestic bottles. A man and a brother was Ambo, after all. It's never sound practice to judge a fellow while he wears the mask of domesticity.

So we charged our pipes and I told him that one about the insurance agent and the film star. He poked me in the vest and related one about a bishop who bought a bull-pup, and so by joyous, unhurrying degrees, interspersed with anecdotes of the potato trade (you have no idea how thrilling Covent Garden is), we got to the crystal set.

Then I found that the Twipe had been using up his ears over a circuit in which the telephones were in series with the aerial and the inductance with the crystal as a sort of "odd man out." Ambo was so pleased that he touched another button and a chart of wavelengths was found to be hiding some very fine Burma cheroots. So that was that, and Ambo had the pleasure of hearing 2LO on his own set for the first time in his life. It was the "Children's Hour," but that did not worry him; he simply ate it and I had great difficulty in preventing him from calling up Twipe to listen.

Makings of a Scientist

"Wait till I am gone, Sonny," I said, lighting another Burma. "I haven't had a smoke like this since I used to buy the things at four rupees the hundred—before

the war—when I was globe-trotting. But tell me how is it that you have all this beautiful stuff—I see an Einthoven galvanometer there, eating its heart out—and you don't know how to tie up a crystal detector properly?"

"Oh—them!" he answered, "why—I don't know. I read all these magazines about radio and



He heard 2LO for the first time.

get filled with great ideas—and they look scientific and sound grand—but I'm dashed if I understand what the darned things are for. I've the makings of a scientific bug in me, because the mere sight of all those doo-dahs soothes me, but the potato trade is trying—most exacting."

"I can believe you," I said. "But you've got to give up tubers and concentrate on tubes."

"I will," said he.

"And then I will help you on and show you all the ropes. I'll introduce you to Blunkey, who first received Potosi Radio on one valve, and to Chilver, the fellow who is the only man in the British Empire in daily communication with Yung-shi-pot at Hong-king. The Foreign Office keeps a special commissioner with seven medals at his door in the hope of getting a look in."

A Promising Future

"Will you really? Well, you are a sport."

"Yes, and I'll show you how to make that father-in-law shave. He'll be useful to hold the soldering bolt and do odd jobs, but he'll have to have a prairie fire on his map first."

"Splendid! When can you come round next? Don't make it Thursday, because I'm going to lecture on Mrs. Parker before the Amalgamated Root-Growers and Potato Pushers."

The perverse passion for potatoes perished hard. But perish it did, as I shall show.

# MAKING A FILTER AND TONE UNIT

A Practical Article for Constructors who want to improve their Loud-speaker Sets

By G. T. KELSEY.

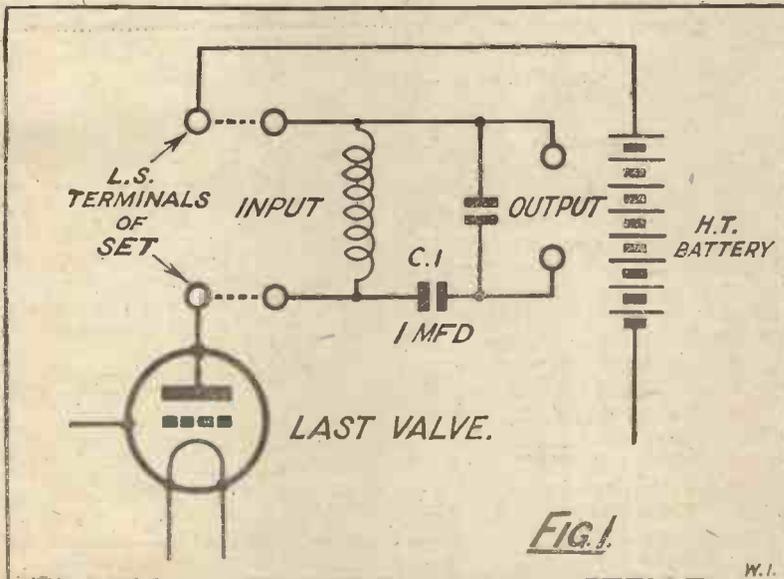


IF a census could be taken of all the radio enthusiasts who use a loud-speaker filter circuit, I am sure the percentage of the whole would be very small. After

tion with a loud-speaker, it will be best to consider first what is happening in the anode circuit of the last valve when the filament is alight.

negative usually by a "plus" (+) and "minus" (-) sign, or by a red and black bush.

If the loud-speaker is connected in circuit the wrong way round, then the current will flow round the windings in the wrong direction, and although it will still produce sound, there will be a tendency for the anode current to demagnetise the permanent magnets. The result of such an error will be to shorten the effective life of the loud-speaker, and after a while it is quite likely that signal strength will fall off.



### The Mansbridge Condenser

It is partly in this direction that a filter proves its worth. The filter consists of an L.F. choke and a large Mansbridge type condenser, so arranged that the direct anode current which has been spoken of as being detrimental to the loud-

all, such a unit is simple enough to make, and the time and money expended on its production are well repaid in the use to which it is put.

Perhaps it is that the majority of people do not know of the important reasons for using a filter, and perhaps there are some who do not even know what a filter is.

### How it Works

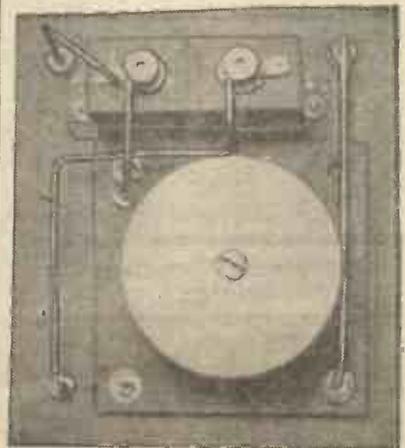
For the benefit of those readers who are unfamiliar with the functions of a loud-speaker filter, it is proposed to give a short non-technical explanation and the reasons for using one.

Since a filter circuit of the kind to be discussed is used in conjunc-

A wireless valve will only function with a positive potential on its anode, and for this reason the anode is connected through the windings of the loud-speaker to the positive side of the H.T. battery.

### Saving the Loud-Speaker

When the filament is alight, there is a direct current flowing round this circuit, and this steady anode current, as it is called, has, therefore, to flow through the loud-speaker windings. It flows in one direction only, whether or not a signal is being received. It is for this reason that on most makes of loud-speakers the terminals will be found to be marked positive and



The simplicity of the internal connections is shown by this illustration of the under-side of the panel.

## MAKING A FILTER AND TONE UNIT

*Continued*

speaker is by-passed through the choke; thus it does not reach the loud-speaker windings.

Here there is a chance for confusion as it may be thought that since the anode current does not reach the loud-speaker, nothing will actuate the diaphragm. As a matter of fact, it is the fluctuating current in the anode circuit which causes the diaphragm to vibrate, and although the condenser ( $C_1$  in the circuit diagram) acts as a barrier to direct current, the fluctuating current caused by "signals" is able to pass through it.

### Components Required

From the preceding paragraphs, it will be gathered that when using a filter, the loud-speaker can be connected in circuit either way round without fear of damage to the magnets.

This, however, is not the only advantage of using such a unit. Although it may not be regarded

as common, it does sometimes happen that the windings of the loud speaker "burn out," and here

again the filter circuit will eliminate risks in this direction.

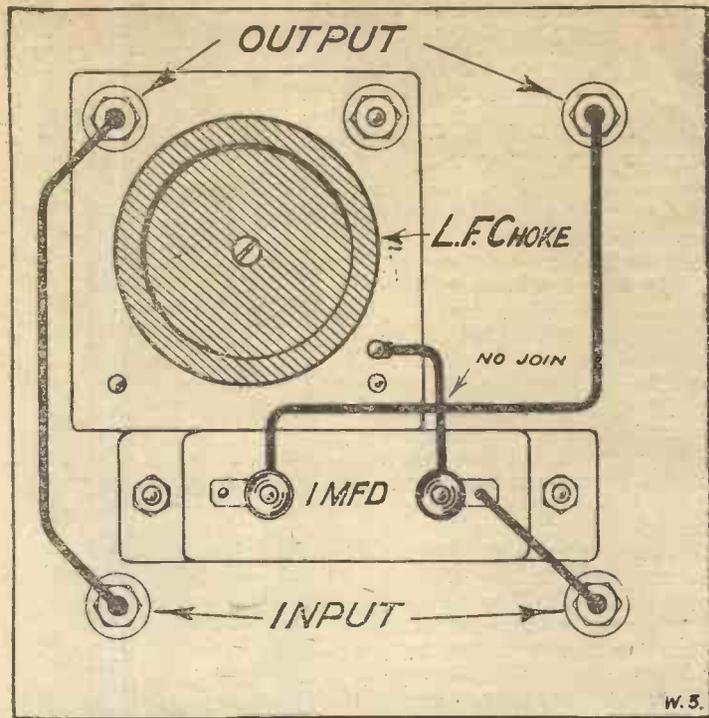
If it is considered from these points of view, then it would certainly seem "worth the candle" to incorporate the necessary choke and condenser into a practical unit; and so to conclude this article it is proposed to describe one which can be built quite easily.

The components required are one L.F. choke of reliable make, one Mansbridge type condenser (capacity 1 microfarad), one "clip-in" condenser with clips (the value required depends upon the loud-speaker in use), one ebonite panel, 4 1/4 in. by 4 in., two telephone terminals, two type W.O. terminals and a box to contain the finished article.

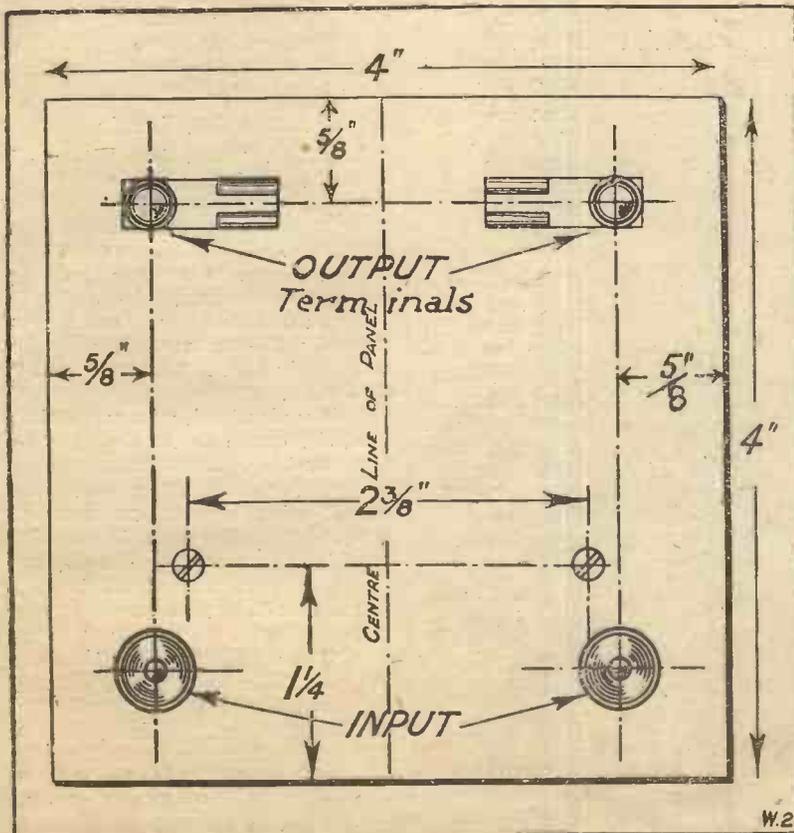
### Tone Control

Commence the constructional work by drilling the few necessary holes in the small ebonite panel. This should not take very long, and with this done proceed by fixing in position the L.F. choke. To reduce the amount of wiring in the unit, one side of the choke winding is connected direct to the base of one of the "output" terminals, which latter, in addition to holding one side of the choke base against the panel, secures one of the clips for the optional fixed condenser. The remaining clip is held in position by the second "output" terminal.

*(Continued on page 144.)*



The wiring is the work of a few moments, as only three or four leads are necessary.



**CUTTING OUT THE LOCAL STATION**  
 :: By ::  
**HUMPHREY PURCELL**

**I**N a straight set, consisting of a detector and one or two L.F. stages, a local station working within about ten miles can often be heard "all round the tuning dial." This is particularly noticeable in sets constructed a year or two ago, and in commercial sets which are frankly designed to enable their owners to listen to the transmission from the nearest broadcasting station.

If it is desired to make such a set selective, in order that distant stations may be picked up without interference from the local station, this may usually be done, without any alteration to the set itself, in either of two ways. The simplest plan is to disconnect the aerial from the set and to attach it to one terminal of a .0001 fixed condenser, the other terminal of the condenser being connected by means of a short piece of wire to the aerial terminal on the set.



The other method is to replace the aerial coil by a coil which is tapped at one or more points, and to connect the aerial to a terminal provided on the coil instead of to the aerial terminal on the set.

There are many suitable tapped coils on the market which fit into an ordinary two-way or three-way coil holder in the same way as the non-tapped types.

.....  
**Mr. T. Thorne Baker,** the inventor, giving a public demonstration of the transmission of pictures by wireless.

**MAKING A FILTER AND TONE UNIT—(Concluded)**

The 1 microfarad condenser and the "input" terminals are yet to be fixed, and with these in position

the wiring is completed. Exactly how the components are arranged, and the connections to be made, will be found in the back-of-panel drawing.

It has been mentioned previously

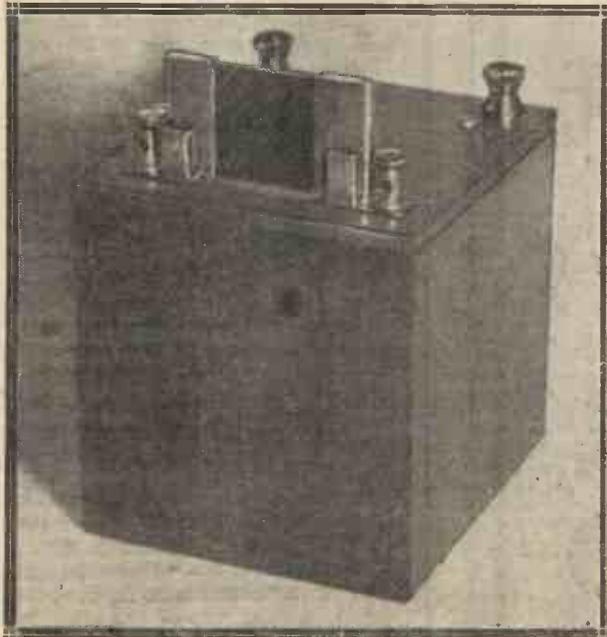
that the small fixed condenser for which clips are provided is optional. While with some makes of loud-speakers the best results may be obtained without an external capacity across the windings, the tonal quality of others may be quite appreciably improved when used in conjunction with a fixed condenser. The value of this condenser is dependent upon the loud-speaker in use.

Usually the correct value is to be found between .001 and say .01. As the value is increased beyond these limits, signals are apt to become "woolly," and the letter "S" may become "eth"

**Extension Leads**

Where a "land line" is used between the loud-speaker and the receiver, always connect the filter unit in circuit at the set end of the extension. The H.T. current will then not have to traverse the long leads, and further, the capacity between the two wires, more particularly if flex is used, may be sufficiently high to act as a "tone" condenser.

It is understood, of course, that the L.F. choke to be used in the construction of this unit should be of good manufacture and not wound with a large number of turns of very fine wire. It must be capable of carrying the heavy anode current that flows in the plate circuit of a super-power valve without becoming "saturated" or distortion will result and the filter will be a failure. Make sure also that the Mansbridge condenser is quite sound, for if this has a short your volume will suffer, while if it has a "dis" nothing will be heard in the loud-speaker at all.



A photograph of the complete unit with the clip-in condenser in position across the loud-speaker terminals.



Centre:  
Capt. Barnard and the  
assistant editor of  
"Amateur Wireless."



Above:  
The "Wireless World"  
man retrieves one of the  
dropped Cossor Valves.

# Crash!

"The world's most sensational Valve test"  
—vide the Press.

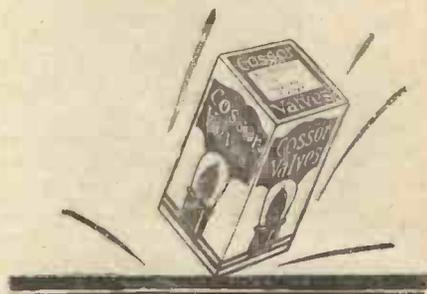
## Cossor Kalenised filaments unharmd after 500 feet drop from aeroplane

**E**XTRAVAGANT claims and bombast have never found a place in Cossor advertising. To demonstrate the immense strength of the new Cossor Kalenised filament we looked for deeds—not words. We determined to convince the public that through recent improvements the Kalenised filament is now practically indestructible. And so we asked for the co-operation of "Amateur Wireless," "Popular Wireless" and "Wireless World."

When we told them our plan of dropping twelve Cossor Valves from a height of 500 feet they were frankly incredulous. "It can't be done," they exclaimed, "no valve in the world could stand such a drastic test." But, knowing the vast strides made by our chemists during the last few months, we had confidence that the new Cossor Kalenised filament would withstand even this amazing abuse.

On December 20th at Stag Lane aerodrome this epoch-making test took place. Twelve Stentor Two Valves—previously sealed within their boxes without cotton wool or corrugated paper—were dropped from an aeroplane at a height of over 500 feet. One valve was lost owing to the high wind but in each of the remaining 11 valves the Cossor Kalenised filament was unbroken. One of the valves hit the tail plane with terrific force and was smashed. But even this filament was found to be intact. This remarkable test from start to finish was directly supervised by the Technical Press and the sealed valves were afterwards opened and tested by them at our Highbury Works.

**This test was  
carried out  
under the direct  
supervision of  
'Amateur Wireless'  
'Popular Wireless'  
'Wireless World'**



### What this test means to you

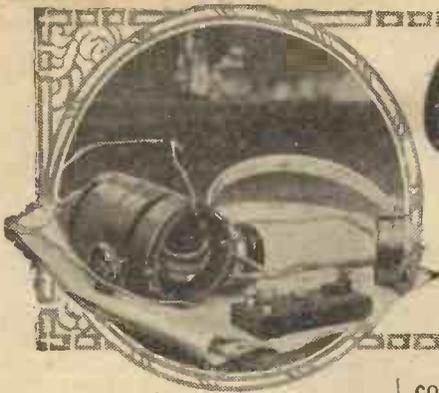
Here is unanswerable proof of the tremendous strength of the new Cossor Kalenised filament—proof that every Cossor Dull Emister will give long and enduring service. Of equal importance is the fact that the Cossor Kalenised filament never becomes brittle in use. This is because it gives off a terrific electron emission without visible glow. Heat has been practically eliminated. The Kalenised filament never loses its emission through over-running—any Cossor Dull Emister can be operated from a fully charged accumulator without a rheostat without harm. Remember the wonderful Kalenised filament is to be found only in Cossor Dull Emitters—no other valve has it. Do not accept a substitute—no other valve is so strong or can give such economical service.

#### TYPES & PRICES

Cossor Point One			
210H for H.F. use	...	...	14/-
210D for Detector	...	...	14/-
(2 volts '1 ampere)			
Cossor Power Valves			
Stentor Two	...	...	18/6
(2 volts '15 ampere)			
Stentor Four	...	...	18/6
(4 volts '1 ampere)			

All above Valves fitted with Cossor Kalenised Filaments

# Cossor —the Valve which serves you longest



# Questions Answered

## Cure for Fizzing Noises

A. T. (Barnet).

"For some time past I have been troubled with an intermittent fizzing noise in my five-valve set. As far as possible, I have tested the components and found that the transformer, anode resistance, and H.T. battery are quite O.K.; yet I am certain the trouble does exist in the I.F. end. What is likely to cause this noise?"

In all probability, if you are using anti-microphonic valveholders of certain types, you will find that the trouble is in one of the valveholders. In this case, it will probably be due to a loosening of one of the pressed joints of the metal-to-metal contacts inside the holder, caused by the heat of the soldering iron. You can usually test the holders by rocking the valves about while the set is in use, and we would advise a scrutiny of all the valveholders and their careful examination with a battery and a pair of phones.

Another frequent cause of such trouble as you experience is the presence of dry joints in the receiver. Test all the joints for mechanical strength, giving them a sharp tug, when it is likely that any faulty connection will come adrift. A faulty fixed condenser or leaky ebonite might be the cause, but it will more often be found in the valveholders if these are not extremely well made. We assume, of course, that the valve legs are clean and fit their sockets properly.

## Distortion in Choke Output

M. G. (Harrow).

"Having just completed a multi-valve set, I have been advised to add choke output in order to prevent the plate current from the last valve passing through my loudspeaker. On the addition of the choke unit, I find that the results have become rather muzzy. (I had obtained pure reproduction before adding the choke.) The

components used in the choke unit are of the best, and I am assured that the choke itself has a high inductance value. What is likely to be the cause of this distortion?"

Assuming that your connections are quite O.K., and that the values of the condensers used in the choke unit are somewhere about 1 mfd. each, in all probability your trouble

is caused by the design of the choke. If you have a choke having a very large number of turns of fine wire, you will find that it will become what is known as "saturated." This means that its opposition to the plate current of the valve is so great that it fails to pass sufficient to enable that valve to operate properly.

It is necessary, of course, to use a choke having a high impedance, but in order to obtain perfect results, and prevent this saturation taking place, the choke must be wound with reasonably heavy gauge wire. Unfortunately this results in a component of rather a bulky nature, and so, in your case, unless you are going in for really powerful amplification, we would advise your using a choke of reasonably stout wire, even if it has a slightly lower inductance value.

As a rule, an inductance of not less than 20 henries is advisable, but as before stated this inductance must not be obtained by winding with very fine wire in order to keep down its size. In the case of really powerful amplification, you will probably find it better, if you do not have a choke specially constructed, to use a bank of four chokes of say about 20 henries each, arranging them in a series-parallel system, so that the total inductance value comes to about 20 henries, and yet the resistance is kept low enough to allow a suitable passage for the plate current of the valve.

## H.F. Resistance Amplification

D. V. (Crewe).

"What is the reason why, although resistance amplification is so often advised for L.F. purposes, it is useless for low wavelengths on the H.F. side?"

This is due to the inter-electrode capacity of the valves. On the L.F. side of the set, this capacity, although it is virtually in shunt with the resistance in the plate,

(Continued on page 185).

## "MODERN WIRELESS" QUERIES DEPARTMENT

### REVISED RULES

Letters should be addressed to Technical Query Editor, "Modern Wireless," The Fleetway House, Farringdon Street, London, E.C.4.

They should be written on one side of the paper only, and MUST be accompanied by a stamped addressed envelope.

Queries should be asked in the form of the numbered questions: (1), (2), (3), etc., but may be accompanied by a short letter giving any necessary additional particulars as briefly as possible.

For every question asked a fee of 1s. should be enclosed. A copy of the numbered questions should be kept, so that the replies may be given under the numbers. (It is not possible to reproduce the question in the answer.)

A selection of the questions and answers dealt with by the department will appear under this heading every month.

**BLUE PRINTS.** A series of 20 Blue Prints can be obtained from the Query Dept., price 6d. per Blue Print.

At the moment only a limited number of circuits are covered in this series and full details of the circuit arrangements available in Blue Print form are published monthly in the advertisement columns of this journal, but the series will shortly be extensively enlarged.

All other back-of-panel diagrams are specially drawn up to suit the requirements of individual readers at the following rates: Crystal Sets, 6d.; One-Valve Sets, 6d.; One-Valve and Crystal (Reflex), 1s.; Two-Valve and Crystal (Reflex), 1s.; Two-Valve Sets, 1s.; Three-Valve Sets, 1s.; Three-Valve and Crystal (Reflex), 1s. 6d.; Four-Valve Sets, 1s. 6d.; Multi-Valve Sets (straight circuit), 1s. 6d. Except SUPER-HETERODYNE DIAGRAMS, all of which, irrespective of number of Valves used, are 5s.

If a panel lay-out or list of point-to-point connections is required an additional fee of 2s. must be enclosed.

Wiring diagrams of commercial apparatus, such as sets of any particular manufacture, etc., cannot be supplied. (Such particulars can only be obtained from the makers.)

Readers may submit their own diagrams, etc., for correction or for criticism. The fee is 1s. per diagram, and these should be large, and as clear as possible.

No questions can be answered by phone.

Remittances should be in the form of Postal Orders.

# THINK THIS OUT—

*your judgment will improve your set and save you money.*

**W**HEN you see Radio parts mentioned in any circuit or receiver built up for publication in any radio journal it does not follow that the best parts have always necessarily been used for that circuit, because naturally advertisers expect a share in that kind of mention and **USUALLY GET IT.**

Always remind yourself of that when building. Remember, too, that you are free to choose your own parts, and should do so if you can benefit. **HOW TO GAIN, AND GAIN**

**CONSIDERABLY**—let LISSEN parts predominate in your receiver. You gain in clarity of signals and in wealth of volume, you gain in money saved. Before you buy any radio part ask yourself, "Can I get it in the LISSEN range?" If you can, then insist upon seeing the LISSEN part side by side with anything else mentioned, and you will buy LISSEN, for your own judgment will then convince you that LISSEN is pre-eminent in the making of fine parts for radio.

### FOR AN AMPLIFIER—

- 1 LISSEN Transformer, 8/6
- 1 LISSEN Wire Rheostat 2/6
- 1 LISSEN Fixed Condenser, 1/-
- 1 LISSEN Valve Holder 1/-; you can see it is not dear, and IT IS CERTAIN IN PERFORMANCE.

### ON FIXED CONDENSERS.



You gain in this way if you use a LISSEN—you get a condenser accurate to 5% of its marked capacity, and a condenser which will never leak, never vary. You get, too, a condenser which **LESS THAN A YEAR**

**AGO WAS BEING SOLD AT TWICE ITS PRESENT PRICE—AND NOW YOU ACTUALLY GET A BETTER CONDENSER TOO, THE FINEST FIXED CONDENSER THAT IS MADE TO-DAY.**

LISSEN Fixed Mica Condensers :—.0001 to .001, 1/- each (much reduced). .002 to .006, 1/6 each (much reduced).

(Every grid condenser has a pair of clips included free.) Note the new improved case which enables the LISSEN condenser to be fitted upright or used flat. Note the convenient grid leak fixing.

### Add 10 per cent. to the life of your H.T. Battery



Put a LISSEN 2 mfd. condenser across it (1 mfd. will do, but the larger size is better). Your H.T. battery will then **GROW OLD WITHOUT YOUR KNOWING IT.** Your dealer will tell you how easily to fit.

LISSEN (Mansbridge type Condensers) :—

2 mfd., 4/8.	1 mfd., 3/10.	
Other capacities are:—		
.01	...	2/4
.05	...	2/4
.25	...	3/-
.025	...	2/4
.1	...	2/6
.5	...	3/4

**YOU PAY NO MORE FOR A LISSEN, YET GET A BETTER CONDENSER.**

To a fine quality condenser has been added a specially moulded case, which, itself a solid insulator, gives you much needed protection when you use big capacity condensers for eliminator circuits. The LISSEN condenser cannot short circuit on to its case—that is an important advantage which is exclusive to this LISSEN condenser.

### SILENT GRID LEAKS.

Never a sound do they make in use, for they never alter. This has been proved by the drastic step of testing them by exposure to rain and sun on our factory roof—once made, **THEY ARE FIXED IN THEIR RESISTANCE VALUE.**

All resistances one price—Previously 1/8. NOW 1/-.



**BUILD WITH ALL LISSEN PARTS**—and your receiver will yield clearer and louder signals than ever you can get with parts of assorted make, because every LISSEN part will pull strongly with the other.

**LISSEN PARTS—WELL THOUGHT OUT, THEN WELL MADE.**

**LISSEN LIMITED, 20-24, FRIARS LANE, RICHMOND, SURREY.**

Managing Director : THOMAS N. COLE.

L 171.



LISSEN 2-way switch.

### NEAT SWITCHES, EFFICIENT SWITCHES.

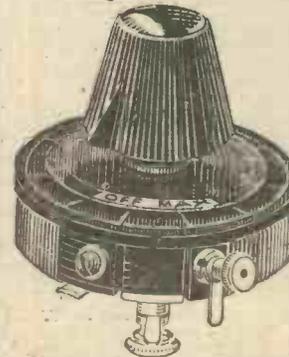
LISSEN switches, one for every switching use in radio. Every one LISSEN ONE-HOLE FIXING, OF COURSE.

- Previously. NOW
- LISSEN 2-way 2/9 **1/6**
  - Series-Parallel 3/9 **2/6**
  - Double Pole Double Key Throw 4/- **2/6**
  - Key Switch 2/6 **1/6**



LISSEN Key Switch.

### Quality RHEOSTATS—previously 4/- NOW 2/6.



Made as LISSEN only can make—LISSEN quality, and note the irresistible appeal of the price.

- Previously. NOW
- LISSEN 7 ohms, patented ... 4/- **2/6**
  - LISSEN 35 ohms, patented ... 4/- **2/6**
  - LISSEN Dual, patented ... 6/- **4/6**
  - LISSEN Potentiometer, patented, 400 ohms ... 4/8 **2/6**

### LISSEN ONE-HOLE FIXING, OF COURSE.

Baseboard mounting type reduced from 2/6 to 1/6.



### SCOOPED OUT TO YIELD CLEARER AND BETTER SIGNALS—

Low capacity, low loss, therefore stronger, clearer signals. You cannot get a good valve holder less than LISSEN sell this one for. Patented. Shown ready for baseboard mounting, can also be used for panel mounting by bending springs straight.

Previously 1/8. NOW 1/-.

**IMPORTANT TO THE TRADE.**—Retailers who have not already been notified of our new direct to dealer policy of distribution should, in their own interests, communicate with us without delay. All orders must now be sent direct to us at Richmond, and not to usual factors.



# WHAT READERS THINK

*NOTE.—All communications, MSS., photos, etc., should be addressed to the Editor, "Modern Wireless," The Fleetway House, Farringdon Street, E.C.4. In cases where a reply is required, a stamped and addressed envelope must be enclosed.*

## Super-Power Valves

SIR,—I have read with great interest Mr. G. P. Kendall's article on super-power valves in MODERN WIRELESS of January, but I cannot agree with him when he says that several loud speakers in series will improve results. I have tried this method of connecting up loud speakers, but have never noticed any alteration in tone that could possibly be construed as an improvement. Also, does he mean that the higher impedance should be used when the super-power valve is employed, or only when a "moderate" power valve is being used? Perhaps Mr. Kendall would enlarge on this point at some future date, as he seems to have left things rather in the air, and to me at least the matter is not at all clear. Another point occurs to me in connection with the same article, and that concerns the last few paragraphs. Mr. Kendall says that the H.T. battery will be "called upon to carry quite a heavy load" because of the use of the super-power valve. This seems quite logical, but yet I recall the words in the advertisement of a well-known valve firm which said "greatly increased emission does not indicate increased H.T. consumption," etc. Surely this is contradictory.

Thanking you for a most interesting and valuable periodical.—Yours truly,  
A. M. T.

Luton.

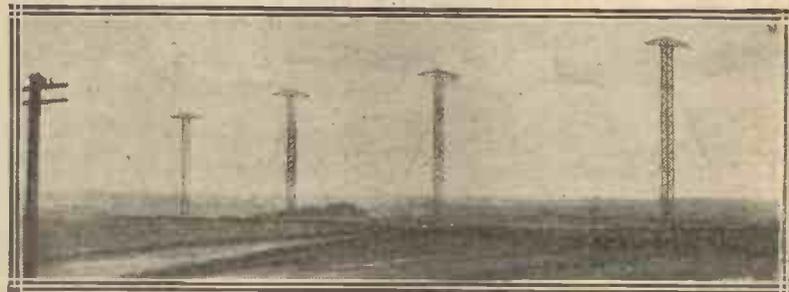
[ED. NOTE.—The above has been forwarded to Mr. Kendall, and we publish below his remarks on the subject.]

SIR,—I am afraid "A.M.T." has introduced a trifle of distortion into my remarks by making me say "will improve results": I actually said "can improve results," for it does not follow that by picking a group of loud speakers at random any improvement will be obtained.

The loud-speakers must suit each other's characteristics, and, if possible, should compensate to some extent each other's defects, but this was not the point with which I was concerned. I was referring to the fact that to obtain something approaching even amplification over the working range of frequencies it is necessary to see that the inductive load in the anode circuit shall present an impedance bearing a certain relation to that of the valve. What we require is a *higher* impedance than that of the valve, and if the latter is not of a type particularly suitable

to locate the working point near the middle of the available straight portion. If this is done the valve will necessarily pass a considerably larger anode current than the ordinary power valve. It is true that it is possible to bias the current down to smaller proportions, but if this is done the working point is no longer in a position to take full advantage of the special virtue of the valve. It would still be capable of handling moderate signals, but surely this is a "penny-wise pound-foolish" way to treat a special valve?—Yours truly,

G. P. KENDALL.



A view of the "Beam" aerial system at the Marconi Company's new station at Dorchester.

for last-stage work it is quite possible that this condition will not be realised with only a single loud speaker in the anode circuit.

Hence it is surely obvious that placing two or more *suitable* loud speakers in series is a desirable proceeding in such a case?

I fail to see how the common error in regard to the normal working anode current of a super-power valve can have arisen. The main point about these valves is their ability to handle powerful signals without distortion, and this means that they possess a very long straight portion on their characteristics. To take full advantage of this property it is necessary

## A Welcome Feature

SIR,—Though I am not what you might call an old reader of MODERN WIRELESS, I have nevertheless derived much pleasure from its contents for the last few months, and I am glad to notice the new feature introduced under the title of "Radio Notes and News of the Month." It has considerably brightened up the paper, and I for one will look forward to this feature.

Wishing you continued success.—

Yours truly, D. VALERY.

Bournemouth.

(Continued on page 187).



*Why Waste Energy?*

**Keep Your H.F. in its Place**

As most experimenters know, it is necessary, in certain circuits, to restrict the high frequency current to certain paths.

This restriction is effected by interposing a H.F. Choke, but this unit must fulfil certain Technical conditions.

It must have a high inductance, a low self capacity, and must efficiently deal with "long" or "short" wave frequencies.

The **NEW** **MH** **H.F. CHOKE**

scientifically designed to meet these conditions is a genuine advance on all existing types. The reduction in diameter of the end windings deals in a graduated manner with the higher frequencies, and the central portion with the lower frequencies. With an inductance of 60,000 microhenries, a self capacity of negligible value, and a D.C. resistance of 130 ohms, it is the ideal Choke for all purposes.

**Price 9/- each**

Demand of your dealer **MH** Components.

**BRITISH, BEST AND CHEAPEST IN THE LONG RUN.**

Telephone:  
SLOUGH  
441-442.

**L.M. MICHAEL LTD**

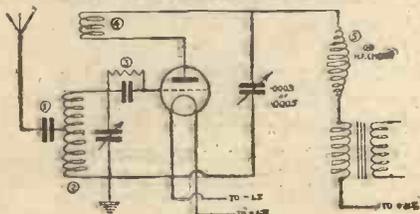
Manufacturers of Wireless and Scientific Apparatus  
**WEXHAM ROAD, SLOUGH, BUCKS**

Telegram  
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Irish Agents: B.N.E. Wireless, Ltd., DUBLIN AND BELFAST.

*Try this*

**REACTION CIRCUIT**

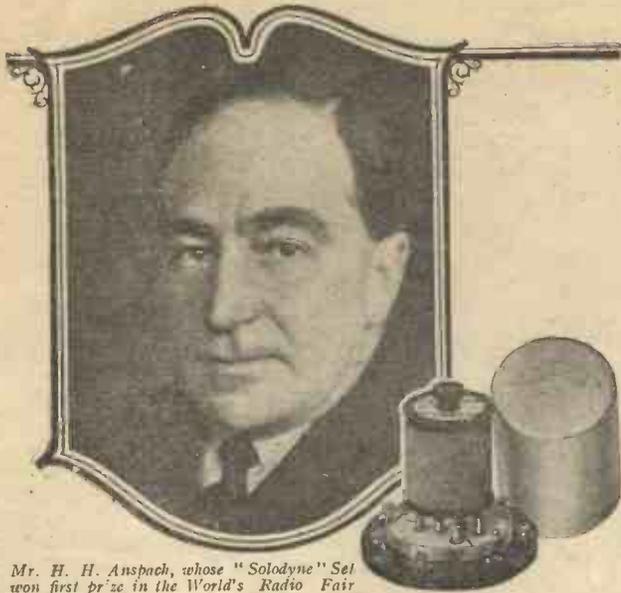


With reaction condenser set at about 90 degrees, adjust the reaction coil so that the set is just off oscillation point. Leave the coil in this position, and thereafter control reaction by the condenser.

1. **MH** .0003 Condenser.
2. **MH** Dimic Coil No. 1.
3. **MH** Grid Leak and Condenser.
4. **MH** Unimic Coil No. 50.
5. **MH** H.F. Choke.



# America appreciates Lewcos Screened Coils



Mr. H. H. Anspach, whose "Solodyne" Set won first prize in the World's Radio Fair (Chicago Section).

Mr. Anspach, winner of the first prize in the New York World's Radio Fair (Chicago Section), writes:—

Dear Sirs,—

May I offer you a word of congratulation on the wonderful coils produced by you which must have certainly helped in obtaining for me first prize at the Chicago Exhibition for my "Solodyne."

I sincerely hope your sales will be very good, and wishing you every success, which you thoroughly deserve.

Yours very truly,

(Signed) H. H. ANSPACH.

P.S.—I hope you will not hesitate to make what use you like of this.

Comparative tests prove that LEWCOS Screened Coils and Transformers have a lower H.F. Resistance within their screens than any other coil on the market.

Use LEWCOS Screened Coils in your set. Obtainable from all wireless dealers. Full particulars and prices sent on request to

The  
LONDON ELECTRIC WIRE  
COMPANY & SMITHS, LTD.

Playhouse Yard, Golden Lane, London, E.C.1

# LEWCOS

Screened Coils

# The Duvarileak



## Perfection in Variable Grid Leaks!

Fit your receiver with a Duvarileak Variable Grid Leak.

It enables you to increase the selectivity and the purity of your reception by applying to the grid the exact resistance demanded by your particular detector valve.

The Duvarileak eliminates all the failings often associated with variable grid leaks in the past.

The resistance material, which it has taken us years to evolve, has a hard surface. It retains its resistance value indefinitely, and the rolling ball contact (see inset) reduces wear to a negligible quantity. The result is that the Duvarileak remains variable and gives a constant value for any given setting of the dial. It carries the Dubilier Guarantee to give complete satisfaction, and is obtainable of all Dealers, Price 7/6.

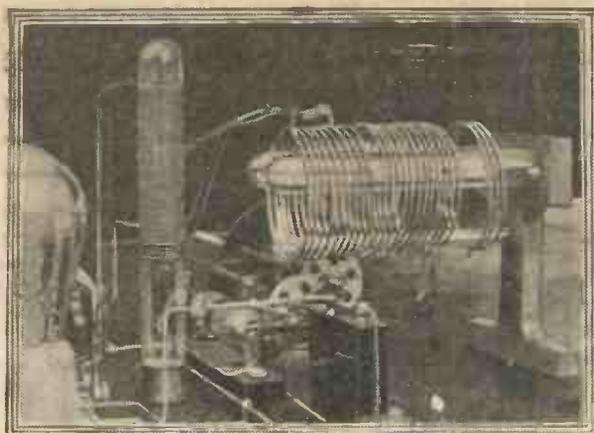
The Duvalcon for Loud Speaker volume control is the same in appearance and price as the Duvarileak. Suitable for use with any Loud Speaker.

May we send you our new Catalogue in which these and all other Dubilier Products are fully described?

Price 7/6 each



ADVT. OF THE DUBILIER CONDENSER CO. (1925) LTD.  
DUCON WORKS, VICTORIA ROAD, N. ACTON, W.3  
TELEPHONE: CHISWICK 2241-2-3. M.C. 249



# A MODERN SHORT WAVE RECEIVER



**SPECIAL** 10-metre receiver designed by the writer was described in "P.W." over twelve months ago. Since then, many inquiries have been

received from readers asking for details of such a receiver, and so many advances have taken place in design, that it has been considered necessary to write a fresh article dealing with the later developments.

As this receiver is designed primarily for amateur use, simplicity of control and ability for quick search are of first importance, and this end is most readily attained by using a receiver of two valves (one detector and low frequency) with a fixed reaction coil, the regeneration being controlled solely by the feed back reaction condenser. Any form of moving reaction coil is to be condemned in a short wave receiver as it renders calibration impossible, and tends to give regeneration in bursts.

### An Ideal Control

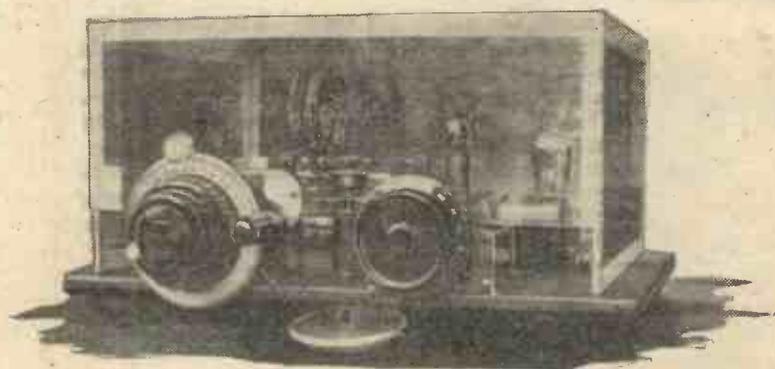
The throttle form of control is free from these defects, and in a well adjusted circuit gives beautifully smooth regeneration, with the ability to hold the detector valve on the threshold of oscillation, a point of great importance where maximum

A practical article by Britain's most famous short-wave amateur.

**By E. J. SIMMONDS, M.I.R.E.**  
(Owner operator of 20D).

sensitivity for the reception of telephony is desired. In order to receive CW stations to best advantage, the circuit should be one which gives a practically constant oscillation point throughout the entire

writer which combines this desirable characteristic with ability for quiet search, and ease of manipulation. The successful operation of such a receiver depends largely upon the initial layout of the apparatus, the electrical efficiency of the various components, and the type of valves used in the detector and L.F. stage. The layout arrangement favoured by the writer is clearly



The complete Short-wave Receiver. In front of the vernier dial is a magnifying-glass, necessary for fine tuning on the higher frequencies.

tuning range, and any change from the oscillating to non-oscillating condition should be gradual and under perfect control. The circuit indicated in Fig. 1 is the only arrangement known to the

shown in the plan photograph, and is the result of much thought as to the most desirable grouping, to cut down as far as possible capacity loss, and avoid any "feed back" which is likely to oppose the normal

## COMPONENTS REQUIRED

- One baseboard, 12 in. by 16 in.
- One .0002 variable condenser.
- One .0005 variable condenser.
- One "Accuratune," or other suitable vernier dial (80 to 1) for secondary condenser.
- One valve holder for L.F. valve.
- One .0002 fixed condenser and 4 megohm grid leak.
- One rheostat, 6 ohm.
- Four terminals, large, for terminal strip at rear.
- About one ounce of 32 D.S.C. wire, for choke.

- Half pound of 18 tinned copper wire, G.B. plugs, etc.
- One L.F. transformer of special type (see text).
- One .0005 fixed condenser.
- One 0.5 Mansbridge paper condenser.
- One glass rod, 6 in. long by 3/8 in. dia. for coil mandrel.
- Four small terminals with through hole to fix on glass rod to hold coils.
- One convex lens for magnifier on vernier dial.
- One neodyne condenser.
- One test tube, for R.F. choke.

A MODERN SHORT-WAVE RECEIVER—(Continued)

feed back arrangements, controlled by the reaction condenser. A careful study of the various photographs and figures will give a good idea of the relative position of the components, and it will be seen that no panel has been used. Instead, all the components are mounted on a wooden baseboard, 12 in. by 16 in., which may be finished by varnishing or french polishing, according to the skill of the builder.

Winding the Coils

Attention is particularly directed to the glass mandrel used to rigidly support the inductances (diagram on succeeding page).

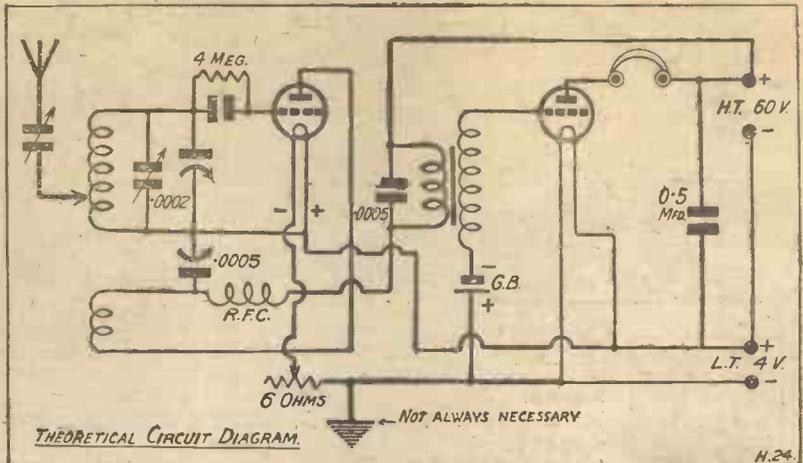
This consists of a stout glass tube or rod, 6 in. by  $\frac{3}{8}$  in., supported by a wooden end bracket. The glass tube carries four brass clips with small terminals with a through hole and clamping screw, for firmly gripping the ends of the inductances.

The construction of these clips will be clearly seen in the other diagram and this arrangement has many points of merit, viz. :—

The coils may be quickly changed. The contact to them is quite positive, avoiding noises in the receiver.

The coils are held with great rigidity, which avoids any frequency changes.

The electrical losses are practically negligible, as the solid di-



electric in the coil field is reduced to the minimum.

To give the receiver a range from 8 to 70 metres, six inductance coils will be required of No. 18 gauge tinned copper wire and consisting of 3, 4, 5, 6, 8 and 12 turns. The diameter of the coils should be 3 ins., and they should be constructed as follows :—

Procure a cardboard tube of the dimensions of the finished coils.

This cardboard tube is then split into three equal longitudinal sections. Now reassemble the tube sections, uniting the cuts with paper or adhesive tape. From thin

sheet celluloid cut four strips  $\frac{1}{4}$  in. wide, and place two of them diametrically on the outside of the cardboard tube. The wire should now be wound over these strips, spacing the turns by winding string between each turn.

The spacing between wire turns should be one diameter. Wind on sufficient number of turns to make the complete set of coils, and also allow sufficient to make the necessary connections to the terminals of the coil holder; 48 turns will be ample for this purpose.

Efficient Inductances

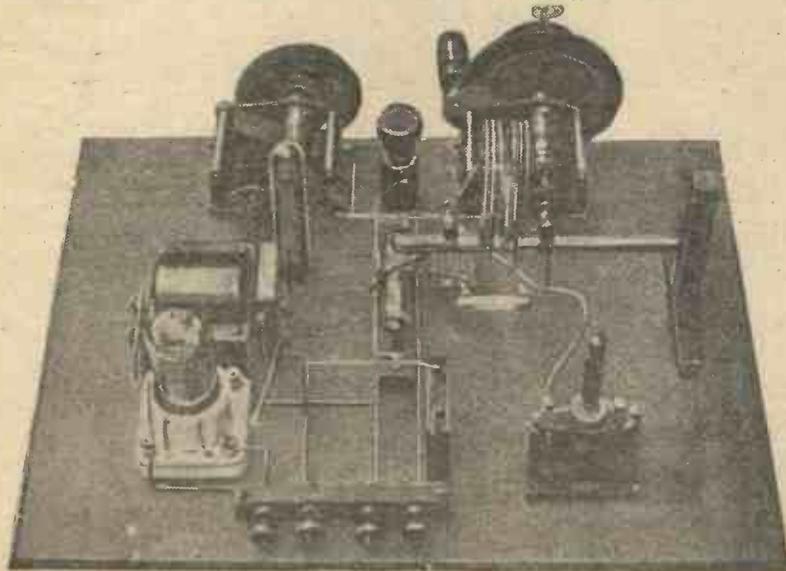
When the winding has been completed, the end of the wire should be firmly secured, and the spacing string removed.

Thick celluloid cement should now be painted along the celluloid strips on the cardboard former, and the remaining two strips fixed over the existing ones and securely bound in place.

The whole coil should now be allowed to thoroughly dry, and when this process is completed, the cardboard former can be removed by cutting away the adhesive tape and removing the cardboard sections. The large coil can then be carefully cut up into the necessary number of small coils detailed above. Inductances constructed on these lines have a very high efficiency and are also mechanically robust.

The Variable Condensers

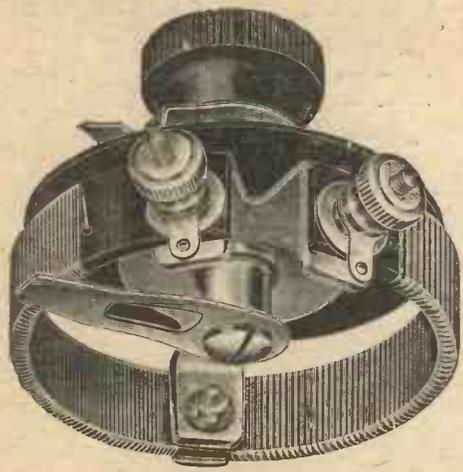
The variable condensers should be of the straight line tuning type with insulated fixed plates, and flexible pigtail connection to the moving plates. Condensers which



The lay-out of the set will be seen from this photograph, which clearly shows the method of supporting the coils upon the glass coilholder.

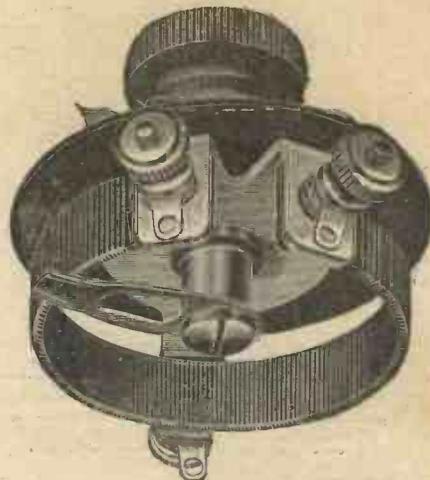
# EASY MOUNTING~SMOOTH WORKING

## Ormond Filament Rheostats



Dual Rheostat.

ORMOND would not trouble your attention with a component unless they could make it better than others on the market. Here, for instance, are rheostats and a potentiometer in which, if you examine them at your dealer's, you will notice several real improvements. The two main results are silent, silky-smooth movement and a rigid, reliable contact.

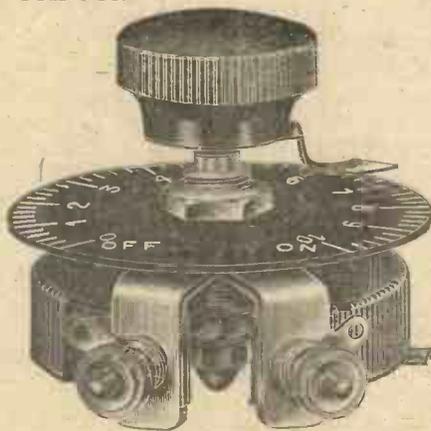


Potentiometer.

These rheostats and potentiometer are of the open type. The resistance wire is wound on an insulating former, supported on a metal frame, well ventilated.

The movement of the contact arm is smooth and silent, giving a firm, sure electrical contact.

The Dual Rheostat is wound in two sections with different gauged wire continuously variable from maximum to zero. It may be used for Bright or Dull Emitter valves.



No. 5 Rheostat.

The 6 ohm and Dual Rheostats may be used as Master Rheostats; they will control three bright emitters without undue heating.

### "ONE HOLE" FIXING.

For Baseboard mounting an additional bracket is supplied. Complete with Knob, Pointer, and suitably engraved dial.

#### PRICES:—

- No. 5 Rheostat, 6-15-30 ohms 2/-
- Dual Rheostat, 5-30 ohms ... 2/6
- Potentiometer, 400 ohms ... 2/6



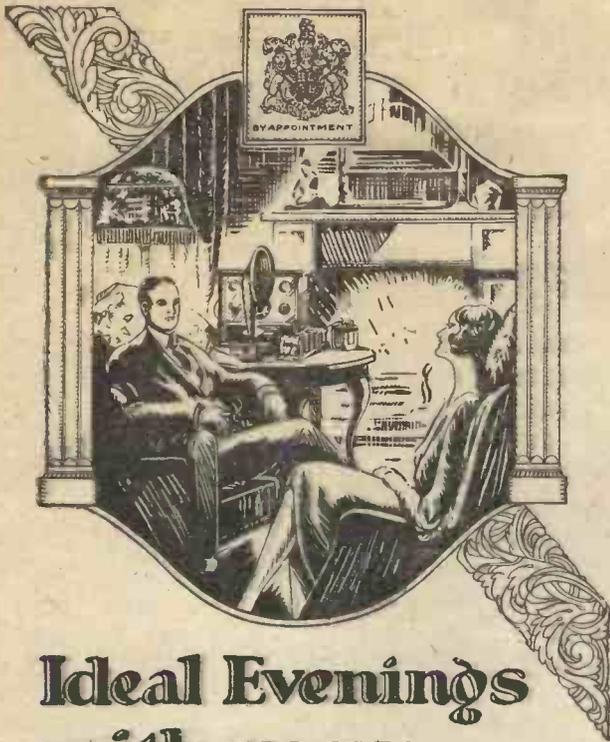
**199-205, PENTONVILLE ROAD, KING'S CROSS, LONDON, N.1.**

Telephone: CLERKENWELL 9344-5-6.

Telegrams: "ORMONDENGI, KINCROSS."

**Factories: WHISKIN STREET AND HARDWICK STREET, CLERKENWELL, E.C.1.**

Continental Agents: Messrs. PETTIGREW & MERRIMAN, LTD., "Phonos House," 2 & 4, Bucknall Street, New Oxford Street, W.C.1



## Ideal Evenings with your Wireless Set

**F**OR real wireless enjoyment—purity of reproduction, freedom from distortion and ample volume of tone are, of course, essential.

Use "HART" BATTERIES with your set for both Low and High Tension supply and "wireless" will reveal new charms to you; their steady voltage, low resistance and exceptional reserve of power ensuring reception at its best.

Discard your dry batteries to-day and substitute the "HART" "RAY" type of High Tension Accumulator (20 volts 14 8, 30 volts 22/-, carriage paid). The marked improvement in reception will certainly surprise you.

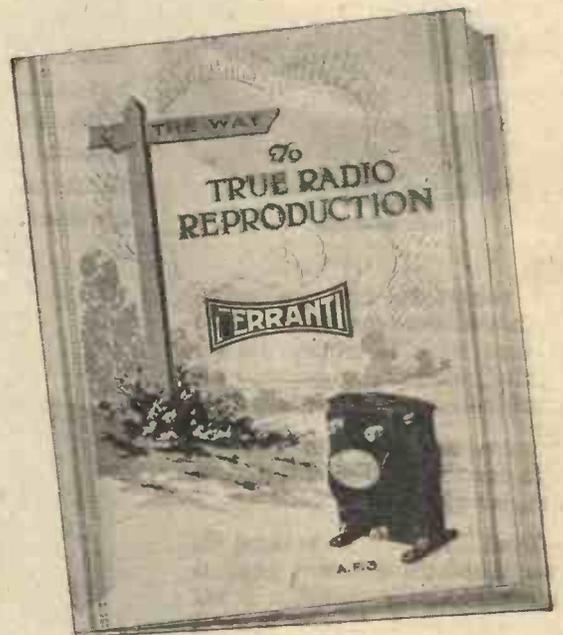
# HART

**THE BATTERY OF QUALITY**

*There are "HART" Batteries for all Low and High Tension Circuits. Write to Dept. "W.C.5" to-day for illustrated lists and FREE Booklet "The Right Way to Use Your Wireless Batteries."*

**HART ACCUMULATOR CO., LTD.,**  
STRATFORD LONDON, E.15

This  
valuable Booklet  
is obtainable  
from your Dealer  
for a  
Nominal Sum



**T**HE contents include hints on the construction and operation of wireless sets, notes on valves with a comprehensive list of valves recommended for each stage, and diagrams of connections for eleven different circuits.

# FERRANTI

LTD.

**HOLLINWOOD, LANCASHIRE.**

FERRANTI ELECTRIC, LIMITED,  
Toronto,  
Canada.

FERRANTI, INCORPORATED,  
140, W. 42nd Street,  
New York.

# A MODERN SHORT-WAVE RECEIVER—(Continued)

rely on the electrical connections to the moving vanes passing through bearings are very liable to cause annoying scratching noises when used in short wave receivers. The secondary condenser is fitted with an "Accratune" vernier dial, having a ratio of 80 to 1, and this is of great assistance in opening out the tuning scale.

## The "Beat Note Control"

To facilitate the reading of the fine divisions on the vernier dial scale, a magnifier is fitted in front of the pointer. This is an ordinary convex lens, such as used in ordinary magnifying-glasses, and in practice this addition will be found a great advantage and well worth the small additional cost. A simple device,

called a "beat note control," has also been fitted to the secondary condenser.

This consists of a small semi-circular aluminium vane with short-bearing and insulated handle, arranged to rotate close to the fixed plates of the condenser. It is most important to remember that the frequency bands included in a single dial division are sufficient to accommodate as many as ten stations, and while fine tuning and searching may be secured by the vernier dial and magnifier, many stations may be missed unless the "beat note control" is also added.

This device allows the operator to separate stations which differ by only a fraction of a kilocycle in frequency, and by this means it is possible to follow and hold the

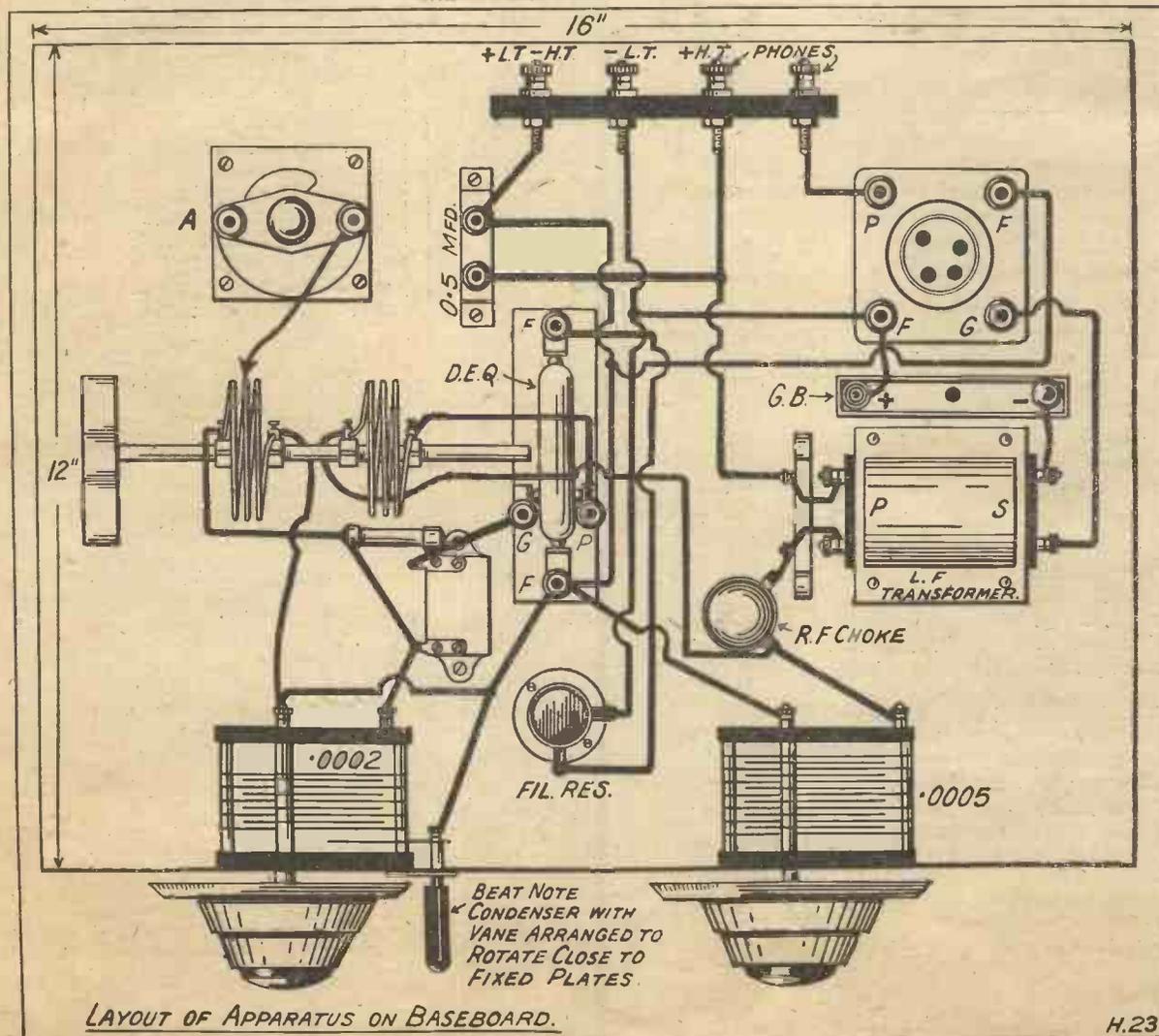
signal from a station which is swinging or changing in frequency.

## The H.F. Choke

The H.F. choke is wound on a glass test-tube, which is mounted upon the baseboard by means of a cork fixed in the mouth of the test-tube, and screwed to the board.

The winding is carried out with 32 gauge D.S.C. wire of which 100 turns are wound on the tube simultaneously with thread of about the same diameter as the wire.

When the 100 turns have been completed, the ends of the wire are made fast either by binding with small pieces of Empire cloth or the slight application of shellac varnish. The whole of the choke is, however, left free of varnish.



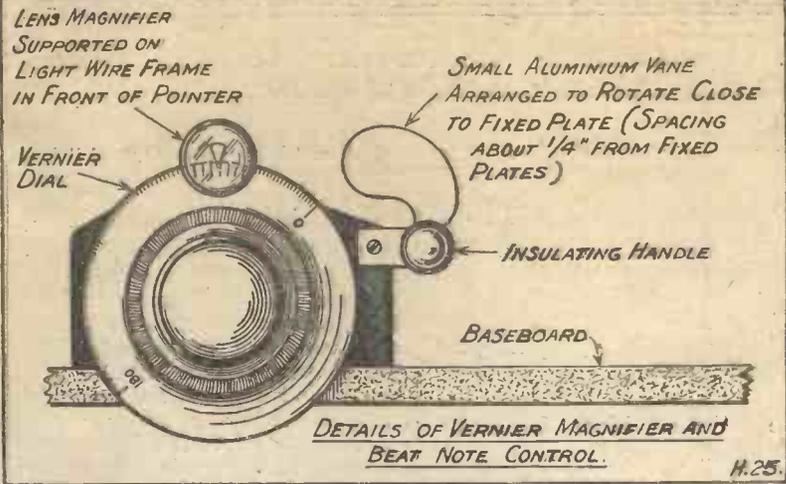
**A MODERN SHORT-WAVE RECEIVER—(Concluded)**

A D.E.Q. valve is used for the detector, and this is mounted by its filament contacts only upon an ebonite strip just behind the rheostat. The other two connections, namely, for plate and grid, are made by pieces of flex soldered to small brass clips, which can be fashioned from springy brass.

The grid leak has a value of 4 megohms, and care should be taken to select a type of leak which is perfectly silent in operation. Many grid leaks are quite unsuitable for use in a short wave receiver, and even if fairly silent at first, quickly become erratic and noisy.

**An Increase in Selectivity**

As this receiver will mainly be used for the reception of CW signals, it will be a great advantage



the characteristics of the receiving aerial.

**Point to Point Connections**

One side of the series aerial condenser is connected by a clip to a point on the grid coil.

One end of the grid coil goes to

denser, to the .5 mfd. fixed condenser, and to the +LT and HT—terminal.

The L.T. negative terminal is connected to the remaining filament socket of the second valve holder, to the G.B. plus lead, and to the filament resistance.

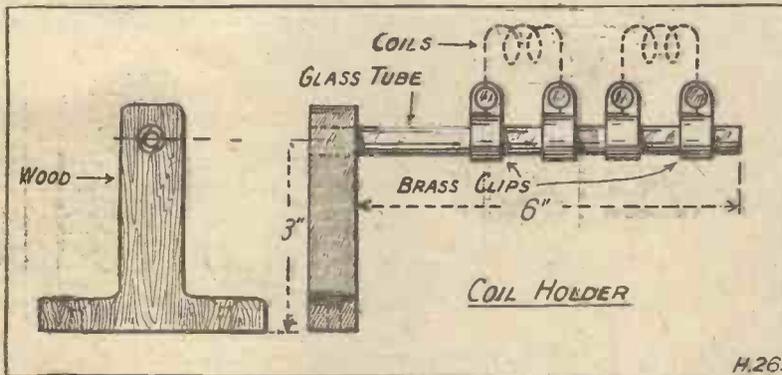
The remaining side of the filament resistance goes to the remaining filament terminal of first valve holder.

The grid terminal of the first valve holder is joined to the remaining sides of the gridleak and condenser.

The plate terminal of the first valve holder is connected to the reaction coil, the remaining side of which is joined to the RF choke and to the fixed vanes of the .0005 variable condenser.

The remaining side of the RF choke is joined to the LF transformer primary, and to its fixed condenser. The remaining sides of these are connected to the HT+ and 'phone terminal, and to the remaining side of the .5 fixed condenser.

The ends of the secondary of the LF transformer are joined to GB neg. and to grid of the second valve, respectively. The plate terminal is connected to the remaining 'phone terminal. This completes the wiring.

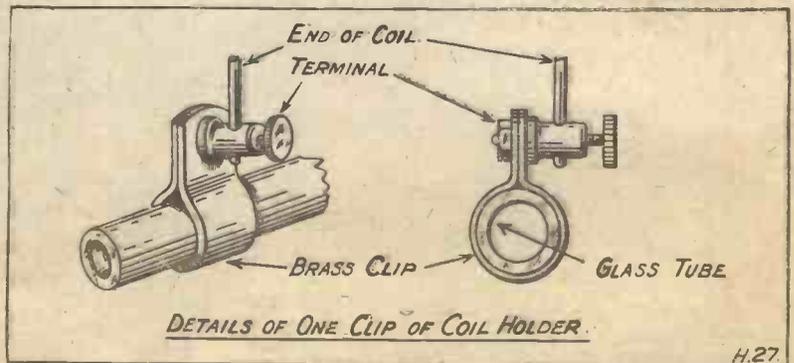


to use a L.F. transformer with an amplification peak between 800 and 1,000 cycles. Used in conjunction with reed type telephones, which are also resonant to 960 cycles, the pitch of the CW note can be arranged to fall within this band, and will then be amplified to a much greater extent than frequencies outside the selected band. This will materially add to the selectivity of the receiver, and enable differentiation between beat notes of different frequencies by audio tuning effect. A L.F. transformer of this type has just been produced by Messrs. McMichael, Ltd.

The aerial is direct coupled to the secondary coil by clipping the lead from the aerial condenser one or two turns from the filament end of the secondary coil.

It is a matter for experiment to find out the correct position for the clip, and will depend entirely upon

the grid leak, to the grid condenser, and to the fixed vanes of .0002 variable condenser. Remaining side of the grid coil is connected to the moving vanes of the .0002 condenser, to the beat note condenser, to one filament terminal of each valve-holder, to the moving vanes of the .0005 variable con-







## H.T. Supply from the Mains

Send for this Booklet and learn all about it.

**H**IGH Tension supply is a question which has troubled most valve users. Constant renewals are costly. Frequent trouble is almost inseparable from the old way of H.T. supply. What is wanted is a means of obtaining an even, continuous supply—completely absent from all crackling and extraneous noises. There is a solution to this problem. It lies in current from the mains by means of a Battery Eliminator.

Anyone who has electric light should send for a little booklet upon this subject which we have prepared. It is called "How to build your own High Tension Eliminator for A.C. or D.C." and is written by Mr. Percy W. Harris, M.I.R.E., Editor of the "Wireless Constructor."

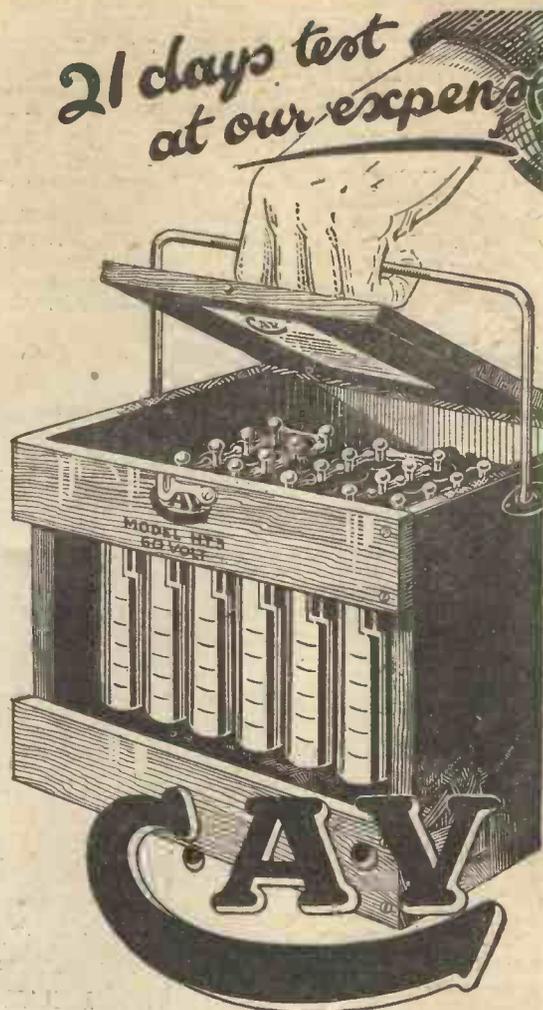
The whole question of H.T. supply from the mains is thoroughly dealt with in its twenty pages. By following the simple instructions and clear, easy-to-follow diagrams anyone can build a Battery Eliminator. Moreover, you know you are safe. No risk of using Condensers which will not stand up to the required pressure. T.C.C. 600 volt Condensers are used because they are reliable and safe. Fill in the coupon and post (with three penny stamps) to-night in order to secure your copy.

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# T.C.C. Condensers

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## 1927 IMPROVED MODEL H.T. ACCUMULATOR

**T**O prove our absolute confidence in these accumulators, we guarantee, if you are not satisfied, to accept return within 21 days from purchase date, and refund money in full provided battery is returned intact to the Agent from whom it was purchased.

C.A.V. H.T. Accumulators represent an epoch-making advance as compared with dry batteries. When dry batteries are down they are done, and frequent renewals make them more expensive. C.A.V. H.T. Accumulators will last for years, and only need recharging approximately every four months. They give bigger volume and are silent in operation.

Every Accumulator is supplied fully charged ready for use, absolutely complete in case, and with distilled water filler, all included in the price, viz.:

60 Volts **60/-**

Size 8½ ins. by 7 ins. by 7¾ ins. high.  
Catalogue supplied on application.

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Telegrams:  
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# My Broadcasting Diary

*Under this heading month by month our Broadcasting Correspondent will record the news of the progress of the British Broadcasting Corporation, and will comment on the policies in force at B.B.C. headquarters.*

## Governors' Influence Delayed

MUCH ingenuity and imagination have been wasted in trying to discern the influence of the new Governors on the programmes. Any change whatever is being ascribed to the new policy inaugurated by the Corporation. The fact is, of course, that the Governors have done nothing whatever to influence programmes so far. They were quite satisfied with the developments in hand, and showed considerable wisdom in letting well alone. Anyway, the programmes for January and February were practically fixed before the middle of December. And by now the arrangements up to the end of April are outlined. New ideas from the Governors, if any, will begin to appear in May.

## Redistribution

The experiments at Daventry with high-power on low wave lengths are still progressing. Until there is a report of these experiments nothing can be done with the new scheme of regional high-power stations. But the report is due shortly, and it is hoped that at least one of the new stations will be ready to work in the autumn. Meanwhile there is growing anxiety about the new German high-power stations, and the increase in their use throughout these islands. It should be remembered, however, that whereas the Germans are first in the ether with high-powered broadcasting, we shall have the benefit of their preliminary experience. They have simply added to their power without introducing compensating refinements such as the best quality reception requires. The B.B.C. engineers are determined to ensure uniformly good quality reception under the new system of distribution.

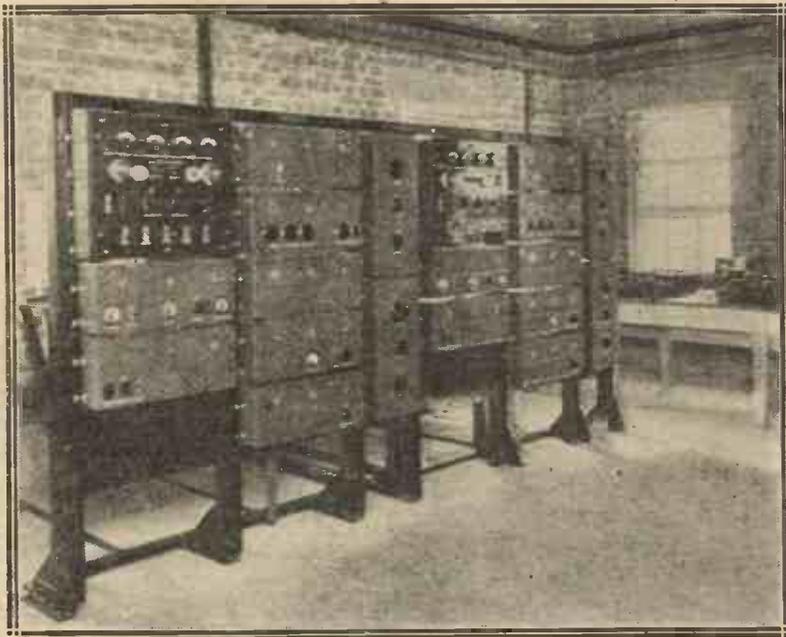
Another point the alarmists have ignored is that British listeners do

not care for the average German programme. If there is too much talk in the B.B.C. programmes there is nearly twice as much in proportion in the German programmes. Moreover, the German talks are on the average three times as long. Nevertheless while there is no cause for alarm, there is also every reason for expediting the new arrangements in Britain. Apart entirely from the obvious considera-

pooling of licence revenue. Their particular object is to get something out of the listeners in France and England who make a practice of taking German programmes. I cannot see the British Parliament allowing any of the receiving licence-money to pass into the hands of our late enemies.

## Payment for Preachers

Now that the novelty of micro-



The receiving panels at the Bridgwater Beam station, which works simultaneously with both South Africa and Canada.

tions of national prestige, it is undesirable that any section of British listeners should get into the habit of depending more on foreign programmes than on their own. Incidentally, it is stated at Geneva that the Germans propose to ask the Broadcasting Union to take up the matter of the international

phone preaching has worn off, there is a growing demand for financial recognition. Hitherto, at the instance of the religious advisory committees themselves, there have been no fees for the ministers and clergy taking part in the broadcast services. But there is now a considerable tightening

MY BROADCASTING DIARY—(Concluded)

up in the standard of selection, with a consequent narrowing of the number of preachers eligible for the microphone. It is felt that they should be regarded as artistes for the purpose of payment. This would seem a reasonable demand, and if accepted should serve to give better results on Sundays.

The best and most practical sermons are immensely popular, and are regarded as attractive

to the introduction of the high-power regional scheme has affected Bournemouth, Newcastle and Aberdeen, and Stoke-on-Trent. The fully organised orchestras at these stations have given way to smaller and more compact organisations, such as octettes, leaving the orchestral work to be relayed from London.

The change over has worked successfully, and there is no

time-signal, at 10 p.m. Ultimately, of course, this over-keen localism will be borne down by the hard logic of improved results. Birmingham's fate is not absolutely determined, but a reprieve has been granted for the present, anyway.

The original idea, I understand, was to reduce Birmingham's establishment in the same way as Bournemouth, Aberdeen and Newcastle. It was thought that the strengthening of Daventry under the new system of distribution would more than compensate the Midlands for this change.

But the view now prevailing at Savoy Hill is that it would be wiser to keep Birmingham up to establishment even if it had to contribute one of the new Daventry programmes. Thus the Midlands are assured of the permanence of a programme reflecting their particular ideas.

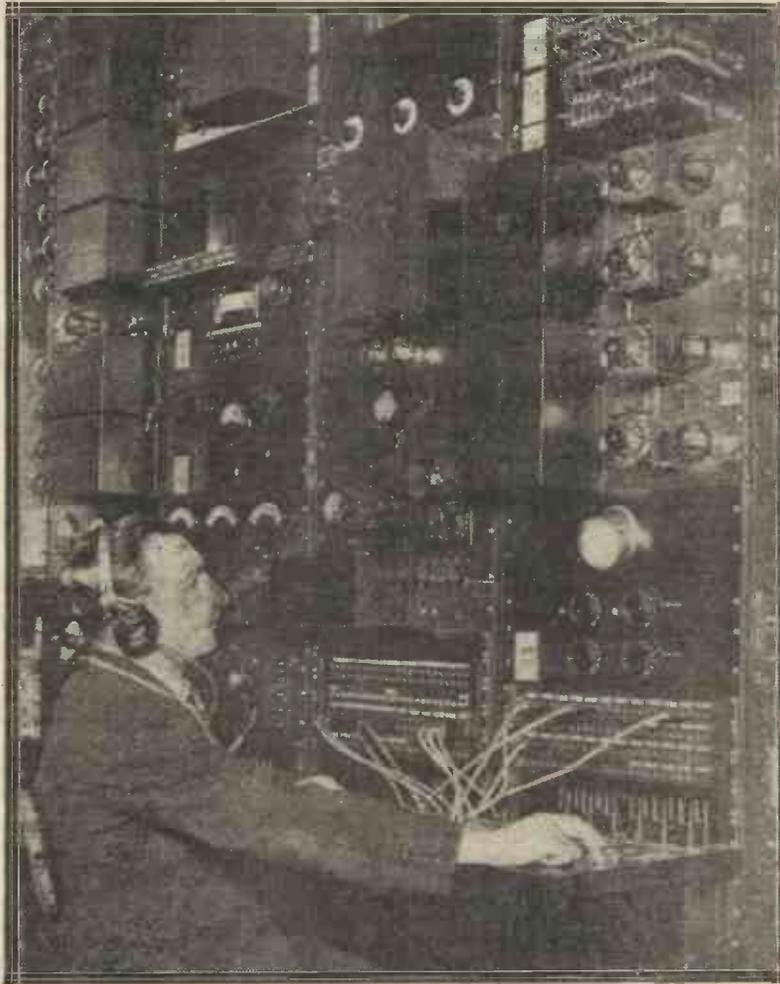
**The Children's Hour Crisis**

The Children's Hour, like every other broadcast feature, is subject to the law of change and growth. The old B.B.C. quite rightly were planning to develop it in the New Year. Their ideas were not too happily applied, with the result that there has been a big agitation and a slight reversal of policy at Savoy Hill.

Most listeners, young and old, are agreed that there was too much amateurish nonsense in the old Children's Hour. There was need for the introduction of professional entertainment. This did not mean, however, that the intimate spirit of the hour need be sacrificed.

The B.B.C. made the mistake of improving the entertainment value of the hour and formalising it at the same time. It was a mistake to drop "Aunt" and "Uncle," and replace them by "Mr." and "Mrs." But they were quick to recognise the mistake, and there is already a happy reversion to something of the old atmosphere of cheeriness and intimacy in the appropriate part of the Children's Hour.

It is to be hoped that the new B.B.C. will continue to show such readiness to recognise mistakes and to discriminate between genuine and artificial public agitations. Their firm attitude over the Glasgow bother about the time-signal was as highly to be commended.



The amplifying and control apparatus at the London Trunk Exchange, used for transatlantic wireless telephone service.

entertainment. The coming of Canon McCormick to St. Martin-in-the-Fields has added another D.S.O. cleric to those closely associated with the B.B.C. Another is the Rev. H. W. Fox, who is the official sermon critic.

**Station Reorganisation**

The development of the new policy of concentration preparatory

doubt that, on the average, listeners in all the areas concerned are now getting much better programmes. Manchester and Glasgow are watching these changes with growing anxiety; the former because of the keen local desire to maintain Lancashire programmes, and the latter a little uneasy about the possible results of the recent violent campaign on the Greenwich

# Let's Look the Facts in the Face.

We don't believe you or anyone else swallows half of what they read in any advertisements. S.T.'s say their valves give the best performance. Don't believe such a statement—without investigation, anyway. They'd probably say the same if they had a rotten valve. Is that libellous? Well, I'm only going by the fact that all valve manufacturers say their own valves are much better than others, and you know perfectly well that some valves are much worse than others. Well, to be fair to S.T.'s, let's see what responsible and independent people say about them in print or in letters.

## Is the S.T. a good valve?

1. "A remarkably good one."—*Wireless World*.

2. "Cannot fail to command admiration . . . an outstanding range. . . . Through all three voltages, S.T.'s will operate with excellent results. . . . We have no hesitation in recommending S.T. valves to our readers."—*Popular Wireless*.

3. "We looked for something really good and were not disappointed, as every valve in the series came up to the maker's claims. The quality and volume are as near perfection as one could imagine."—*Manchester Evening Chronicle*.

4. "Find them very satisfactory indeed. . . . We shall have no hesitation whatever in recommending these valves. It is very satisfactory to us to know that such excellent components are available."—*Ferranti, Ltd.*

5. "Really better than is indicated by the rating."—*Wireless Trader*.

6. "They are of very high efficiency."—*The Broadcaster and Wireless Retailer*.

7. "Amongst the best we have tested. They gave great volume and exceptional purity of tone. Particularly efficient, and bring in the distant stations with surprising volume."—*Amateur Wireless*.

8. "We have tried it with excellent results. Gives remarkably good reproduction on strong signals."—*P. W. Harris in Wireless Constructor*.

## Are S.T. valves uniformly good?

1. A published statutory declaration made by John Scott-Taggart, F.Inst.P., A.M.I.E.E., before a commissioner of oaths (19th November, 1926), states that each valve is tested electrically on three occasions and once on actual broadcasting. Two of the electrical tests are the same, but are carried out by different test engineers, and each includes at least nine electrical measurements.

2. Anyone can inspect the testing work in progress at 2, Melbourne Place, London, W.C.2, and check any valves in stock against the standards.

3. The declaration states that every single valve has been thus tested, and after satisfying himself that it comes within the specification, John Scott-Taggart personally initials the certificate on every valve box.

4. "When using the H.F. valves in a superheterodyne it was noticed they were all perfectly matched, showing the extreme care the inspection department must have taken with the testing."—*H. E. Hassall, winner of the European Championship at the New York Exhibition*.

5. "As a further check, we visited S.T., Ltd., and ourselves picked specimens of the valves at random from stock. Again all were better than published characteristics."—*P. W. Harris in Wireless Constructor*.

6. "They are, judging by the several samples of each type we have tested, absolutely consistent."—*Popular Wireless*.

## Are the advertised characteristics of S.T.'s correct?

1. "Every S.T. has proved to be highly efficient and to have characteristics as stated in advertisements. The whole range was checked and found to be as stated."—*Popular Wireless*.

2. "Every valve in the series came up to the maker's claims."—*Manchester Evening Chronicle*

3. "The performance to be expected from the characteristic curves and technical data was obtained."—*Ferranti, Ltd.*

4. "The valve is really better than is indicated by the rating."—*Wireless Trader*.

5. "The individual specimens have shown themselves well up to published characteristics. In practically every case they have been distinctly superior."—*P. W. Harris in Wireless Constructor*.

## Are S.T.'s really built like the pyramids, to last?

1. The life of every S.T. is insured at Lloyd's. The S.T. is the only valve in 22 years the life of which has been considered sufficiently certain to warrant the issue of such a policy. This is due to the torodium filament and Barget vacuum.

2. No ravages of heat shorten the life of the S.T. filament—the coldest filament in the world. "No glow can be seen."—*Wireless World*.

3. If your S.T. valve should fail to give long and faithful service it will be instantly replaced by S.T., Ltd., without fuss or quibble. You can at any time send or bring your S.T. for a free "medical" report, if in any doubt.

4. A second statutory declaration has been made by John Scott-Taggart before a commissioner for oaths stating that the number of valves returned is negligible and that there has not been a single case where replacement has been refused.

## Are S.T.'s robust and non-microphonic?

1. "The valve is non-microphonic."—*Wireless Trader*.

2. "Herewith remains of an S.T. 41 valve. An accumulator was accidentally dropped

on it whilst it was laid on the beach. The glass you will notice was smashed to fragments, but the filament is still intact."—*J. Grimshaw*.

3. "Sound and robust."—*Wireless Constructor*.

4. "None of the S.T. valves are microphonic and all are robust in construction."—*Popular Wireless*.

## Are S.T.'s economical?

1. "They are economical."—*Popular Wireless*.

2. "Their main features are economy in both filament and anode current (the readings in each case being extremely low), a high standard of efficiency and they are inexpensive."—*J. H. E. Black, Silver Cup winner at the New York International Show*.

3. "In spite of the very low filament consumption the value of A.C. resistance for a given amplification factor is remarkably low."—*Wireless World*.

(This implies that less H.T. voltage is needed while maintaining high efficiency.)

## What do the leading amateurs think of S.T.'s?

1. "In the Elstree Six, I obtained with S.T.'s results considerably better than those given by other valves I had been using, and that is saying a great deal. I have tried them in several other sets, and I am delighted with the results. They give really high amplification and are exceptionally pure in reproduction."—*R. Waldo Emerson, winner of the World's Championship at the Amsterdam International Competition*.

2. "In every way most satisfactory. On a very old 3-valve set (on which very unsatisfactory signals were usual), the 2-volt, 4-volt and 6-volt types give extraordinarily good results. I can thoroughly recommend these valves for all receiving purposes, and I am highly satisfied with the results."—*J. H. E. Black, Silver Cup winner at the New York International Show*.

3. "I have recently given a set of your 2-volt and 6-volt valves an exhaustive test in various types of receivers, and I feel I must express my admiration at the results obtained by their use. Compared with valves of somewhat similar characteristics at present on the market they give better purity and volume. Amplification and the tone quality is extraordinary. An extremely efficient design, and I have pleasure in congratulating you on placing such a splendid series of valves on the market."—*H. E. Hassall, winner of the European Championship at the New York Show*.

4. "May I be one of many to congratulate you on your valves? I have now tried them out thoroughly and words fail me to express my admiration. I have used them in my Solodyne and I find the combination of S.T.'s is not to be equalled by any other valves made."—*H. H. Anspach, winner of the First Prize at the International Show at Chicago, U.S.A.*

# The Constructor's Favourite Magazine

EVERY reader of "Modern Wireless" should read our companion Sixpenny Magazine. Every month it describes the most modern sets, gives the latest radio developments, and helps the experimenter to solve his problems. "THE WIRELESS CONSTRUCTOR" is edited by

**PERCY W. HARRIS**  
M.I.R.E.

who has introduced some of the most outstanding sets ever designed. In next month's issue on sale February 15th, another great development will be introduced by Percy W. Harris to the radio world—

## "RADIANO"

—a new system which simplifies wiring, will be fully explained by means of full size drawings on an elaborate blue-print chart, which shows the necessary components in position. For the experimenter, "Radiano" will be a great boon, whilst for the occasional constructor it will abolish the chief bugbear of home set building—soldering.

*As the demand for this issue of "THE WIRELESS CONSTRUCTOR" will be unusually great, you should order your copy at once.*

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# The Wireless Constructor

MARCH Issue.

Price 6d.



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The "SELF-ADJUSTING" Rheostat  
Patented. Registered.

**REMEMBER**—The Amperite is the original and ONLY self-adjusting rheostat. Amperite is NOT a fixed resistance and is the ONLY automatic filament control giving perfect valve operation. Amperites simplify set wiring and are absolutely noiseless in use. Amperites double the life of valves and do away with all guess work.

There is an Amperite for all standard valves. Ask your dealer for full details or in case of difficulty write direct to:—

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Radio Corporation of Great Britain, Ltd  
24-26, Maddox Street, London, W.1.  
Telephone: Mayfair 578-9. Telegrams: "Rothermel, Wesdo, London."

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of uncertain High-Tension Batteries.

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**"B" BATTERY ELIMINATORS**  
and lead the way to Brighter Radio.

Models for A.C. and D.C. Current. Variable Voltages. Grid Bias. Full wave rectification.



Upkeep negligible  
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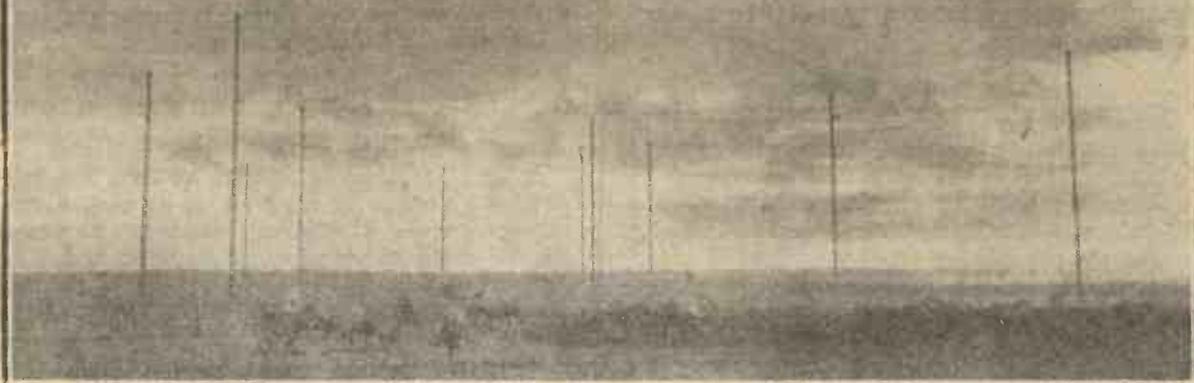
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GUARANTEE  
every instrument.

We make them good! Good judges make them famous!

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H. Clarke & Co (Mer) Ltd., "Atlas" Works, Old Trafford, Manchester

# OFF THE BEATEN TRACK



(From a Correspondent)

## *A brief survey of conditions upon wavelengths both above and below the usual broadcasting band*



OR the many enthusiasts who take delight in "ferreting round" with their receivers, simply for the sake of finding something they have not heard before, December and January were certainly two very interesting months. Last month,

you will remember, I confined myself chiefly to the short-wave side.

It has, I confess, been a very difficult matter to tear myself away from it this month; but after many brave struggles I unearthed my large coils, even unto No. 1500, and proceeded to take note of the happenings in the upper regions.

I wonder, by the way, how many there are who have one receiver which will transport them from 15 metres to 25,000 metres simply by means of interchangeable coils? Of course, the difficulty is this: if you use a tuning condenser of about .0002 capacity, which is quite large enough, if not rather too large, for short-wave work, you will find that when you get up to the wave-

length of a station like Leafield, on about 12,000 metres, that your condenser does little more than cause a slight variation in the pitch of his C.W. note! On the other hand, a .001 condenser, suitable for the longer waves, will make the set quite unmanageable on the lower bands.

### Two Variable Condensers

I myself surmounted this difficulty by using a .0002 condenser permanently across the A.T.I., and having a .001 condenser also mounted upon the panel so that it could be put in parallel with the smaller capacity by means of a switch. Thus on the longer wavelengths the .0002 condenser acts

almost as a vernier. Another method is to have two .0005 condensers arranged so that they may be used in series or parallel. This also is quite satisfactory:

Quite a large number of long-wave C.W. stations are now sending out regular time signals at various times of day. Some of them apparently relay FL's famous spark transmissions. Few of them are of any



Wavelength measurements at Daventry. The wave-meter is being used to check the tuned circuits in the 5XX transmitter.

---

**OFF THE BEATEN TRACK—(Concluded)**


---

use to the average amateur, however, since they mostly transmit the modern type of "rhythmic" or sidereal signals.

#### The Rugby Station

Rugby is a newcomer still, and it will probably take some time to become thoroughly accustomed to the new voice in the ether. He has, moreover, a disturbing habit of working on four or five different wavelengths, both singly and collectively, so that one never knows quite what is happening! He is usually to be heard on about 5,000 metres, and at almost equal strength somewhere near 10,000 metres, but which of these is a harmonic and which is his natural wavelength I really do not know!

Northolt and the Ongar stations are the other really powerful transmissions, as far as Londoners are concerned. There are now four transmitters at Ongar, working on, I believe, 2,300 metres, 2,900 metres, 3,800 metres and 5,700 metres. They have various disturbing harmonics, both on the broadcast wavelengths and in the neighbourhood of Radio-Paris and Hilversum.

#### Foreign Broadcasting

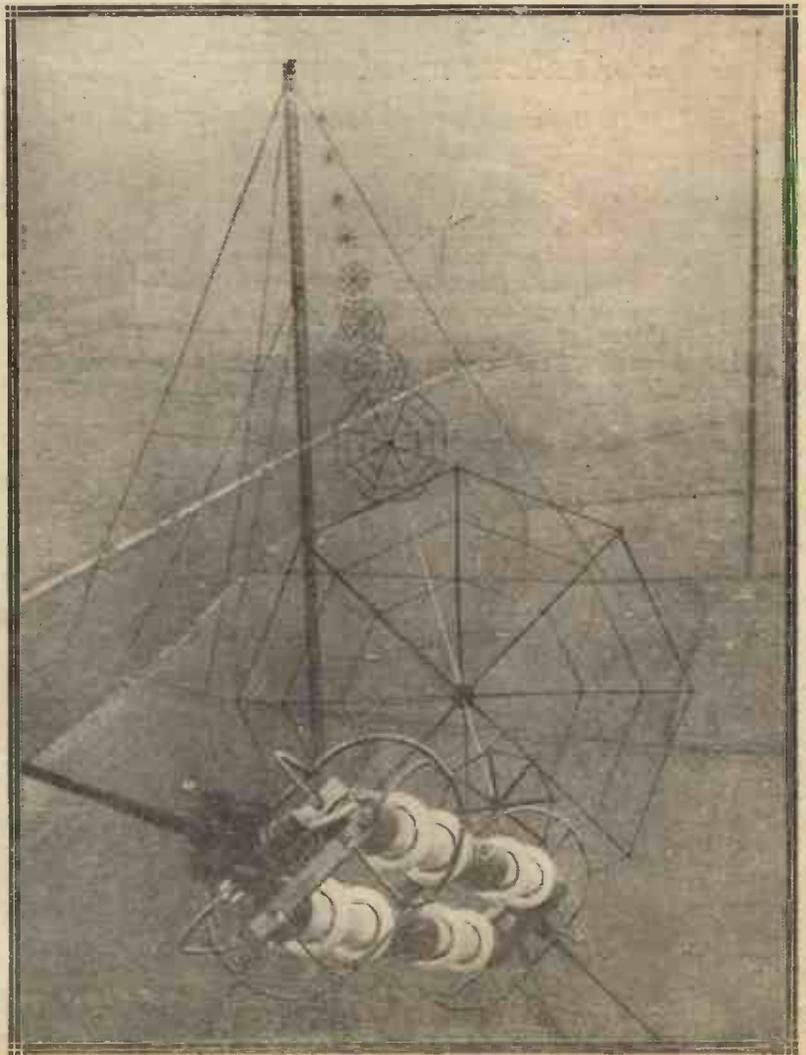
The latter two stations, by the way, have been coming in extraordinarily well throughout the winter. Radio-Paris, at my station, is as strong with a detector and two stages of L.F. as Daventry with a detector and one stage. His quality, unfortunately, leaves much to be desired on occasions. Probably it is his excessive modulation that makes him seem so strong. The Eiffel Tower transmission, however, is distinctly good, although the volume is probably not quite so great. As I write this a violin solo from FL is issuing from the loud-speaker, and the quality would certainly do credit to the B.B.C. All these long-wave transmissions seem to be at their best in winter. Incidentally, I wonder how much longer FL's spark transmissions will be continued, and whether they have any special value other than their "sentimental" value? It may be argued that these transmissions are especially useful for ships, many of which still carry only an out-of-date crystal

receiver, but surely a tonic train or interrupted C.W. transmission would serve the same purpose?

Our own Air Ministry station GFA is an expert at tonic train, and I think all will agree that his transmissions are past all comparison with spark.

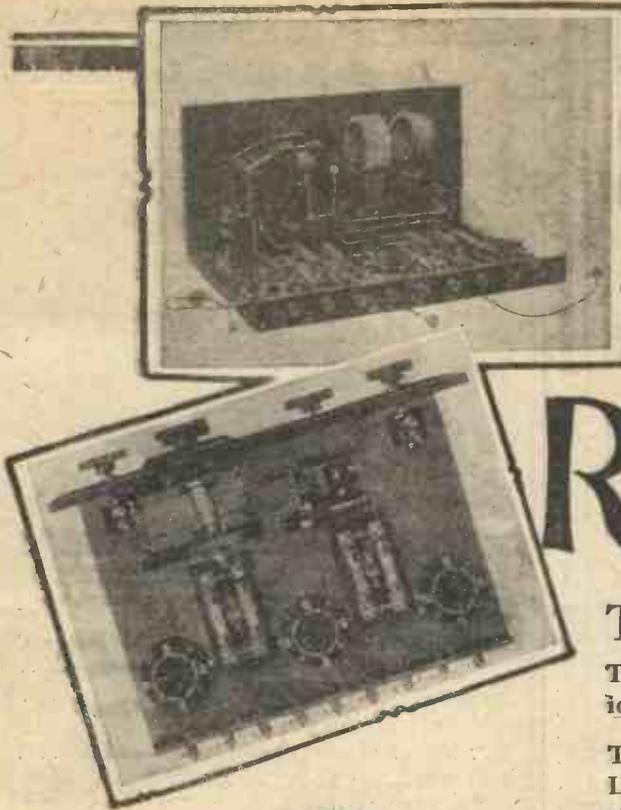
#### British 32-metre Band

A small number of British stations are now obtaining permits to transmit on 32 metres, and all report excellent results. Probably the reason for the excellent reception of Australia and New Zealand in this country is largely due to the fact that they use the 30-33 metre band very extensively. In fact, one rarely hears a signal coming from outside Europe except on waves well below 42 metres—our own select little gathering on 45 metres is quite unique!



Telephoning to New York.

This photograph, taken from an unusual view-point, shows the huge cable, insulators, and aerial employed at the P.O. Station at Rugby.



# Are you making the famous R.C. Threesome?

To get the wonderful results obtained with the original R.C. Threesome Set, you should use identical components.

The Coil Holder used is a "Lotus" Left-Hand Two-Way Coil Holder; the three Valve Holders are "Lotus" Buoyancy Valve Holders, with Terminals.

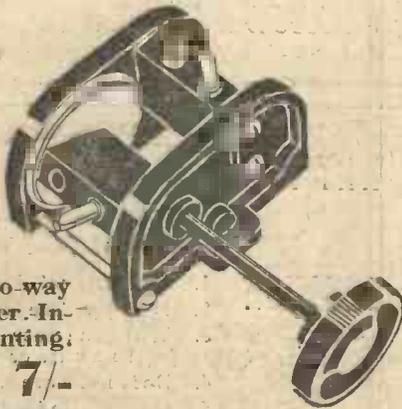
Wireless experts decided that these were best for a very important experiment; that they would get most out of the set on which depended the very high reputation of the famous Ediswan Valves.

They were not disappointed. YOU will be more than pleased with the R.C. Threesome's performance if you fit "Lotus" Valve Holders and Coil Holder.

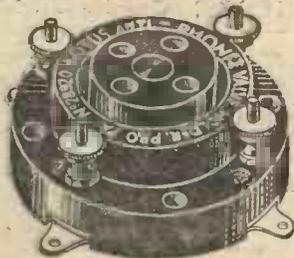
From all Radio Dealers

## LOTUS COMPONENTS

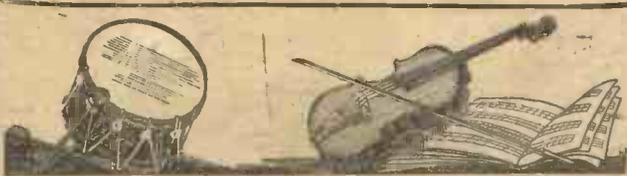
Lotus Two-way Coil Holder - Inside mounting; Left-hand. **7/-**  
Patent No. 244251.



Lotus Buoyancy Valve Holder with Terminals. **2/6**  
Patent No. 256833.



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The case is stamped from high-grade electrolytic copper, and is polished, buffed and lacquered.

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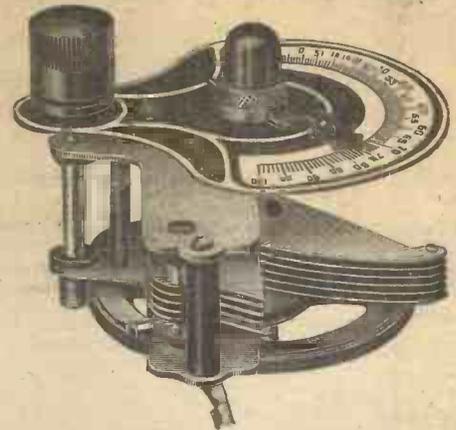
—in fact, by using a Powquip "Orchestral" Transformer, every instrument of the Orchestra is heard perfectly—every note distinguishable over a wide band of frequency. There is no suspicion of distortion, and music, song and speech are delivered on a background free from blurs. The "Orchestral" truly reproduces the very delicate waves to which other transformers are deaf, and is a really efficient instrument. The officially certified efficiency expressed as the coefficient of coupling between the primary and secondary windings is 0.978, i.e., within 2.2 per cent. of Absolute Efficiency. Can you equal these results with any other transformer?

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ORCHESTRAL  
TRANSFORMERS

THE POWER EQUIPMENT COMPANY, LIMITED,  
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'Phone: Colindale 6196-6197. 'Grams: "Powquip, Hyde, London."

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Perfectly designed and beautifully finished, Lamplugh Condensers are unequalled for efficiency and ease of tuning. Built of brass with ball and cone bearing shaft. Copper indicator scale. Lamplugh S.L.F. and S.L.T. Condensers possess a remarkably efficient Slow Motion device. It is absolutely noiseless in operation, has a positive drive and backlash is impossible.

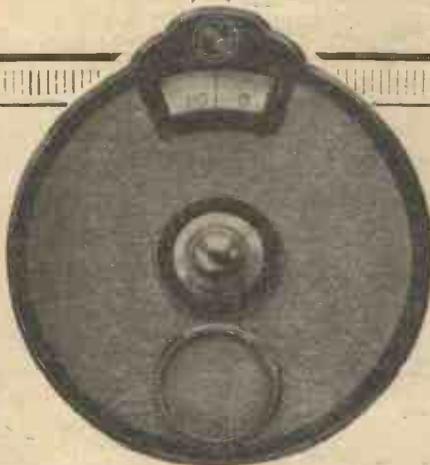
PRICES .0005 mfd. 17/- .0003 mfd. 16/- 10002 mfd. 15/6.  
Lamplugh .0005 mfd. Twin Gang S.L.T. Con-  
denser, complete with dial 33/6.  
Lamplugh .0005 mfd. Triple Gang S.L.T. Con-  
denser, complete with dial £2 10 0.

Particulars of Lamplugh Twin Gang and Triple Gang S.L.F. Condensers on application.

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### The 'Samson' Vernier Dial.

Ratio 10-1.  
Diam. 4 in. Fits any condenser with 1/2 in. spindle. Dial housing of Best Black Bakelite to harmonise with any panel. Hair-line indicator calibrated 100-0-100, enabling the dial

to be used on either clock or counter-clockwise condensers. Free from backlash. One hole only required in panel for fixing.

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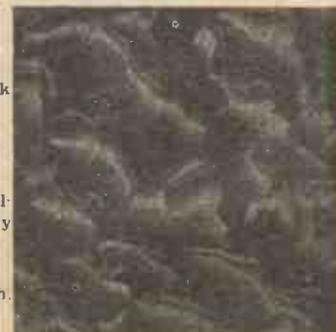
1. Its Electrical Properties are excellent.
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PRICES  
Polished Black  
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per square inch.



5 Finishes:

- Polished Black
- Polished Mahogany
- Polished Walnut
- Wavy Etched Black
- Cube design Etched

Illustration Wavy Design.

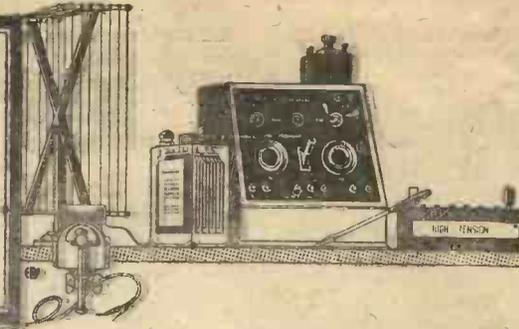
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## ADVICE FOR INVENTORS

A special section which should prove of the utmost interest to all experimenters. Conducted by  
**Dr. J. H. T. ROBERTS,**  
*F. Inst. P.*



THE Editor of MODERN WIRELESS has asked me to undertake to conduct a section in this journal to help inventors and experimenters, and following the announcement of this arrangement which was made in the last issue I have already received a large number of communications from interested and enthusiastic readers.

Most of these will, of course, be dealt with privately by post, whilst a number of representative problems and answers will be taken and dealt with each month for the interest of the general body of readers.

However, before dealing with these I think it would be better if I started with some observations on the subject of inventions and their development.

### The Inventive Brain

THERE are many hard things commonly said about inventors and, whilst in some ways these are frequently true, it has often seemed to me that a very little real guidance might mean all the difference between the proverbially unsuccessful and impecunious inventor and that very rare creature the financially successful patentee.

Perhaps the first and most fundamental characteristic of the average inventor is that he is not a business man and is therefore unable to appreciate the position of the party undertaking, or proposing to undertake, the commercial exploitation of his invention. The second characteristic of the inventor, and one which is perhaps almost equally fundamental, is that he is a dreamer, that is to say, he is definitely distinct from the practical man or the man of action.

### Inventor or Business Man?

IT is not surprising that the inventor should be a dreamer; in fact, it is natural and it would be surprising if he were not.

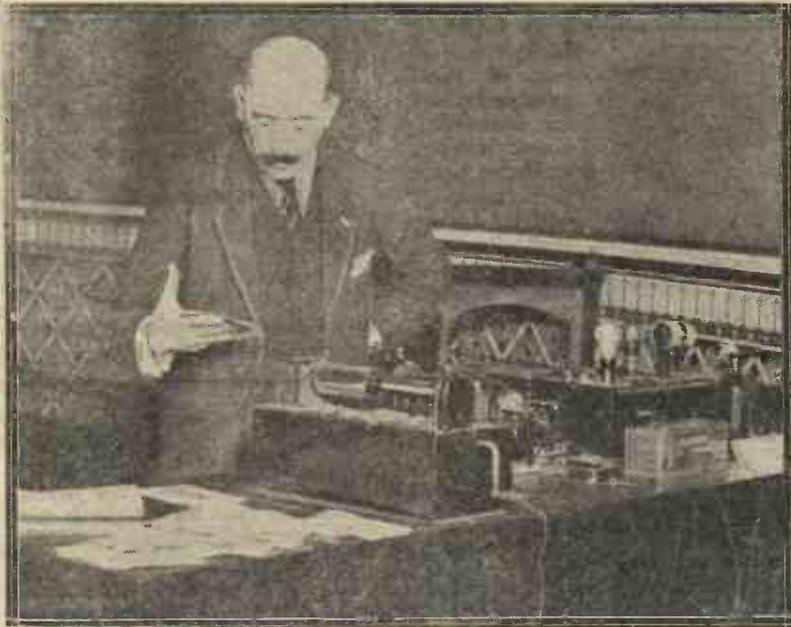
The very fact that he invents is an indication that he thinks or ponders, and the more he ponders the more is he apt to go on pondering and the less likely he is to act. Some of the greatest inventions in the world have been the product of the brains of men who were rightly and aptly described as dreamers.

In saying this I do not for one moment want any of my readers to think that I am using the word "dreamer" in any derisive sense: I use it in a perfectly normal sense and with a full appreciation, as

the really inventive brain is infinitely more rare than the successful business brain; so that, if anything, the boot, so to speak, might well be on the other leg.

### The Financial Side

THERE are a considerable number of experimenters who love making inventions for their own sake and who do not look for any reward beyond the gratification of achieving a scientific discovery or a new pro-



Captain Foulton giving a public demonstration at Leeds of the transmission and reception of pictures by wireless.

I have indicated a moment ago, of the great services to mankind which have always been rendered by the dreamers and the visionaries. I am fully aware that it is common for business men to look down upon inventors as often being misguided creatures who are also in some way inferior. This, however, need not disturb the inventor in the least, for, as a matter of fact,

duction. To these there is, at any rate from the point of view of these articles, no need for me to offer any advice.

On the other hand, there are many individuals who invent solely with the view to securing monetary reward, and here advice is necessary.

The mistakes made by the  
*(Continued on page 190.)*

# In Our Test Room



## A New Cossor Valve

We recently had the opportunity of testing several of the new Stentor Fours recently introduced by Messrs. Cossors and intended to occupy the same position in the four volt range as does the original Stentor in the two-volt range, i.e., that of an economical power valve.

It takes but .1 amp at 3.8 volts but has a very respectable emission and can handle quite large inputs.



The new Stentor Four, a power valve that takes only .1 amp.

In fact it is one of the most successful four-volt power valves we have had pass through our hands. Despite a marked sensitivity it can deliver a round full output without distortion. The Stentor Four was tested in several receivers, ranging from a straight Det.-L.F. to a five valver employing two stages of note magnification, and in every instance it proved to be most satisfactory. Readers who have hitherto had difficulty in finding a suitable valve to occupy the last position in a receiver in which four volters are used should try this new Stentor. We are of the opinion that they will discover in it a complete solution to their problem.

## Puradyne L.F. Transformer

The Puradyne Manufacturing Company, 27, Elgin Road, Seven Kings, recently sent us a Puradyne



This British-made Transformer retails at 13s.

L.F. transformer having the ratio of 1-4 to test. It is of the unshrouded type and is a massively assembled component. We noted with interest that its terminals are widely separated and are mounted directly on to a specially shaped bobbin in such a manner that it is impossible for them to turn and so break their connections. In fact much of the design of this transformer bears evidence of careful attention to essential details. And it is a much better article throughout than one usually expects a cheap English wireless component to be.

On test it gave good results, results which in our opinion were nearly equal to those given by a standard transformer constructed by ourselves. Of course, price with such a component gives no indication of quality, but judged by

such standards as can be set we consider the Puradyne is cheap at 13s., more especially in comparison with many of the "foreigners" that are on the market. Ratios of 1-6 and 1-2.7 are available at a similar price.

## An Artistic Loud-speaker

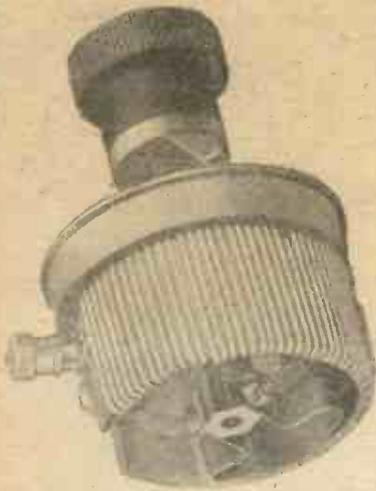
We recently received a Beco "Rose Bowl" model hornless loud-speaker for test. It forms a refreshing departure from standard designs and is a distinctive, handsome instrument. Without in any way affecting its normal duties it can fulfil the function indicated by its name and will hold the necessary water as well as a mass of flowers.

In fact placing water in the bowl appears to improve the tone of the speaker and certainly does not cause the slightest muffling. This Beco is very nicely finished and judged as an ornament alone it is almost worth the money asked for it.



A Loud-speaker that is really ornamental in appearance.

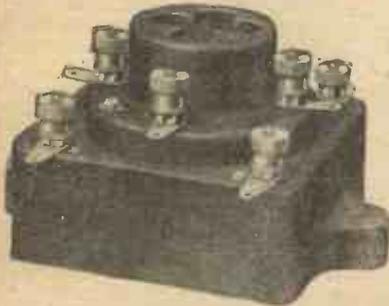
On test we found it to be fairly sensitive and the purity of reproduction was of a high standard. Its tone was most pleasing and



The "Cosmos" Rheostat.



The "Cosmos" Permacon.



The "Cosmos" Coupling Unit and spring valve holder.



Ask your dealer for these attractive Folders on "Cosmos" Valves, Sets and Components.

# Cosmos

RADIO COMPONENTS

ensure reliable sets

Constructors who desire smooth working and efficient sets use "Cosmos" Precision components.

The "Cosmos" Rheostat. The principal features of the "Cosmos" Filament Rheostat are its sturdy construction and reliable, smooth movement. The contact arm cannot easily be damaged, having its movement on the inner side of a porcelain bobbin which carries the windings. Other pleasing features of this Precision Rheostat are the handsome knob and dial, ONE HOLE fixing, and the small space it occupies.

Made in four types, two of which are double-wound for DULL or BRIGHT Valves and one a Potentiometer.

Description.	Ohms.	Current.	Price.
Single Wound	6.0	1.0 amp.	s. d. 4 8
Double "	20	.4 "	5 0
"	34	.2 "	5 0
Potentiometer	300	—	6 0

The "Cosmos" Permacon is an ideal fixed condenser, being light in weight, of guaranteed accurate capacity, and having the lowest possible losses.

The dielectric is mica, and each condenser is tested at 500 volts during inspection. Nickel-plated cases give them a particularly neat appearance.

.0001 mfd. ....	1/8	.001 mfd....	1/8
.0002 " ....	1/6	.002 " ....	1/10
.0005 " ....	1/6	.005 " ....	2/8
.0003 " (with clips for grid leak)...	1/8	.01 " ....	3/9

The "Cosmos" Resistance Coupling Unit.—Real purity of reproduction can only be obtained with resistance capacity coupling. The "Cosmos" Coupling Unit with a suitable valve is as effective as an ordinary transformer-coupled stage. It avoids all distortion and effects considerable economies in first and operating costs. Designed primarily for use with the "Cosmos" S.P. Blue Spot Valves, it can be used successfully with any valve having an amplification factor of 30 or more. Special attention is directed to the following advantages of the "Cosmos" Coupling Unit:

- (1) It takes up little space in a set.
- (2) It is not liable to be broken.
- (3) It has permanent resistance values.
- (4) It allows for simplified wiring.
- (5) It is economical in L.T. current (S.P. Blue Spot Valves consume 0.09).
- (6) It is economical in H.T. Battery consumption (less than 1/20 normal).

And lastly its use results in purity of reproduction without loss in volume.

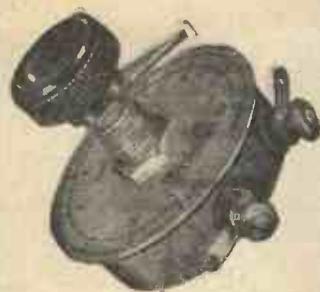
Type "O," the Unit alone ... 8/8  
 Type "V," the Unit incorporating spring valve holder (as illustrated) 10/6  
 Suitable valves for use with this unit are "Cosmos" S.P. 18/B at 14/- and "Cosmos" S.P. 55/B at 18/6.

## METRO-VICK SUPPLIES LTD

(Proprietors : Metropolitan-Vickers Electrical Co., Ltd.),  
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 155, CHARING CROSS ROAD, LONDON, W.C.2.

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**new and better  
valve holder**



WHEN we introduced the C.E. PRECISION RHEOSTAT, we thought that in quality, in efficiency and in price, this Component could not be beaten.

Now that we have added the C.E. PRECISION FLOATING VALVE-HOLDER, we find it even excels the former in these respects to such an extent that the demand has been amazing and we are working to maximum capacity to keep pace with the orders.

Before purchasing other makes just ask your dealer to show you ours. We are confident that after comparison they will have the preference.

C.E. PRECISION FLOATING VALVE-HOLDERS, anti-capacity, non-microphonic, 2/3 each.

C.E. PRECISION RHEOSTATS, efficient and velvety, 50 and 30 ohms, 3/- each; 7 and 15 ohms, 2/9 each. Dual Rheostats and Potentiometers, 3/9 each.

C.E. PRECISION GRID-LEAK, an entirely original and accurate component, 2/- each.

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C.E. PRECISION  
EFFICIENCY**

If unobtainable, please send us the name of your dealer.

**C. EDE & CO., LTD., BYFLEET, SURREY**

Telephone: Byfleet 226.

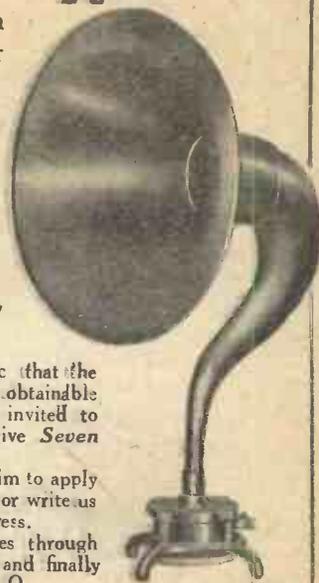
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You can obtain through your Local Dealer or direct from us, an



**Loud Speaker for  
SEVEN DAYS' FREE TRIAL  
in your own home.**



In order to convince the public that the "Orphean" is by far the best value obtainable in Loud Speakers, any reader is invited to request any wireless dealer to give **Seven Days' Free Trial**.

If your dealer is out of stock ask him to apply to us for an "Orphean" for trial, or write us direct giving dealer's name and address.

Every "Orphean" instrument goes through vigorous tests during construction and finally is tested on actual reception of 2L.O.

The results of over four years' research and experience in the production of perfect reproducing instruments are built into every "Orphean."

"Orphean" Model De Luxe 70/-  
Height 24 in.; Flare 24 in.  
"Orphean" Model No. 12 50/-  
Height 21 in.; Flare 12 in.

IF UNOBTAINABLE THROUGH A LOCAL DEALER, SEND TO:  
**LONDON RADIO MANUFACTURING CO., LTD.**

Station Road, Merton Abbey, London, S.W. 19.  
Telephone: Wirbleton 2061 and 2062.

**RADIAX Super LOW LOSS COILS**

The high efficiency, splendid finish, and precision characteristics of Radiax Coils make them essential if you want the best.

**SPLIT SINGLE COILS**      **TRANSFORMER—SPLIT**  
for anode tuning and a variety of purposes.      Primary or Secondary.

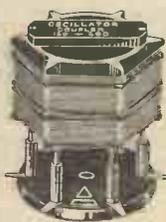
150/400 ... 6/9    300/600 ... 6/9    130/400 10/6    300/800 10/6  
600/1200 ... 8/-    1200/3000 ... 9/-    600/1200 11/-    1200/3000 12/6

Three-leg Base ... 2/3      Six-leg Base ... 2/6

A variety of types is standardised and we make any special coils required. List stamp.

**LOW LOSS FORMERS.** We now supply our standard Low Loss Formers ready for winding any coil, transformer, oscillator, etc. Plain or fitted holding bar, 6 nickel pins and nuts.

**H.F. CHOKE.** Use the Radiax Choke and ensure effective reaction control. Not merely a bunch of wire, but a low capacity high resistance sectionised winding designed for its job ... 8/-  
Send two Stamps for Catalogue of all Radiax Guaranteed Components and all wireless requirements.



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**CONSIDER**

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**OUR BARGAINS.**

**Marconi Straight Eight,** complete with Valves, H.T. Batteries and Accumulator, B.B.C. Coils and High Wave Coils. Seen very little used.      **£50**  
List Price with High Wave Coils ...      £70.5s.

**Elwell 4 Valve Receiver;** Aristophone Model No. 100, Wave Band 800-4,000 metres, Mahogany Case, Plug and Jack switching, complete with Valves, H.T. Batteries and Accumulator. Shop spiled only.      **£33**  
List Price ...      £43.5s.

And numerous others, also a large assortment of Components and Loud Speakers by the best manufacturers.      **Extended Payments Arranged.**

Wireless Specialists.



"SERVICE—Our Name and Aim."

Wireless Dept. 273-274, HIGH HOLBORN, LONDON, W.C.1.

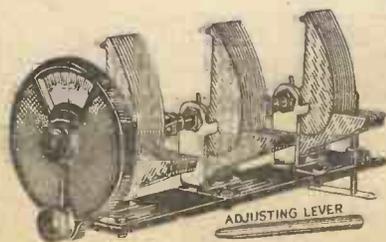
**ONLY FORMO USERS KNOW  
EFFICIENCY AND ECONOMY**



**ULTRA LOW LOSS S.L.F.**  
SINGLE '0003 $\mu$ F,      7/6  
'0005 $\mu$ F      7/6  
TWIN GANG -      24/6  
TRIPLE GANG      33/6  
DIAL 1-16      6/-

**SHROUDED TRANSFORMER**  
1st stage 1-3, 2nd stage 1-5      10/6

These instruments are of surpassing merit proving possibility of economy with efficiency. The consistent high quality has made them favourites with every wireless enthusiast in all parts of the world.



Crown Works, Dept 3, Cricklewood, N.W. 2.

Send for Catalogue.

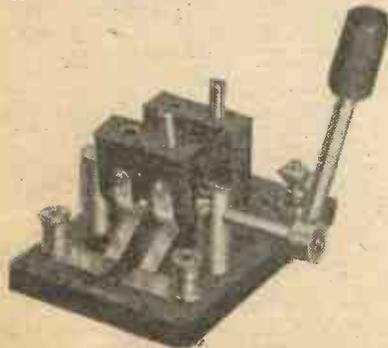
Manchester: J. B. Levee, 23, Hartley Street, Levenshulme 475, Heaton Moor.



IN OUR TEST ROOM — (Continued)

had that mellowness which particularly appeals to us. There was an entire absence of resonance and despite its design there was an efficient projection of sound without any directional effect.

The price of the Beco Rose Bowl model is, with a nickel plate finish, £5 5s., or in oxidised silver



A substantially-built two-way coil-holder.

or antique bronze, £5 17s. 6d., and the makers are the British Electrical Sales Organisation, 623, Australia House, W.C.2.

**Slektun Plug-in Coils**

The Automatic Coil Winder and Electric Equipment Co., Ltd., of "Wellington House," Buckingham Gate, London, S.W. 1, recently sent us a range of their "Slektun" plug-in coils for examination and test. They are totally enclosed in beautifully made and finished cases, but upon dissecting one we discovered that a polished exterior was not hiding anything that would not meet with the approval of a critical amateur. The winding is an efficient one and ample air spacing between layers is allowed in order to keep the self-capacity down.

On test it was found that the "Slektun" coils coupled well and provided moderately sharp tuning. It is interesting to note that the N.P.L. figures for the No. 200 are: Inductance 1,770 mhs.; self-capacity 3 micro-microfarads. There are only about two other coils of similar orders of inductance on the market which record anything under 5, although the H.F. resistance of this Slektun did not appear to us to be abnormally low. But even in this respect it is superior to only too many others.

The "Slektuns" range in price

from 5s. 6d. for the 25 and 35 up to 9s. 6d. for the 300, at which point the range apparently ends, although the demand for larger ones than this must be small these days, more especially as one does not now hear much about the Super-regenerative Armstrong!

**Some "Silvertown" Components**

Messrs. The India Rubber, Gutta Percha and Telegraph Works, Co., Ltd., Silvertown, London, E.16, recently sent us several "Silvertown" components.

Among them was a two-way coil-holder. It is substantially built but of a design that we should imagine would have a rather limited appeal these days. As the accompanying photograph shows, the handle, while providing an excellent control on account of the leverage that is obtained, would hardly suit the panel of the "American" type set, a type which apparently has almost completely superseded the "flat panel" type.

An excellent feature of this "Silvertown" coil-holder is the elimination of "flexes" between the moving block and the two terminals provided for its connections. The springs which accomplish this are sufficiently "hard" to ensure efficient contacts.

It is difficult with this type of coil-holder to get a smooth movement while retaining sufficient resistance to hold large coils rigidly at angles. Gearing of some kind seems to be the only solution, and we trust the makers will let us have a coil-holder of really modern design produced with their usual high-class assembly and finish.

The price of this two-way coil-holder is 7s. 6d.

The "Silvertown" straight-line-frequency variable condenser forms a very marked contrast to the above coil-holder. It is essentially of modern design and fulfils all the usual "low loss" requirements. It has metal end plates "earthed" to the rotor vanes, a minimum of solid dielectric and a "pigtail."

It is an excellently assembled component and has a smooth movement entirely free from "backlash."

The vanes are of best quality brass and a very substantial dial is fitted.

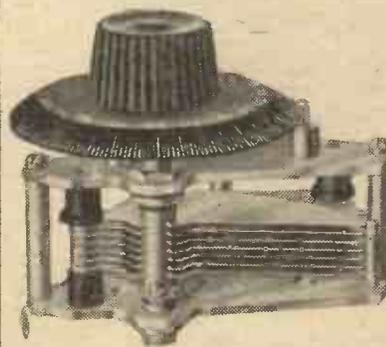
This variable is as good as anything we have seen at the price (11s. 6d., .00025 mfd.; 13s., .0005 mfd.). Its minimum capacity is low and its maximum as stated. We have no hesitation whatever in recommending this "Silvertown" variable to our readers.

We also received two "Silvertown" fixed mica tubular condensers. These are not unlike grid leaks and a base is available in which they can be inserted in a similar manner to the usual method of mounting adopted for the latter articles.

Thus capacities can be changed very quickly and this is a distinct advantage in any set.

On test we found these neat fixed condensers to be very efficient. They held their charges well and proved to have capacities very well within commercial limits of those stated.

They range in price from 2s. for values between .0001 mfd. to .001 to 2s. 6d. for values from .002 to .005 mfd. 3s. 6d. is charged for a .01 mfd. capacity.



The new Silvertown straight-line frequency variable condenser.

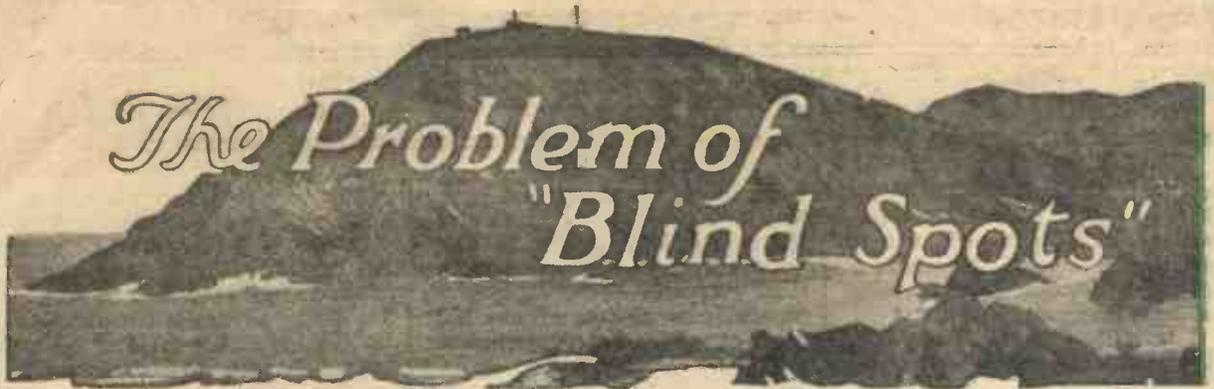
The necessary clips on a nice little base cost 1s. 6d.

These condensers, too, we can fully recommend as useful, cheap and efficient components.

**S.T. Valves**

We were recently given the opportunity of testing a complete range of S.T. valves. Owing to the very clear nomenclature adopted and the detailed information that has appeared in our advertisement pages concerning

(Continued on page 186).



# The Problem of "Blind Spots"

**W**HY is it that when a number of home constructors decide to build a given receiver, each one obtains results appreciably different from the rest? Such was the question put to me recently, and without waiting for an answer the querist continued—"Here am I with a well-known five-valve receiver about which innumerable letters of appreciation have been written, and yet for the life of me I cannot give a similar performance."

From all one hears there must be many listeners who entertain somewhat doubtful views upon the merits of various receivers, for though the authors or the designer may claim various stations at loud-

This article explains why reception in one part of the country may be good, whilst inferior results are obtained elsewhere, under apparently similar conditions.

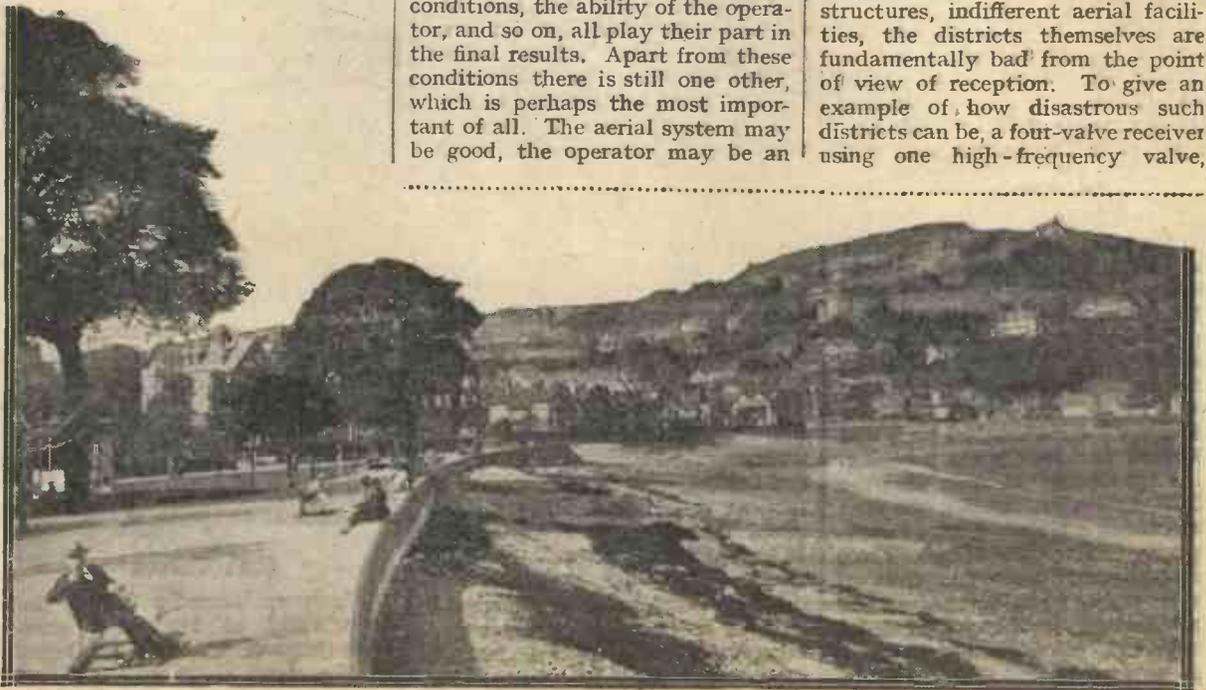
speaker strength, these claims being subsequently confirmed by published letters, there are nevertheless a number of enthusiasts who never will in their present surroundings repeat the performance claimed by the designer of the set. The reason for this is at first a little difficult to understand, but upon giving the matter a little more consideration it will be appreciated that local conditions, the ability of the operator, and so on, all play their part in the final results. Apart from these conditions there is still one other, which is perhaps the most important of all. The aerial system may be good, the operator may be an

expert, but unless this last condition is favourable nothing can be done: the condition being a matter of geography.

### An Illustration

The type of surrounding country, whether the receiving station is in a valley, whether mineral hills lie between the receiver and the transmitter, all these things determine the average of the results obtainable with a given receiver in any particular district. In some cases the geographical conditions are such that receiving results are limited to a relatively few broadcasting stations, and when the results are sufficiently poor that particular district is called a "blind spot," there being many such places throughout the United Kingdom.

Excluding all such things as neighbouring buildings, steel structures, indifferent aerial facilities, the districts themselves are fundamentally bad from the point of view of reception. To give an example of how disastrous such districts can be, a four-valve receiver using one high-frequency valve,



Reception in Minehead suffers on account of the hills which border the town. Beyond these hills reception is practically normal.

# SIX-SIXTY

## The Valve of Proved Merit

AN UNSOLICITED TESTIMONIAL

**GENERAL RADIO COMPANY LIMITED**  
 MANUFACTURERS OF WIRELESS, X-RAY & ALLIED APPARATUS.

HEAD OFFICE:

*Radio House,  
235, Regent Street,  
London, W.1.*

22th. January 1927.

SOLE AGENTS  
 S. S. MERRILL & CO.  
 10, RIVER STREET,  
 LONDON, E.C.4.

WHOLESALE  
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 IN ALL  
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 LONDON, E.C.4.

Messrs. The Electron Company, Limited,  
 Triumph House,  
 189 Regent Street,  
 London, W.1.

Attention of Mr. Kaye,  
 General Manager.

Dear Sirs,

We take pleasure in advising that as a result of further tests on valves of all types, we are in 1927 - as in 1926 standardizing on Six-Sixty Valves on all General Radio Receiving Sets.

The enormous popularity of General Radio Receiving Sets is in a measure attributable to using the best valve with the best Set.

Yours faithfully,  
**GENERAL RADIO COMPANY LIMITED,**  
 BY: *W. H. Stevenson*  
 Managing Director.

W.S. 217  
 W.S. 217/23000.



- S.S.2A, H.F. & L.F.**  
 D.E. 1.8 volts, .1 amp.,  
 H.F., L.F., and Detector,  
 14/-
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 D.E. 2 volts, .15 amp.,  
 Power Amplifier, 18/6
  - S.S.7.**  
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  - S.S.8.**  
 D.E. 3.4 volts, .1 amp.,  
 General Purpose, 14/-
  - S.S.9.**  
 D.E. 5-6 volts, .1 amp.,  
 Power Amplifier, 18/6
  - S.S.11.**  
 D.E. 5-6 volts, .1 amp.,  
 Power Amplifier, 18/6
- Descr. leaflet S.S.9-26,  
 free on application.*

**E**VERYWHERE there is a growing appreciation of Six-Sixty Valves. We reproduce one of the many letters we have received from various Wireless Set Manufacturers who have proved for themselves that Six-Sixty Valves are the ideal valves for their Receivers.

Messrs. A. J. Stevens and Co. (1914) Ltd., state that after exacting and exhaustive tests they decided to standardize Six-Sixty Valves in their famous "Symphony" Range of Receivers. The large number of Set Manufacturers who have standardized Six-Sixty Valves know that they can only be sure of real purity of tone by using our valves, and that every advantage of the special Six-Sixty filament is utilised to the highest degree possible by Duo-Triangular suspension, which ensures increased electronic emission, consistently perfect reception, longer life, and lower running costs.

Six-Sixty Valves are suitable for operation in all stages of a Receiver, whether the L.T. supply be 2, 4 or 6 volts.

**SIX-SIXTY VALVES**  
*Better by Six Times Sixty*

THE ELECTRON Co., Ltd., Triumph House, 189, Regent St., London, W.1

THE PROBLEM OF "BLIND SPOTS"—(Continued)

a detector and two note-magnifiers was installed at a farmhouse in the open agricultural country around Minehead in Somerset. The aerial was slung between two fifty-foot poles, and the nearest building of any height, with the exception of the farmhouse, was several miles away.

The set was a good one, while the operator was a man of no small ability in the matter of picking up distant stations, yet, in spite of all these things, the only stations which could be received at any volume approaching good strength were Cardiff and Manchester, both stations being comparatively near.

**Probing the Mystery**

Investigation into this condition of things, that is to say, systematic investigation by moving the set to other towns in the same county, resulted in a conclusion being arrived at to the effect that the hills lying to the east of Minehead, Dunster and other towns in Somerset were entirely responsible for the poor reception, in that once the receiver was placed in a position lying east of these hills reception became normal.

Another instance of "blind" reception may be recorded in the county of Devonshire, for here a wireless enthusiast carried out certain experiments in Ilfracombe, only to find that, excluding the



Lynmouth listeners are affected by the proximity of the neighbouring heavily-wooded hills, the screening effect of which will be obvious from this photograph.

Cardiff station, reception was both weak and difficult. Those readers who have been to Ilfracombe will remember that hills surround the whole place, excluding the coastline, some of these inclines reaching several hundred feet. Irrespective of position in the town, in all cases a really good aerial being used, reception was decidedly poor.

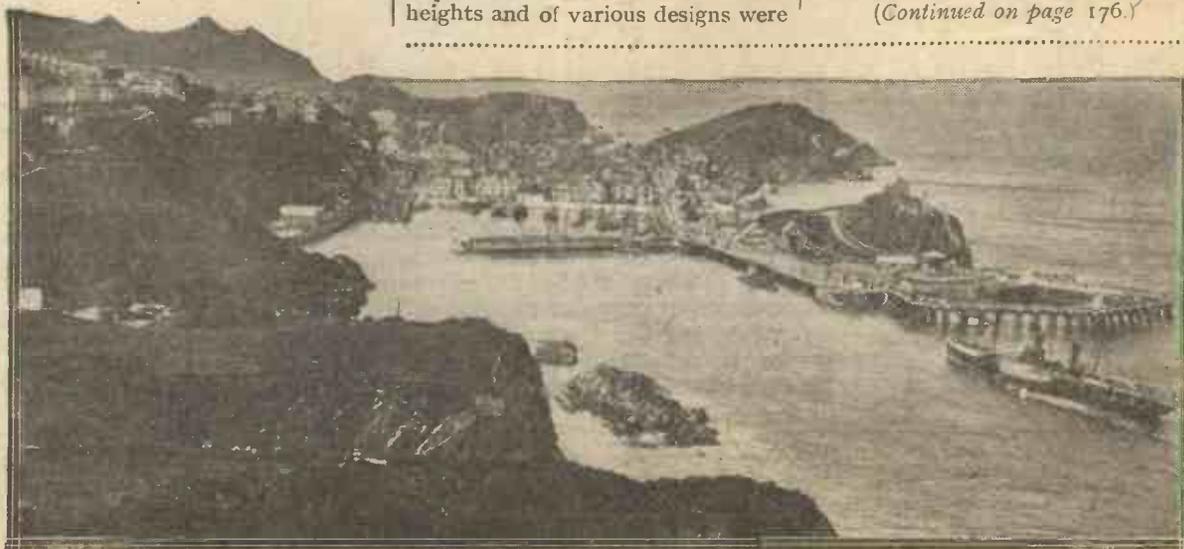
**On the Hills.**

The experiment was even carried out to the extent of taking a portable set to the top of that landmark called "The Capstone," but still reception conditions were not improved. Aerials of various heights and of various designs were

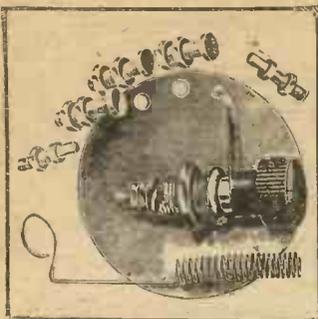
tried, sets of the multi-valve type were used, positions on the outskirts of the town were tried, but, though results were a little different in each case, on no occasion was anything approaching normal reception conditions experienced. Continuing the experiments further, the receiver was installed at various heights up the hill-side, temporary aerials being used for the purpose.

For the benefit of those who know the district, the experiments were conducted along the slopes leading to Hillsborough, and it was not until the summit was reached that reception approached the normal.

*(Continued on page 176.)*



A general view of Ilfracombe, showing how the town is shut in on three sides by high ground. Even with a good aerial, reception is very restricted, owing to this natural "screen."



**EXCEPTIONAL VALUE**

**A Switch with Many Uses**

Obtainable through any Wireless Dealer, the switch here illustrated represents the finest value possible. Specially designed to supply the demand for a neat and highly finished component with a smooth action and positive contacts.

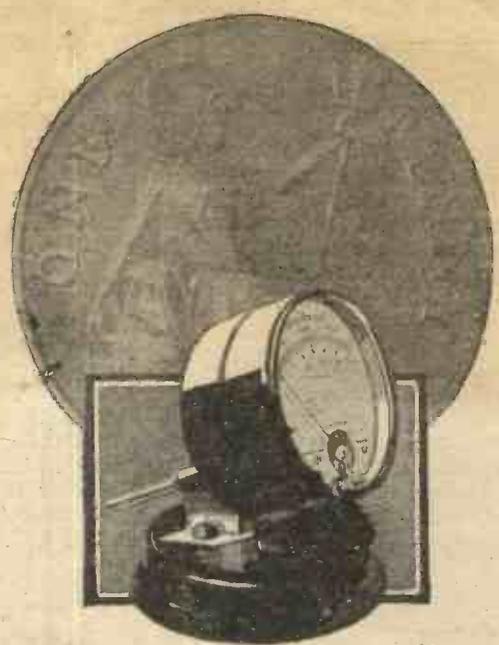
**Ducco STUD SWITCH**

May be used for a variety of purposes, such as:—"On" and "Off" L.T. supply switch, for tapping inductances, switching for increasing or decreasing number of low frequency stages, etc. Contact studs fit nearly flush on panel and brass template is provided for drilling. The switch arm is insulated with best quality ebonite knob, and two stops are supplied in addition to connection wire.

BRASS FINISH.			NICKEL-PLATED FINISH.		
No. RS70/2	2 way ... each	2/3	No. RS70/3	2 way ... each	2/9
"	3 " " " "	2/3	"	3 " " " "	2/9
"	4 " " " "	2/3	"	4 " " " "	2/9
"	6 " " " "	2/3	"	6 " " " "	3/-
"	10 " " " "	2/6	"	10 " " " "	3/3

Please order from your usual Wireless Dealer.

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**Details**

"Take care of the pence and the pounds will take care of themselves," is an adage well worth considering if you want really fine Radio reproduction. Small details, especially where anode and filament currents are concerned, unless carefully checked, frequently ruin an evening's programme.

Economical operation of your Set is only possible by correct adjustment of filament, plate and grid voltage.

See that your low and high tension supply is absolutely correct—test it with a reliable High Resistance Instrument, that is, a Weston Voltmeter with a sensitivity of 125 ohms per volt. Weston Model 506. Pin Jack Voltmeter is designed specially to measure accurately both filament and plate voltage, but will prove of great service for ordinary continuity tests. It is another of the wide range of WESTON products that are now recognised as standard throughout the world, and it reveals that same excellence of design and workmanship for which the name WESTON has been famous since 1888

**WESTON Pin Jack Voltmeter**  
 Price complete with testing cables  
 £2 : 10 : 0

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 STANDARD THE WORLD OVER  
*Pioneers since 1888*  
 Weston Electrical Instrument Co. Ltd.  
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for  
 non-metallic  
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**REDFERN'S Ebonart**  
 NON-METALLIC SURFACE  
**RADIO PANELS**

Stand Supreme

GET LIST 262.

**REDFERN'S RUBBER WORKS, LIMITED,**  
 Hyde, Cheshire.

**THE PROBLEM OF "BLIND SPOTS"—(Concluded)**

(Continued from page 172).

**The Effect of Trees**

Though hills and mountains are largely responsible for "blind" spots, or if not totally responsible give rise to very peculiar effects, there are nevertheless several other causes which observation goes to show are capable of giving "blind" reception.

On the outskirts of the New Forest, for instance, reception can be most extraordinary; good in one place, bad in others, with practically no indication of what may be expected at the next spot.

During the summer of last year some experiments were conducted with a superheterodyne fitted to a car, the main intention being to tour the southern counties by way of a summer holiday. During the trip a halt was made at places such as Lyndhurst, Beaulieu, and so on, and the opportunity was taken of making observations as to the receiving conditions obtaining in that part of the country.

It was noticed that within dis-

tances of as much as ten miles the New Forest had a very considerable influence upon reception, many of the broadcasting stations lying on the other side of the Forest from where the receiver was were completely inaudible.

**A See-Saw Effect**

Proceeding along the forest roads with the receiver tuned to one particular station gave an effect which, to say the least, was remarkable. The station at times would be dead weak, when suddenly it would bellow from the loud-speaker in a deafening roar; at other times it would disappear altogether only to come back in a few moments at full loud-speaker strength. The rising and falling in volume was not, as one would have expected, a gradual process, but whereas the signals would be strong one second, they would be weak or inaudible the next. On the other hand they would continue uninterrupted for five or ten minutes and then just as suddenly vary in their volume.

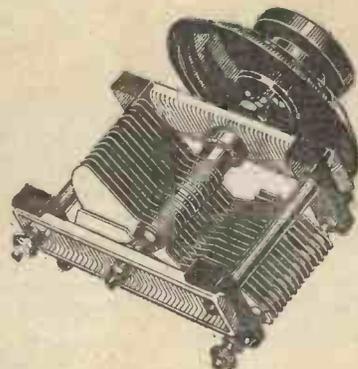
Though these latter observations were more in the nature of screening effects, rather than "blind" spots, they tend to show how considerably reception is influenced by surroundings. Outside the forest, even ten miles away, reception is still affected in a manner much resembling the results obtaining in a "blind" spot, distance work being practically impossible.

**A Summing Up**

Though it is not possible to deal with every type of "blind" spot which has been encountered in the country in the space available, sufficient indications have been given as to how listeners using similar sets in different parts of the country obtain different results.

Probably the most delightful spot for reception in the United Kingdom is a place called Cupar, in Scotland, where, using a single-valve receiver with reaction, all the British broadcasting stations can be received, selectivity, being practically the only requirement.

**THERE IS NO BETTER CONDENSER AT DOUBLE THE PRICE!**



The Bowyer-Lowe condenser is acclaimed — by amateurs — everywhere as being the best condenser of its kind it is perfectly made of sound materials and generously guaranteed. Increase the efficiency of your Reception through the perfect control provided by the Popular Condenser

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Mr. H.H. Anspach used the Bowyer-Lowe Gang Control Condenser in his "Solodyne Set" which secured the FIRST PRIZE at the Chicago Exhibition U.S.A.

WITH DIAL  
•0003 M.F.  
**10/-**

TESTED RADIO  
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WITH DIAL  
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(ANNOUNCEMENT BY THE BOWYER-LOWE CO LTD. LETCHWORTH, HERTS.)

# "Silvertown" <sup>99</sup>

## WIRELESS ACCESSORIES

Quality guaranteed by over 50 years' electrical manufacturing experience.

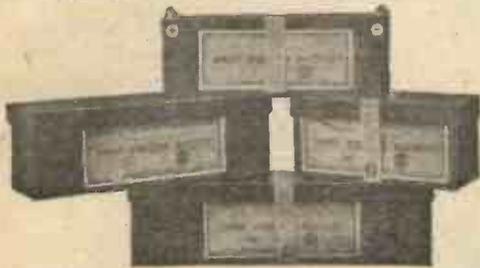


### ANTI-MICROPHONIC VALVE HOLDERS

(Registered design No. 723272)  
(Patent applied for).

The Silvertown Anti-Microphonic Valve Holder is built to stand the heaviest vibrations. Manufactured from best-quality ebonite, with metal parts nickel finished. Superfluous metal work is eliminated, thereby reducing capacity effects to a minimum. These Valve Holders are light and strong, and take up very little room on the baseboard, to which they are fixed by two screws. Diameter at Base, 2 ins., Height, 1 1/4 ins.

Price 2/9 each



### HIGH TENSION PRIMARY BATTERIES

(Dry Cells)

No. 1720	.. ..	15 volt,	9 1/2" x 7" x 2 1/4" high,	3/6
No. 1721	.. ..	30 "	6 1/2" x 2 1/4" x 3 1/4" "	7/6
No. 1722	.. ..	50 "	10 1/2" x 2 1/4" x 3 1/4" "	10/-
No. 1723	.. ..	60 "	12 1/2" x 2 1/4" x 3 1/4" "	13/-
No. 1724	.. ..	100 "	10 1/2" x 5" x 3 1/4" "	21/-

The 15-volt Battery forms one unit, but the larger batteries can be tapped every 4 1/2 volts, and are provided with two "wander" plugs to each.

#### AN AID TO ENTHUSIASTS.

We have prepared a logging chart for recording wavelengths, condenser settings, etc., of those stations which require careful calibration to tune in. A copy of this chart, printed on stiff card, with hanger, can be obtained free of charge at any of our Branches or from any high-class dealer.

Makers :

**THE SILVERTOWN COMPANY,**  
106, Cannon St., London, E.C.4. Works : Silvertown, E.16

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# THE NEW NO 7



### RECUPERATING AGENT

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## HELLESEN DRY BATTERIES

Try any number of new gadgets you like, they add a little interest to radio, but commence the new year with the New No. 7 Recuperating Agent controlling your H.T. Supply. If your power supply is efficient and economical, the question of trouble-free radio is solved.

When radio was in its infancy users of dry batteries regarded the name Helleesen as being synonymous with the best in dry battery construction.

To-day they meet your special need with a special recuperating agent and they are still

### The Best in the World

You can now buy Helleesen Dry Batteries at a competitive price and whatever your requirement there is a Helleesen Dry Battery to meet it.

60 volt "WIRIN" 12/6

99 volt "WIRUP" 21/-

(Postage Extra.)

All types, voltages, etc., in Double and Treble capacities for H.T. and L.T. Supply. Ask your dealer for the type to suit your set and get the maximum service, or write us for full particulars.

Obtainable at all Radio, Electrical and General Stores, Harrods,

Selfridge's, Barkers, etc., or direct from

**A. H. HUNT LTD., Dept. 5, CROYDON, SURREY**

TRADE

# HUNTS

MARK

*They Last Longer*

**"DX" HINTS FOR NEW AMATEURS**

(Continued from page 116)

type are fitted distant stations may be tuned in, say, twenty in an hour, over a wave band of 300 to 600 metres; but if slow motion variables are fitted it is fairly safe to say that at least 50 per cent. more distant stations will be tuned in.

But to return to the statement that simplicity is the keynote of distant reception; let us take, for example, a receiver with a double circuit aerial tuner, both aerial coil and grid coil being tuned by separate condensers, the coupling between the two inductances being of the variable kind. In such a case, two controls may be eliminated without seriously lessening the efficiency of the receiver as a whole.

By disconnecting the aerial condenser altogether and fitting in place of the existing aerial coil a very small coil, say one consisting

of only twenty-five or thirty turns of wire, and leaving this coupled tightly to the grid coil—there we have an example of the simplification of a receiver which, in nine cases out of ten, when handled by an inexperienced amateur, is rendered less efficient by the excessive number of controls requiring adjustment.

**The Varley H.F. Choke**

In our last issue we gave a report on the Varley Split Coil H.F. Choke, and gave it as our opinion that at 12s. 6d. it is rather an expensive component.

We have since learned that this Varley choke was specially designed for use in receivers employing split coil tuning circuits, and more particularly for those receivers of this type designed to cover wide wavelength bands.

The "European Five" is a set of this nature.

For ordinary purposes the original Varley choke at 2s. 6d. is still available. Now it is a fact that there are H.F. chokes on the market which will not operate in the above sets efficiently over very wide bands, so in the circum-

stances the last sentence in our report deserves greater emphasis.

Rheostats have to be adjusted, but these days they can in many cases be replaced by using fixed resistors of values suited to the particular valves used on the set.

The above are only a few suggestions for the amateur who wishes to simplify the receiver and enhance his chances of being successful at DX work. The tuning of distant stations in any case requires patience and delicacy of manipulation of controls however simplified they may be; slow-motion condensers, to my mind, or some refined "Vernier" action for condenser tuning, such as a geared dial, is absolutely essential.

The amateur who wants to prove this for himself can try tuning in distant stations with the ordinary dials and then replacing them with slow-motion dials. I think that, on the whole, he will find the "slow-motion" adjustment will reward him with a 50 per cent. better "bag" of distant stations than the "direct drive" control.

**THE BEST SET YET THE SUPER-HET.**



**MAGNADYNE SUPER-HET.**

With all the recent remarkable improvements and developments in High Frequency Amplification, the Super-Het properly designed and constructed still stands pre-eminent as a super-selective long-range receiver. No pains have been spared to bring the Magnadyne to a pitch of perfection hitherto unapproached by any other type of receiver. A switch is provided in order that the local station may be received on 4 valves only, thereby economising the H.T., L.T. and the life of the valves. Perfect reproduction is assured, and the range of reception is limited only by atmospheric conditions.

In order to assure ourselves that every Magnadyne fulfils the claims made we are not supplying the component parts for home construction.

Every receiver is thoroughly tested in our works and carries a year's guarantee. Any fault which may develop in workmanship or material within this time will be rectified or replaced free of charge.

**THE NEW MAGNADYNE.**

in finest quality hand polished Mahogany Cabinet with Calibration Chart including Folding Frame Aerial, Extra Oscillator, H.F. Transformer and Loading Coil for high wave-lengths and Eight Special Valves.

**£45 0 0**

Plus Marconi and Western Electric Royalties, £6 10s.

**MAGNUM SCREENED COILS**



**NEW STANDARD COILS AND PRICES. MAGNUM**  
Screening Box, complete with 6-Pin base (Standard spacing and cross formation) ... 15s.

Split Primaries.		s. d.
Aerial Coil ...	250/550	6 0
H.F. Transformer ...	250/550	10 0
Aerial Coil ...	1000/2000	6 0
H.F. Transformer ...	1000/2000	10 0
Split Secondaries.		s. d.
H.F. Transformer ...	250/550	10 0
H.F. Transformer ...	1000/2000	14 0
Reinartz Coil ...	250/550	10 0
Reinartz Coil ...	1000/2000	14 0
Price per Set of 3 Screens and Coils, 250/550, for the Elstree Solodyne ...		£3 11 0
Ditto for European Five ...		£3 11 0

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**ELSTREE SOLODYNE**



Ready wired and tested ... £25 : 0 : 0  
Plus Marconi Royalty ... £3 : 2 : 6  
Complete Set of Components for home construction  
£20 : 19 : 0

**THE RAZOR-SHARP WAVEMETER**



Described by Mr. J. H. REYNER, B.Sc., in Radio Press Envelope No. 14.

Complete Set of Components, including Coils for 180-2,000 metres  
£4 : 4 : 0

The instrument ready wired and tested  
£5 : 0 : 0

Special Magnum Coils can be supplied separately, as follows:—

- No. 1, 180-600 metres ... 10/-
- No. 2, 600-2,000 metres ... 10/-
- Three Pin Coil Mount with Brackets ... 4/-

Send stamp for comprehensive range of lists, including latest Star Sets and Kits of Components. Components supplied for "The Wanderer Five," "Skyscraper," "Reinartz" and all sets described in Amalgamated Press Publications.

# —HOW CAN A FIXED RESISTOR BE VARIABLE?—

—an open letter to the Wireless Public

Cyldon Works,  
Sarnesfield Road,  
ENFIELD TOWN, Middx.

Gentlemen,

Certain advertisers are making extravagant claims and state that the Fixed Resistor is fast becoming obsolete! This is entirely wrong.

The Fixed Resistor is guaranteed 100% efficient. It cannot be otherwise if manufactured the "Cyldon" way—that is Wire Wound, therefore absolutely noiseless. Carbon mixtures or chemical combinations change their characteristics as often as the English climate and cause home-made atmospherics.

Supposing your valve requires a resistance of 4 ohms to run it at the correct temperature. With

a variable resistor (glorified filament rheostat), you start off with an unknown resistance, maybe too high or too low. If it is too low, your valve will probably be ruined for the rest of its life.

With "Cyldon" Temprytes you *must* be right because they are definitely designed to suit the particular valve you are using and it is impossible to run that valve at anything but its correct temperature.

We issue a very comprehensive valve chart which shows the correct resistance for practically every valve in existence. It is free for the asking.

The cost of 2/6 for a "Tempryte" is much less than 15/- to 22/6 for a ruined valve through starting with an unknown resistance which may only be approximately right.

Yours faithfully,

*Sydney S Bird*



TEMPRYTES  
2/6 each.

HOLDER MOUNTINGS  
1/6 each.

Get full particulars also of the famous range of CYLDON CONDENSERS.

If unable to obtain CYLDON PRODUCTS locally, write direct to:

SYDNEY S. BIRD & Sons, Cyldon Works, Sarnesfield Rd., Enfield Town, Middx. Telephone: Enfield 0672.

## The "SOVEREIGN"



### SCREEN & COILS

Approved by the ELSTREE LABORATORIES

- AERIAL COILS - - 5/6 each
- H. F. TRANSFORMER - 9/- "
- H. F. TRANSFORMER S. Sec. 9/- "
- MONODIAL COILS - 9/- "
- MONODIAL BASE - 1/8 "
- SCREEN & BASE - 10/- "
- H. F. CHOKE - 7/- "

ALL POST FREE.

We can supply Screen & Coils for the WANDERER FIVE & SOLODYNE. DEALERS! Send to-day for LIST & TERMS.

J. R. WIRELESS Co.,  
6-8, Rosebery Ave., E.C.1

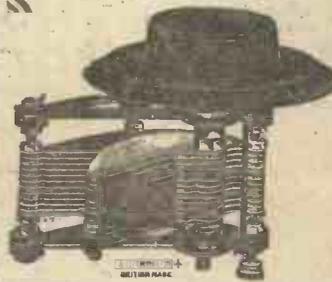
## AN INSTRUMENT OF PRECISION

The Etherplus S.L. Frequency Condenser gives an even distribution of frequencies over the whole range, and has a low minimum capacity. A cone bearing and self-centring ball race ensure smooth movement.

No. W/180 0005 12/- each  
(with 4 in. knob dial).

From all dealers or from

**M. & A. WOLFF**  
9-15, WHITECROSS ST.,  
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**ETHERPLUS**

## VALCO MAGIC!

WILL MAKE YOUR BROKEN VALVE AS GOOD AS NEW

ALL TYPES OF VALVES REPAIRED AT HALF LIST PRICES (minimum charge 5/-)

**Satisfaction Guaranteed or Money Refunded**

An unsolicited testimonial from one of our many satisfied users.

PEMBROKE DOCK, 23/11/26.—The valve you repaired last week for me is giving every satisfaction and I will certainly recommend your firm to any of my friends who want any valve repaired.—J. D. H.

Weeco, S.P.'s and low capacity types not repairable. Minimum D.E. current 0.15 amps when repaired.

**VALCO LTD.,** Dept. "M.W.," TABOR GROVE,  
WIMBLEDON, S.W.19.

## CUT THIS OUT FOR CABINETS

and post to us for **FREE** list illustrating Cabinets as shown in "Modern Wireless," etc., etc., and for our additional Bulletin No. 1.

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(Write in block letters please.)  
**CARRINGTON Mfg. Co., Ltd.**

18-20, Normans Buildings, Mitchell St., Central St., E.C.1.

Trade enquiries especially invited.  
Telephone: Clerkenwell 6903.

**RADIO ABROAD**

*(Continued from page 134.)*

current in the case mentioned above could be supplied for about 40 years, 8 hours a day, for a total cost of about £10.

If wireless messages could be broadcast throughout the universe with the same efficiency as was achieved in this case, a large 100-kilowatt transmitting station should be detected at a distance of between 2,000 and 3,000 million miles, enough to reach some of the stars of the solar system, whilst the planet Mars would be within very easy range of some of the more powerful broadcasting stations.

**Strict Aerial Regulations**

At an average transmission rate of, say, 20 words a minute, about 40 million words could be sent for 5s., whilst, if this number of words were sent by telegram in the form of a night-letter, the cost would work out at about 500,000 times as much.

In this country, whilst there are certain simple rules with regard to the erection of a receiving aerial, these consist more particularly of the Post Office regulations with

regard to length, and the ordinary local bye-laws with regard to danger to the public, etc. In San Francisco, however, some very definite rules and regulations have been issued by the Department of Electricity which state, amongst other things, that no antenna shall be erected over a street or over any conductor carrying more than 600 volts, or shall be secured to any pole which carries electric light mains or power lines.

There is to be a vertical clearance of at least 8 feet above any flat roof and 4 feet above any gabled roof. All wires used for supporting the antenna must be either copper or galvanised steel and must not be less in gauge than No. 14. No antenna or supports for an antenna must be attached to any fire escape. Leading-in wires must not be smaller than 14 gauge and must be supported and secured in a proper and substantial way so as to avoid any possibilities of their coming in contact with electric light or power lines.

The earth wire may be bare or may be insulated, but it again must not be of smaller gauge than No. 14 and it must be securely connected to a grounded waterpipe. These regulations may, perhaps, seem unnecessarily stringent, but, after all, it is always a good thing

to be on the safe side, and when you see some of the aerials, or so-called aerials, in and around London—I suppose the same thing applies in the provinces—it makes you think that perhaps it is time that some sort of regulations affecting aerials were introduced in this country. Apart from the question of efficiency or public safety, there is also the important question of offending the public taste, for I am sure that some of the "aerials" in my locality would be hard to beat for ugliness.

**Aerials at K.D.K.A.**

Talking about aerials KDKA now uses two separate aerial systems, one a vertical copper tube and the other a flat-top horizontal arrangement.

The first-mentioned aerial is used for short-wave broadcasting, whilst the flat top horizontal arrangement is used for the 309 metre programmes which are heard by a large number of listeners within range of the Pittsburg station.

The engineers in charge of the station believe that the vertical aerial has an advantage because its natural wavelength is very close to the wavelength which is used for its transmission, which *(Continued on page 182.)*

**THE AERIAL TUNER WITH AN INDUCTANCE EQUAL TO A WHOLE RANGE OF COILS**



**PRICE 35% COMPLETE**

Ask your retailer, or write to-day for CATALOGUE 573/2 of EFESCA Components with diagrams illustrating their use in various circuits. It is more than a list—it is a fine 72-page book of great value, containing much technical information, which you will greatly appreciate.

**FALK, STADELMANN & CO., LTD.,**  
83/93, FARRINGDON RD, LONDON, E.C.1

And at Glasgow, Manchester, Birmingham, Newcastle, and Dublin.

THE Efesca Regenerative Aerial Tuner is not a new gadget; but is a tried and tested component which has firmly established its superiority over conventional methods of tuning. It has an inductance equal to a whole range of Plug-in type coils from 30 to 300. A turn of the switch covers both low and high wavelengths. This, with a Variable Condenser at 8/6, and an L.F. Transformer at 17/6, represents the main outlay of a Two-Valve Loud-Speaker Set for local station and Daventry.

You cannot do better than use the

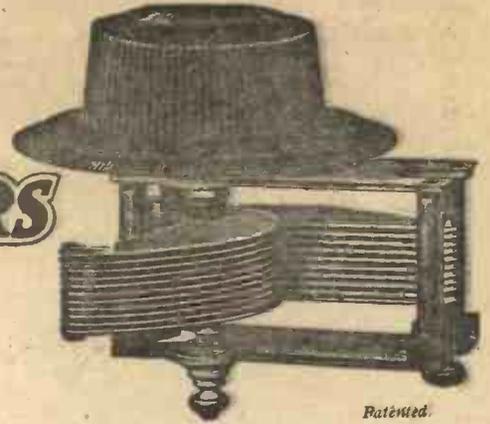
**EFESCA**

**REGENERATIVE AERIAL TUNER**



Patented

# JACKSON CONDENSERS

Patented

## The Final Condenser

Old advantages retained, new and vitally important improvements added—these are the factors that mark the J.B., S.L.F. as the **final** Condenser on the market to-day.

The slow motion type—the J.B. True Tuning S.L.F.—is fitted with a double reduction friction drive, ratio 60:1, which permits of remarkably close tuning. The friction surfaces are machined to a fine limit of accuracy, thereby preventing all possibility of lost motion. Ball bearings ensure wonderfully smooth control.

The vanes in both types are designed on a new principle which obviates crowding at any part of the scale and solves for ever the tuning evils of the past. Accurate spacing is maintained by supporting the tips of the vanes.

J.B. Condensers are beautifully finished throughout—they are built like precision instruments to last a life time.

*J.B. Condensers have been recommended for the P.M. Circuits.*

The J.B. True Tuning S.L.F.  
Complete with 4" Bakelite Dial.

0005 mfd. ... ..	16/6
00035 mfd. ... ..	15/6
00025 mfd. ... ..	15/-

**JACKSON BROS.**  
8, POLAND ST-OXFORD ST  
LONDON - W.1.  
(First Floor)

Telephone:-  
GERARD 7414

The J.B., S.L.F.  
Complete with 4" Bakelite Dial:

0005 mfd. ... ..	11/6
00035 mfd. ... ..	10/6
00025 mfd. ... ..	10/-

## The only Accumulator which has all these seven features:

- 1.—Charged ready for use—merely add acid.
- 2.—Laminated buckle-proof plates.
- 3.—No leaking away of charge when not in use.
- 4.—Large coloured terminals and special spray-proof filter cap.
- 5.—Rapid charging and slow discharging.
- 6.—Stout glass cell requiring no separators.
- 7.—All plates made under the special activation process

### Charged in 8 hours.

Laminated plates permit thorough and instant penetration of acid. Other accumulators with thick plates must be charged slowly over 30/40 hours. The O.V.D. can be charged in 8 hours. Time and money saved to you.



2 volts—for use with Dull Emitter Valves Dimensions 6 in. by 3 in. by 2 1/2 in. 10 amp. hours. **5/6**

**OLDHAM & SON, LTD.**  
DENTON, MANCHESTER.

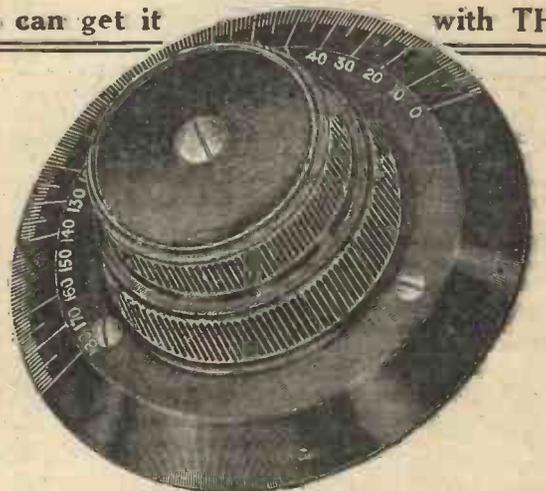
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Special Activation Process Batteries



G.A. 7454.

You can get it with THIS



## The "Utility" Micro-Dial.

The "Utility" Micro-Dial successfully solves the problem of ultra-fine tuning—the finest adjustment with an ordinary dial being but the preliminary movement of the "Utility." A scientifically designed slow motion mechanism will enable users of the "Utility" Micro-Dial to secure perfect tuning, unlimited movement and no backlash. This Dial can be fitted to all makes of condensers, but when ordering the diameter of spindle it is required to fit must be stated.

Insist upon "Utility" Guaranteed Components.

THE "UTILITY" CONDENSER-

Price: 0005 ... .. 15/-

Price: 0003 ... .. 14/-

When fitted with this Micro-Dial.

**WILKINS & WRIGHT, LTD.,**  
KENYON STREET, BIRMINGHAM.

**Better Reception**  
*The New*  
**Varley Varley**  
 Tapped Resistance  
 It's Bi-duplex Wire-wound

Another example of the progressive policy of the Varley Magnet Company. The new Varley Tapped Resistance possesses all the advantages of the original famous Varley Bi-Duplex Wire-Wound Anode Resistance with the added advantage of having four different values of resistance in one component.

Wireless enthusiasts will at once appreciate the value of the Varley Tapped Resistance for

- Tone Control**
- Volume Control**
- H. T. Eliminators**
- Voltage Dividers**

and knowing it to be Varley Bi-Duplex wire-wound they will rest assured of perfect purity of tone, absolute constancy under all conditions, and complete freedom from shortage or leaking turns.

This is only the beginning. We are marketing in the near future a special resistance with 6 tappings, in addition to other Bi-Duplex wire-wound components, particulars of which will be announced in the Wireless Press.

The Varley Bi-Duplex Wire-Wound Tapped Resistance .. complete 15/-  
 Varley Bi-Duplex Wire-Wound Anode Resistances are made in a complete range of sizes up to 500,000 ohms, prices from 4/- to 16/-  
*Full particulars on application.*

The Varley Multi-cellular H.F. Choke complete 9/6

The Varley Multi-cellular H.F. Choke for circuits of the SPLIT COIL Type .. complete 12/6

**MAKE SURE IT'S VARLEY BI-DUPLEX WIRE-WOUND**



**THE VARLEY MAGNET CO.**  
 (Proprietors: Oliver Pell Control, Ltd.)  
 Cranville House, Arundel Street, London, W.C.2.  
 Telephone: City 3393.

V. 17

**RADIO ABROAD**  
*(Continued from page 180.)*

means that there is very little tuning of the aerial required and tuning losses are therefore avoided or, at any rate, minimised.

In the case of the horizontal aerial the fundamental wavelength is not quite so close to that of the radiated waves as it is with the vertical aerial. Instead of using steel supporting masts, wooden poles are used, which are treated with a special water-proofing compound, and which have the effect of insulating the aerial from earth.

**The Short Wave Aerials**

The aerial used for short-wave experiments is about 60 metres in length, whilst the short-wave aerial is about half-a-wave in length. Several aerials are used in the short-wave transmitting system, these being specially placed in relation to one another with the object of securing directional effects for long-distance relaying. Each aerial consists of a copper tube supported vertically on a wooden pole, with a small horizontal counterpoise element at the lower end, and about 4 feet from the earth.

The length of the aerial is a few feet less than half a wavelength, but the short horizontal counterpoise at the bottom of the tube, together with the leading-in wire, make up for the deficiency in length and bring the natural wavelength of the aerial to about the same as the wavelength which is being radiated. The copper tube is separated into two parts by means of a cut near the middle, this in order to facilitate tuning adjustments of the aerial circuit, and an earthed coil is inserted in the space between the two sections of the tube.

It is possible to tune the aerial circuit by slight adjustments of this coil so that its natural wavelength can be adjusted to be exactly the same as the wavelength radiated.

An interested arrangement is made in the short-wave aerials, only one of these being coupled to the broadcasting apparatus whilst the others are placed at definite distances from the main aerial and are energised by induction, the purpose being to give the desired directional effects. When two of the aerials are separated by exactly half a wavelength, the signals have a maximum strength at right-angles to a line drawn between the two aerials. If the two aerials are

separated by a quarter of a wavelength this condition is reversed. The upright aerial system is not used for the 309 metre transmission, as this would necessitate a vertical mast about 500 feet in height.

"I expect to see and hear by electricity," the Presidential Inauguration in 1929, even though I may be thousands of miles away from Washington," says Dr. Gerald Wendt, Director of Industrial Research at Pennsylvania State College. "Single pictures are already being sent across the sea," he says, "and when a more sensitive photo-electric cell is developed, a picture will be transmitted as rapidly as the movie can flash it on the screen. In Washington during the ceremony the microphone will have a 'microscope' alongside it, and I shall be sitting in my own room, seeing and hearing the entire performance as if I were on the spot. Then we shall have radio movies for every home."

A few years ago a prophecy such as that of Dr. Wendt would have been regarded as fantastic, but every wireless experimenter of to-day will surely feel that there is nothing fantastic in the idea of radio movies. What with the wonderful developments in television accomplished by Jenkins in America and Baird in England, there seems every reason to believe that television is no longer a figment of the imagination, but is, in fact, already with us.

**The International Radio Week**

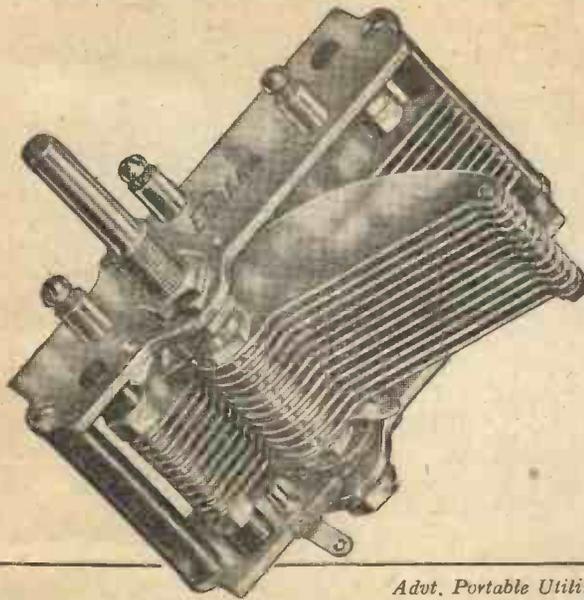
There is a good deal of mixed opinion in the States on the question of the overseas tests in connection with International Radio Week. The expense connected with the undertaking, and the protests which were made last year by broadcasters on the Pacific Coast, who urged that their audiences were unable to share in the reception of European broadcasts because of their geographical situation, are believed to be the principal reason for the lack of enthusiasm for a repetition of the radio tests.

It is probable, according to one American journal, that these tests may be entirely discontinued owing to the growing importance of toll broadcasts and the unwillingness of many stations to cancel contracts with broadcast advertisers in order to maintain the silent periods necessary to the success of the experiments. In the cities on the Pacific Coast and in the middle West, the hours for the experiments would fall right in the middle of the evening broadcast programmes.

# This Condenser won't allow stations to crowd!

**W**ITH Jazz Bands and Grand Opera almost inextricably intermixed in an overcrowded ether no wonder the new Geneva wavelength plan was necessary! Under this plan, Great Britain receives nine exclusive wavelengths. But there is to be a separation of 10 kilocycles between each wavelength. Not 10 metres but 10 kilocycles. Metres have been ignored in these calculations. The Eureka Condenser also abandons metres and deals with kilocycles. It gives

orthocyclic tuning—an even separation between wavelengths no matter where they may appear on the dial—crowding is impossible. With the Eureka Orthocyclic 10 degrees cover 10 wavelengths precisely—no more, no less. What a difference from the ordinary Condenser, which crowds as many as 39 wavelengths into the same 10 degrees. Practically 4 wavelengths to every degree on the dial, while at the opposite end of the scale the last ten degrees will barely span 2 wavelengths. The new conditions of Broadcasting demand the use of a Eureka Orthocyclic with its even separation, step by step, all the way up the scale.



### Superb, all-British Workmanship

Instal these magnificent Condensers in your Set now and enjoy selectivity. They are a pleasure to use. Because gears are eliminated, backlash is impossible, while the superb workmanship of the whole instrument will improve the appearance of any Receiver. Order them from your dealer without delay.

In two sizes:

·0003 mfd. 14/6 : ·0005 mfd. 15/6

# EUREKA

ORTHO-CYCLIC

## C O N D E N S E R

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

G.A. 7212.

## Real Radio reception

and perfect musical delivery has hitherto been merely an apology. We cordially invite all music lovers and those interested in perfect radio reception to visit our show-rooms and listen to the new Walker.

### ALL WOOD TONE ARM LOUD SPEAKER.

Without doubt for quality of delivery this new Loud Speaker surpasses all the commercial loud speakers built hitherto, the trumpet and tone arm being entirely produced from wood, thus giving that mellowness of tone and true inflection of the human voice in a manner that no other instrument has yet achieved.

This loud speaker is supplied in three grades:—

1. Specially made in Mahogany to fit Lissenola Loud Speaker Base, 27/6.
2. Junior Walker, £4.
3. Senior Walker, £6/10/0.

OUR INTERNATIONAL RADIO CATALOGUE (3rd Edition) will be sent to all enthusiasts sending 6d. to cover cost of postage and packing.

**WILL DAY LTD. (Dept. M.W.),**  
19, Lisle Street, Leicester Square, LONDON, W.C.2.  
Telephone: Regent 4577. Telegrams: "Titles, Westrand, London."



## 100% EFFICIENCY H.T. BATTERY

Constructors' Ideals realised. As tested "M.W." April, 1924, etc. Brass terminalled Giant Unit Dry Cells, 300 per cent. capacity (compare standard cell). 1½ volts, 60 volt, 14/8, carriage 1/6 Replacement cells, 4/- doz. plus carriage. Every cell replaceable. Sacs only, for wet H.T., 2/9 doz. Sample cell or sac, 6d. Lists free. Prompt delivery. Direct only from maker, saving 50 per cent.

G. A. FINCHETT, Old Armoury, Oswestry.

### ADVERTISEMENTS

As far as possible all advertisements appearing in "M.W." are subjected to careful scrutiny before publication, but should any reader experience delay or difficulty in getting orders fulfilled, or should the goods supplied not be as advertised, information should be sent to the Advertisement Manager, "Modern Wireless," 4, Ludgate Circus, London, E.C.4.



Registered Trade Mark.

#### NOTICE

Do not be put off with an imitation. Ask for BECOL and use the Former with a reputation.

Write for List "B."  
**THE BRITISH EBONITE CO., Ltd.,**  
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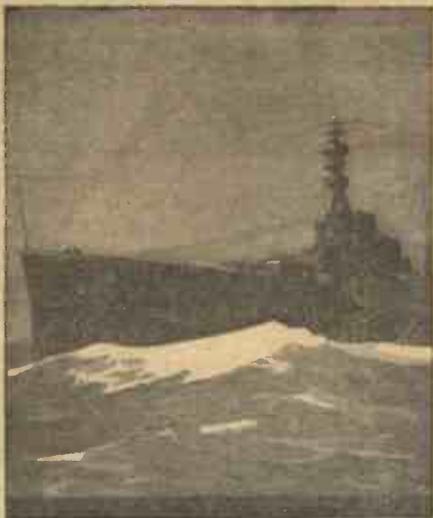
### Makers of the ORIGINAL world-famous BECOL Low Loss Former

As used in sets that took the first four prizes at the 1926 "Manchester Evening Chronicle" Wireless Exhibition and the set that won the Gold Medal at the 1926 Amsterdam Exhibition.

Size: 3 inches diameter to outside of wings.  
Prices:  
6-inch lengths 3/- (Postage 9d.)  
4-inch lengths 2/- (Postage 6d.)  
3-inch lengths 1/6 (Postage 6d.)  
Up to 30-inch lengths.



Ebonite Rods, Tubes and Sheets. Panels guaranteed free from surface leakage.



**FRANKLIN  
NELSON  
RODNEY  
GRENVILLE**

**N**AMES that are the personification of action. In war and peace the need has always found the man, and today in the radio world the name Mullard implies decisive progress.

Radio appeals to the million. Mullard has brought radio within reach of the million. The Franklin, Rodney, Nelson and Grenville P.M. Receivers are the result of the remarkable success achieved by the Mullard P.M. Valves, and the research, construction and organisation which has made the finest valve is the basis of the Mullard Ever-Rest Wire Wound Anode Resistance.

A Resistance wound on a textile fibre core, perfectly covered and interlayered with the same material, eliminating all self capacity, and also renders the fine metallic wire free from every particle of mechanical shock.

The temperature coefficient is negligible since the resistance is not set in wax, but only covered by a thin layer of wax, allowing perfect dissipation of heat.

MULLARD EVER-REST Wire Wound Anode Resistance (80,000 and 100,000 ohms) ... ..	5/-
Complete with Holder	6/6

*Other Values to Specification.*

<b>Mullard Grid Leaks and Condensers,</b>	
Type Grid B 0.0 megohms ... ..	2/6
Type Grid B combined with .0003 mfd. Condenser Type MA ... ..	5/-
Type MA Condenser .0001 to .0009m fd.	2/6
Type MB Condenser .001 to .01 mfd....	3/-



**WIRE WOUND ANODE RESISTANCE**

The MULLARD WIRELESS SERVICE Co., Ltd.  
Mullard House, Denmark St., London, W.C.2

**WHAT VALVES SHALL I USE?**  
*(Continued from page 122).*

ST21, SS22 H.F., though in this class the choice is not always quite so happy, and often one finds that exactly the right valve cannot be obtained so easily as where the 6-volt class are being considered. Personally the writer prefers to use 6-volt valves in all Reinartz circuits as a rule, and has obtained better results by so doing. Four-volt valves of the PM3 and ST41 type work well here, but in this case again I must say I prefer the 6-volters for this circuit.

The last set we shall consider in this article is the 5-valver, "The Wanderer," and in this case we shall find that the choice needs a little more care than in the others, especially where the L.F. side is concerned. The H.F. valves will necessarily be of the DE5B class, having impedances of about 25-30,000 ohms and magnification factors of somewhere about 20,000 if 6-volters are used. In the 2 and 4 volt classes suitable amplifiers will be the DE2 H.F., and ST21, etc., for the former and corresponding valves in the 4-volt range. Higher impedances can be employed if desired, but the writer prefers not to raise this to too high a value in this type of circuit and to keep the magnification factor about 25 or 20.

The detector being resistance coupled must be of a high magnification, and here the SP55B or PM5B can be used to advantage, though valves with less magnification and lower impedance will also give quite good results. The point to remember is that a valve suitable for resistance capacity coupling has to be used.

The first L.F. valve can be of the DE5 and DFA, class, having an impedance of between 6,000 and 10,000 ohms, with a magnification factor of about 6-10. This can be followed by a super-power valve. Such valves as the LL525, SP55R, ST63, DE5A, etc., can be used with success if 6-volt valves are being considered. Valves of other voltages should be chosen with the same end in view, namely, that of obtaining a valve with a long straight portion in its curve, and therefore capable of sustaining a considerable variation in grid volts without causing distortion. To do this it will be found that the valve will have an impedance of somewhere round about 3,500, with a magnification of about 3.



**free—  
details for building four unique Receivers**

**H**ERE'S an invaluable book for constructors. The "Radion Book." It's a practical manual which tells you how to build four unique Receivers. The explicit working drawings and complete illustrated descriptions make it possible for the most unskilled to build a One-Valve Receiver (which has a 250-400 mile range on head-phones), a two-valve Amplifier, a self-contained Loud Speaker Set and a Five-Valve Neutrodyne.

Anyone could follow the easy instructions, and build a Set as good as a professionally-made one. In addition, the Radion Book contains useful information on Aerial erection and Set installation and gives easy-to-follow tool hints for "working" panels.

Send the coupon below for the Radion Book and an interesting booklet called "The Gentle Art of Choosing One's Panel." It tells you all about the superb panels, Radion and Resiston, which increase the appearance and efficiency of your Set a hundredfold. Write to-night

**—Send for the "Radion Book"—**

Please send, free, the "Radion Book" (which describes four unique Sets) and, also, "The Gentle Art of Choosing One's Panel."

Name .....

Address .....



American Hard Rubber Co., Ltd., 13a Fore St., E.C.2  
G.I. 725

**QUESTIONS ANSWERED**

(Continued from page 146)

circuit of the valve, is so small that it is negligible and does not allow the passage of the L.F. impulses.

In the case of H.F. amplification, with most types of valve the inter-electrode capacity may assume serious proportions when amplification on the higher frequencies is attempted. In this case, instead of allowing the H.F. energy to build up in the plate circuit of the amplifying valve, the capacity of the valve tends to by-pass the energy to earth.

Thus it is only possible to obtain any reasonable amplification on high frequencies by means of the resistance method if special valves having an extremely low self capacity are employed.

\* \* \*

**Effect of Grid-Leak on Grid Bias**

H. H. L. (S.E.21).

"I often see it stated in constructional articles where resistance capacity coupling is employed on the L.F. side, that (to give an example) 6 to 9 volts negative grid bias are required on the L.F. valves. As this voltage has to be applied through a resistance of as much as half a megohm, surely it is insufficient."

We find it is quite a common error on the part of constructors to assume that because the grid leak is inserted between the grid bias battery and the grid of the valve, the grid bias voltage must be increased in order to overcome the extra resistance of the grid leak. If you will consider Ohms Law for a minute, you will see that it does not matter whether a transformer or a grid leak is inserted between the battery and the grid for the simple reason that no current is flowing in that circuit when the voltage is properly adjusted. By

Ohms Law, we have  $C = \frac{E}{R}$ , which may be rewritten as  $E = CR$ ; thus, if we have a grid bias voltage of 6 volts and a resistance of 500,000 ohms, and yet C is equal to zero, the effect of R becomes also equivalent to zero. In other words, the voltage applied to the grid in spite of the insertion of a resistance of 500,000 ohms is the same as that which would be applied if the grid bias battery were taken direct to the valve.

EXPERTS IN RADIO ACOUSTICS SINCE 1908



**OLD FRIENDS**

**THE BRANDOLA**

Greater volume with minimum current input. Large diaphragm gives fullness to upper and lower registers. Walnut plinth, electro-plated fittings. *Reduced from ninety shillings.* **75/-**

**THE AUDIO TRANSFORMERS**

Ratio 1 to 5. High amplification of applied voltage, together with straight line amplification frequency curve. Also 2nd stage, 1-3. 1-5 (Black case). 1-3 (Brown case). **17/6**

**THE TABLE-TALKER**

Material used in the construction of goose-neck horn eliminates metallic harshness. Adjustable. Height 18 ins. neutral brown finish, padded base. **30/-**

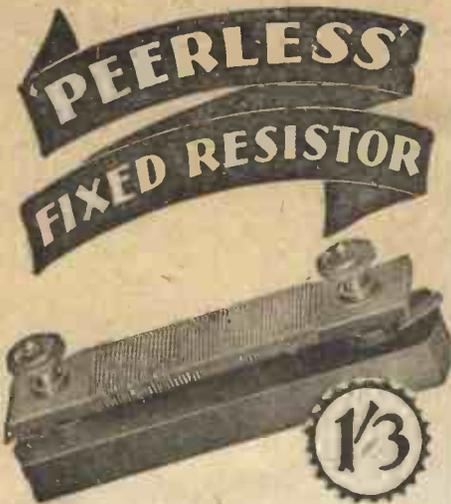
**MATCHED TONE HEADPHONES**

The synchronised effort of both receivers discovers greater sensitivity and volume and truer tone. Light, comfortable and sturdy. **20/-**

**Brandes**

*From any reputable Dealer.*

BRANDES LIMITED, 296 REGENT ST., LONDON, W.1



## Efficient, Neat and Cheap

You can see from the illustration what a neat job this "Peerless" Fixed Resistor is. The Base is solid insulation and the former a strong impregnated material that atmospheric conditions will not affect. The wire is wound evenly and firmly and terminals and soldering tags are fitted. One hole fixing. A very thoroughly assembled and finely finished unit in all.

### OTHER BEDFORD PRODUCTS:

- "Peerless" Dual Rheostat .. 3/9
- "Peerless" Junior Rheostat 2/6  
(already over half a million sold)
- "Peerless" Resicon Variable Condenser, from .. 15/- to 18/-  
(Dial and Vernier 2/6 extra)
- "Peerless" Master Switch .. 2/9
- "Peerless" Valve Switch .. 3/-

From all good dealers or direct.



## IN OUR TEST ROOM

(Continued from page 171)

these valves it will be unnecessary for us to give the full characteristics and prices. Suffice it to say that where slight discrepancies have been noticed in the former these were in every case errors on the side of modesty. We mainly refer to emissions which appear to be conservatively stated.

Now the S.T. range includes but nine valves all told, and this nine is divided into three voltage classes, but practically every possible receiving set purpose is adequately served. This has been accomplished by a very careful arrangement of characteristics. These might not in every instance meet with the approval of many holding preconceived ideas on the subject, but we have been able to find S.T.'s capable of holding their own in every one of the several sets in which we have used them.

It is difficult to pick out any one S.T. valve that deserves special comment, for the whole range is excellent and does credit to its eminent creator. But personally we particularly like the S.T. 63. It is certainly a "Super Power" valve in the strictest sense of the term. It can handle very large inputs indeed and does so with remarkable efficiency. Then the two voltors form a "team" that is capable of performances which would not shame a group of six voltors. For instance we used an S.T. 21 and an S.T. 23 in a two valve set (Det, L.F. trans., coupled) and the results were excellent—five speakers operated with good strength and this with a total filament consumption of less than half a watt!

### Formo L.F. Choke

We recently received one of the Formo Co.'s new L.F. chokes. It will be remembered that one of these was used with complete success in the H.T. unit which was described in our Christmas Double Number. The component is very well designed and constructed and operates well in all the usual circuits. It is completely shielded in a very heavy metal casing and two widely spaced terminals complete with soldering tags are provided. The whole choke is modelled on first-class "transformal lines" and represents excellent value for money at 20s. 6d.



H.F. CHOKE

PRICE 7/6



Double silk-covered wire wound in four accurately balanced sections ensures required constant impedance, very low capacity, small external field. Transparent case. Ebonite base. A British product well up to the "Wattmel" standard.

From your dealer, or direct from:

### THE WATMEL WIRELESS CO., LTD.,

332a, Goswell Road, London, E.C.1.  
Telephone: Clerkenwell 7990.

Lancs, Yorks and Cheshire Representative  
Mr. J. B. Levee, 23, Hartley Street, Levenshulme, Manchester. Telephone: 475 Heaton Moor.

### THE WIRELESS DOCTOR

Will call (anywhere London and Home Counties) and put your set right. Sets installed—maintained and brought up to date. A specialist in Elstree Sets, Solodyne demonstrated.

ALEXANDER BLACK 2a, WOODVILLE GROVE, LONDON, N.16 Clissod 3637

All those who desire to communicate with **Mr. C. P. ALLINSON, A.M.I.R.E.,** late of Radio Press and Elstree Laboratories, may do so:—  
c/o **THE CONSTRUCTION PUBLISHING CO.,** 37, Drury Lane, London, W.C.  
to which address all communications should be sent. Mr. Allinson takes this opportunity of expressing his appreciation of the interest shown by readers of MODERN WIRELESS who have sent in reports as to the results obtained with receivers designed by him.

### SOMETHING UNUSUAL

When you require Special Apparatus, Transmitting, Receiving or Recording, Precision, Instruments, etc., "THOSE HARD-TO-GET THINGS," write or call on us

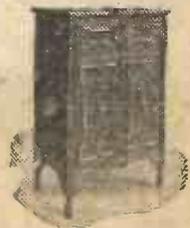
We stock the famous DIX-ONEMETERS. Send 4d. stamps for our 1,000 Bargains. Illustrated Catalogue.

**ELECTRADIX RADIOS**  
218, UPPER THAMES ST., LONDON, E.C.4.

### A HOME FOR YOUR WIRELESS SET

#### OUR STANDARD CABINETS

are DUSTPROOF and house the whole apparatus, leaving no parts to be interfered with. Made on mass production lines, hence the low price. Provision is made to take panels from 7 by 7 up to 30 by 18 in.



Special Cabinets for the ELSTREE SOLO-DYNE, NIGHT HAWK, ALL BRITISH SIX etc., now ready. Write for free particulars.

**FAKERIN PORT CO.**  
Dept. 2, 50a, Lord Street, LIVERPOOL.

**DEVELOPMENT OF THE BEAM**  
(Continued from page 111)

along that line are equi-distant from both the aeri-als. Con-sequently, waves coming from both A and A<sub>1</sub> will have covered the same distance, and so will be in phase when they meet. The re-sultant field will, therefore, be doubled along the line OP.

On the other hand, a wave travel-ling laterally from A to A<sub>1</sub> (i.e., in the direction of the arrow AX), will arrive at A, 180 degrees out of phase with the wave which is just leaving that aerial. These two waves will consequently cancel each other, and practically no energy will be transmitted to the right of the aerial A<sub>1</sub>.

Similarly waves radiated laterally from A<sub>1</sub> (along the line A<sub>1</sub> Y) will arrive at the aerial A 180 degrees out of phase with the waves leaving A (because the two aeri-als are separated by half a wavelength); accordingly, no radiation will take place to the left of that aerial.

In the same way each pair of aeri-als separated by half a wave-length in the network illustrated in Fig. 3, may be considered as acting conjointly to neutralise end radi-ation, i.e., along the plane of the aeri-als, but adding their separate energies cumulatively to form a "beam" in the direction at right angles to the network.

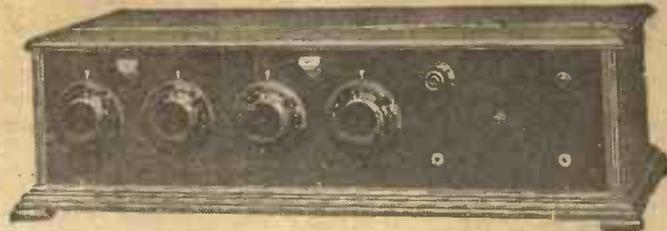
**WHAT READERS I THINK**  
(Continued from page 148.)

**Short Wave Circuits**

SIR,—I was very interested in the article on short waves in the January issue of MODERN WIRELESS and can vouch for the efficiency of several of the circuits discussed by Mr. L. H. Thomas. Especially do I find the circuit in Fig. 5 efficient. Though perhaps less easy to adjust for the purpose of receiving tele-phony than it might be if loose coupling were used for aerial and grid coils, it is nevertheless very sensitive, and I have repeatedly tuned in 2XAF and KDKA trans-missions after 7 o'clock in the evening. An aperiodic aerial coil of about three turns I find is a great advantage, as its position with regard to L<sub>1</sub> can be varied to give a very delicate vernier re-

(Continued on page 188.)

**BEST IN ALL EUROPE**  
**THE "ALL-BRITISH SIX"**



This Set gained the highest award for any European entry in the recent American International Amateur Competition held in New York.

This is the Set "par excellence"; it has no superior in all Europe. The original model has been considerably improved and simplified by the addition of single-control mechanism to the four condensers, so that an almost incredible number of stations now comes in at full loud-speaker strength by slowly rotating one control. One delighted customer writes:—"Apparently all stations within a range of 1,000 miles come in at full loud-speaker strength." A glance at a map shows that this covers practically every European station.

**MONO MODEL**, as described, complete with B.B.C. coils, aerial tested and guaranteed,

**£37 : 5 : 0**

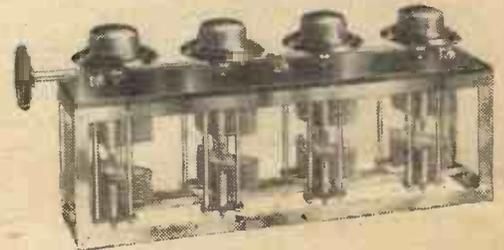
**ORIGINAL MODEL**, as illustrated, complete with B.B.C. coils, aerial tested and guaranteed,

**£33 : 15 : 0**

Marconi Royalties, extra to both above prices **£3:15:0**

**THE MONO-MODEL CONDENSER**

Here is a photograph of the Mono Model Condenser—in every detail a beautifully precise and rigid piece of workmanship. Friction clutches are fitted to the spindles to allow for separate adjustment of each condenser if required, although ordinarily the four dials are rotated in unison by means of the control shown on the left. Amateur constructors who wish to incorporate this feature in their sets may now obtain same from us. Delivery from stock **£9:10:0**  
Price, complete, as illustrated



**Improved Solodynes to be distributed free!**

Further to popularise the now famous "Solodyne"—which we have recently improved—we are setting aside 100 of these Sets to be distributed amongst our customers entirely free of charge.

The conditions are perfectly simple, and full particulars of this novel scheme will be sent on application. Don't delay—write to-day.

To Messrs. Peto-Scott, Ltd.,  
77, City Road, E.C.1.  
Dear Sir,  
I wish to heartily congratulate you and Captain Tingey on the results attained by the "Solodyne" you supplied to me.  
It has come through a trying ordeal with flying colours—it resides in an unused bathroom just over the steering engine and adjoining the engine room—in spite of that and a three-day gale in the Bay the set functioned perfectly and the calibration of it is excellent.  
The vibrations are so intense, even in a calm sea, that the valves are never still—your set is invincible, and I am giving our cousins over here quite a surprise; they are full of admiration—the wiring and cabinet coming in for great praise.  
Yours truly,  
P.S.—At a position 720 miles west of Finisterre the set brought in—Aberdeen, Dublin, Oslo, Stockholm, Lemberg, Rouen, K.D.K.A., and twenty-odd others at loud-speaker strength, this during the last of a really bad three-day gale. This gives you some idea of the range although handicapped with only 84 volts H.T. instead of 120 volts.  
U.S. STATIONS—63 TO DATE.  
The ship has come out in ballast, so you can't imagine the sort of vibrations when her engines raced—in spite of which your work is as good as when it left your hands.

**THE SOLODYNE**

Complete with Osram DE5B and DE5 Valves, Oldham J.T. and H.T. Accumulators, Battery Leads, Long-wave Coils and Ampion Radiolux Loud Speaker, **£47:11:3**  
Marconi Royalties paid.

5 Valves—1 Dial—50 Stations. Finished Instrument, Aerial tested and guaranteed, **£24 : 5 : 0**

Marconi Royalty, **£3 : 2 : 6**

We will gladly demonstrate either of these sets in your own home without charge and without obligation.



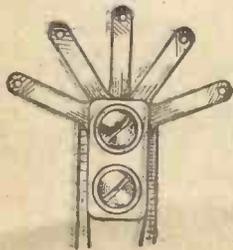
Send to-day for a copy of the PILOT MANUAL, which gives illustrated details of the above and many other up-to-date receivers. Post Free, 6d.

**PETO-SCOTT CO., LTD.,** 77, CITY ROAD, LONDON, E.C. 1.  
Branches: 62, High Holborn, W.C.1; 4, Manchester Street, Liverpool; 4, Bank of England Place, Plymouth; 230, Wood Street, Walthamstow.  
P.S. 7230.

# The best British at Continental PRICES Jacks, Plug, and Resistances

Manufactured in the latest materials and design. Approved by the Elstree and other famous laboratories. Tested to withstand many times the conditions imposed in ordinary practice.

## JACKS



One hole fixing. Neatness combined with efficiency.

Tags are tinned and spread fan-wise for easy soldering. Nickel Silver springs, pure silver contacts. Insulated throughout with genuine Bakelite.

No. 1. Single Circuit open **1/3**

No. 2. Single Cir. (closed) **1/6**

No. 3. **1/9**

Double Circuit as illustrated.

No. 4. Fil. sin- **1/9**

No. 5. Fil. Double Con. **2/3**



## Plug



Actual size, conforms to spade tags, pin tags, flexible or rigid wire leads, Genuine Bakelite Neatly finished.

**1/6d. each**

## ASHLEY-LEDWARD RESISTANCES (A node and General Purpose).



Absolutely stable at ordinary temperatures & under high impressed voltages. Capacity free. Impervious to moisture. Each component is subjected to a 48 hour test, during which it is continuously under pressure at a mini-

**2/6d. each**

with clips.

imum of 230 volts. **Extract Radio Press remarks** The uniform qualities of this component under adverse conditions, (left out of doors several days) are worthy of notice and it can be recommended with confidence.

ASHLEY WIRELESS TELEPHONE CO., (1925) LTD., 17, FINCH PLACE, LONDON ROAD, LIVERPOOL.

*Ashley Radio*

## WHAT READERS THINK

(Continued from page 187)

action control. It is essential to use a .0001 fixed condenser in the aerial for low wavelengths, and I find that C<sub>1</sub> must also be of the order of .0001 and certainly not larger than .0002.

It would be interesting to hear from other readers concerning this circuit.

Wishing MODERN WIRELESS all the success it deserves.—Yours truly,

Herts.

G. HUGHES.

### An Appreciation

SIR,—May I thank Mr. Allinson through the columns of your interesting paper for the extremely useful and interesting articles he contributes from time to time? His latest article on H.F. stabilising I found to be exceedingly interesting, and I have tried out several of his suggestions with marked success. May we have more from his pen in the future!—Yours truly,

Brighton.

M. KYLE.

### Some Super-hot Results

SIR,—Though somewhat belated, I feel I must write and give you the results I am obtaining on the 7-valve super-hot, described sometime back by Mr. Allinson. Results are simply wonderful, the following being heard on full loud-speaker strength:—All B.B.C. and most of the relays, Berlin, Munich, WGY, CNRO (Ottawa), Barcelona, Frankfurt, Rome, Hamburg, Madrid, Oslo, Leipsic, Paris, Prague, Milan, Toulouse, Muenster, San Sebastian, Copenhagen, Berne, and many others. These results speak for themselves, I think, and I feel I need say no more except to thank all concerned for a wonderful circuit.—Yours truly,

Belfast.

A. B. L.

### Beginner's Crystal Set

SIR,—I am glad to see that under the new régime the simple constructor is not to be neglected. The beginner's crystal set is one that will surely appeal to a large number of readers, and I for one have pleasure in reporting extremely satisfactory results from it. It easily operates three pairs of 'phones here.—Yours truly,

B. M. DADD.

Hale, Cheshire.

(Continued on page 189.)

# TRIX

## SPECIALITIES

### PERMANENT DETECTOR

giving the utmost sensitivity and stability. Extends to fit clip up to 2 in. apart, also one-hole fixing. Nickel plated. No. 344 ... 2/9

Send for "Book of Trix" M.W. 2

### TRIX SLIT INSULATORS.

Shown below full size provide the most convenient means of erecting indoor and outdoor aerials. Wire is simply hooked in the slot. Best white porcelain. No. 350, per doz. 1/3



FROM ALL DEALERS, IF ANY DIFFICULTY, APPLY:—  
ERIC J. LEVER, 33, Clerkenwell Green, London, E.C.1.  
Phone Clerk, 3014/5. And at L'pool, B'ham, Glasgow, &c.

**BARGAIN!**—"Nightingale" Master Crystal Detectors, slightly soiled, 1s. each, 3 for 2s. 6d.  
N.M.C. Detectors, 30, Princes Parade, London, N.3.

# PICKETT'S CABINETS

### For BRITAIN'S BEST.

	Standard.	Super.	De Luxe.
Elstree Solidone ..	45/-	75/-	95/-
All British Six ..	50/-	85/-	105/-
Elstree Six ..	75/-	95/-	125/-
Drawing Room Five 35/-	55/-	80/-	

GUARANTEED.—Super and De Luxe Models to be the same High Grade Work and Finish as supplied: H. H. Aesch, 1st Prize, Chicago, Envelope of Cabinet Designs, No. 22. FREE.

PICKETT'S CABINET (M.W.) WORKS, BEXLEY HEATH.



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Please note that communications concerning advertising in

## MODERN WIRELESS WIRELESS CONSTRUCTOR POPULAR WIRELESS

must be made to

JOHN H. LILE, LIMITED, 4, Ludgate Circus, London, E.C.4

(Phone: City 7261).

and NOT to the Editorial or Publishing Offices.

**WHAT READERS THINK**

(Continued from page 188)

**Do YOU Know ?**

SIR,—An interesting idea has occurred to the writer with reference to the rectification properties of the ordinary radio crystal detector. It may seem a more or less childish point to raise but I have never seen it stated whether or not the detector has the power of offering greater resistance to D.C. in one direction than in another. I have no instruments which will enable me to test the point accurately, but some of your readers may have done so. I should be interested to hear if any peculiarities in the "one-way" properties of the crystal are observable when D.C. is applied to it.—

Yours truly,

London, W.

**THE SKYSCRAPER**

(Continued from page 132)

Each cell is of 1½ volts and both were taken from a round torchlight battery. Should the prospective constructor be able to get two cells that are covered with paper and have terminals fitted, he is strongly advised to do so, as this will overcome the necessity of soldering wires to them.

Wiring is carried out with No. 20 S.W.G. round tinned copper, the leads being taken from point to point, and right angle bends generally being avoided.

The wires that pass through the copper screen between the coils and those near the H.F. variable condenser should be covered with "Systoflex," or Glazite over these leads. Grid bias leads must, of course, be flexible.

In planning the layout, due consideration was given to the possibility that L.F. amplifiers might be added to the set, and it was decided to fit all the terminals on the edge of the panel. When adding an amplifier therefore, it is only necessary to arrange short connecting bars between the two panels, instead of long unsightly leads.

With regard to tuning, it will be found that the settings of the two variable condensers will nearly be the same, London for instance, coming in at 100 degrees on the A.T.C. and 110 on the H.F.C.

**KAY RAY**  
S.L.F. CONDENSERS  
LATEST MODEL  
NOW READY  
**6/11**  
POST fd.



...0005  
...0005  
With 4 in. dial.

**LOW LOSS SQUARE LAW**  
This variable Condenser is simply marvellous value. It cannot be equalled in price or quality.



...0005  
...0005  
4/11 each  
By Post 5/11.  
With VERMIER 1/- extra.

**ASTOUNDING 2-Valve AMPLIFIER** in L.F. pliers, 25/11. Amplifiers in or COMPLETE handsome with valves, polished box. H.T. and L.T. 1 valve, 16/11. Units, 4/6. Carriage 1/6.

**BURNE - JONES. LEWCOS. PETO-SCOTT. BOWYER-LOWE** COLVERN SCREENED COILS, PAIRS AND GREENS.

**ALL CIRCUITS, PARTS, COILS AND SETS STOCKED.**

**HEADPHONES**, all 4,000 ohms N and K. Standard Pattern, 7/11 pair. N and K. Genuine new lightweights, 11/6, 13/6, Dr. Nesper, 10/6 and 12/11. Telemagn, adjustable genuine (20% model), 14/11. Brunel, 12/6, 12/11, 14/6, 3 models. "GRIZZARD" (Continental) 3 models. "13" set. (Post, 6d.)

**S.T. VALVES**  
World's most Wonderful Crystal "WYRAY" 1/6  
The Crystal with the Power of a Valve.

**BEFORE YOU PURCHASE ELSEWHERE : CALL AND LET ME QUOTE YOU**

**ORMOND SQUARE LAW LOW-LOSS.**  
...0005, 9/6; ...0003, 8/6; (1/6 each less no. verified); Friction Geared, .0005, 15/-; .0003, 14/6; .00025, 13/6. Straight Line Frequency Friction Geared, .0005, 20/-; .00035, 19/6. S.L.F. .0005, 12/-; .00025 11/-; SQ. LAW LOW-LOSS. DUAL, .0005, for Electric, 8/6, 16/- each. Ormond Friction Dial, 10/-; Filament Rheostats, Dual, 2/6; 6 ohms or 30 ohms, 2/-; Potentiometer, 400 ohms, 2/6. L.F. Shrouded, latest model, 15/-.

**GANG CONDENSERS.**  
Dual .0005.  
ORMOND, with dial, 32/-  
CYLON, no dial, 50/-  
Triple .0005.  
ORMOND, with dial, 40/-  
CYLON, no dial, 70/-  
IGRANIC, no dial, 75/-  
BOWYER-LOWE, no dial, 70/-

**WATES' MICROSTAT** 2/9 each

**PARTS IN STOCK FOR THE ELSTREE SIX, SOLIDNEY, NEWFLEX, ELSTREEFLEX, 1927 FIVE AND ALL THE CHIEF CIRCUITS.**

**RAYMOND ANTI-MICROPHONIC VALVE HOLDER.**  
Board Mounting, 1/6

**CALL HERE FOR LISSEN, BENJAMIN, RADIO-MICRO COSMOS, MULLARD, EDISWAN, MARCONI, COSSOE, OSRAM, JACKSON'S (J.B.) DUBILIER, McMICHAEL, SUCCESS, BEARD & NICHOL, BOWYER-LOWE, LEWCOS, IGRANIC, BURKEA, ORMOND, HILL, BERGANTY, R.I., MAGNUM. WE HAVE THE GOODS! CALL AND SEE US. ALL LINES IN DEMAND STOCKED. SPECIAL TERMS RADIO CLUBS, GENUINE EXPERIMENTERS.**  
BE SURE YOU ARE AT RAYMOND'S!

**K. RAYMOND**  
HOURS . . . 9.15 to 7.45  
SATURDAY . . . 9 to 8.45  
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**THIS MAGNIFICENT 2-VALVE SET**  
(D. and L.F.) as shown, in Handsome American Type Cabinet, 12 by 8 Panel. ALL PARTS ENCLOSED. Complete with 2 Dual Emitter Valves, Tancic latest Coils, British L.T., Super 100-v. H.T. Aerial Equipment, 4-way Leads. B.T.H. 4,000 ohm 'Phone, OR Lissenola, OR Loud Speaker. **£5 5 0**

Marconi Tax Paid.  
Carriage and Packing, 5/-

**CRYSTAL AND ONE VALVE AMPLIFIER (L.F.)**, in handsome polished cabinet, tested for use, 25/6. Post 1/6. (With D.E. valve, 30/-). Or complete Set, valve, H.T., L.T., units, aerial Equipment, 5XX coil, 45 11. Post 2/- Extraordinary Offer.

**ASTOUNDING 2-Valve AMPLIFIER** in L.F. pliers, 25/11. Amplifiers in or COMPLETE handsome with valves, polished box. H.T. and L.T. 1 valve, 16/11. Units, 4/6. Carriage 1/6.

**BURNE - JONES. LEWCOS. PETO-SCOTT. BOWYER-LOWE** COLVERN SCREENED COILS, PAIRS AND GREENS.

**HEADPHONES**, all 4,000 ohms N and K. Standard Pattern, 7/11 pair. N and K. Genuine new lightweights, 11/6, 13/6, Dr. Nesper, 10/6 and 12/11. Telemagn, adjustable genuine (20% model), 14/11. Brunel, 12/6, 12/11, 14/6, 3 models. "GRIZZARD" (Continental) 3 models. "13" set. (Post, 6d.)

**EDISWAN R.C. THREESOMER.C.R.**  
2 Ediswan R.C. Units, 3 Valve Holders, Left-hand 2-way Coil Holder, 2 R.C.2 Valves, 1 P.V. do., 3 M. Rheostats, 9-v. Grid Bias, .0005 Tuning Condenser. SET OF PARTS **67/6** Post Free.

**LISSENOLA**, 13/6, L.F. Transformer, 8.6. 35 ohm Rheostat, 2/6. H.F. or L.F. Choke, 10/-; Fieldless Coils, 15/6. Grid Leaks, 1/-; D.H.O., variable, 2/6. All parts available.

**BRADES, AMPLION, B.T.H. STERLING, and ALL LOW SPEAKERS, T.C.C. MANSBRIDGE, USUAL SIZES.**

**RADIO FOR THE MILLION** (Mullard Receiver).  
FRANKLIN P.M.  
RODNEY P.M.  
NELSON P.M.  
GRENVILLE P.M.  
All parts in Stock. Set of 4 Blue Prints, with Book of Instructions, Free to customers (cash only).

**TUNEWELL** LOW-LOSS COILS (Tanco Patent).  
Accurately calibrated. Standardised Polarity, 25, 35, 50, 75, 1/6 each. 30, 40, 50, 100, 1 8 each. 150, 2/3. (5XX 175, 2/0.) 200, 2/8. 250, 2/3. 300, 3/8. Post extra (5/- worth free).

**COLVERN SCREENED COILS, BASES AND SCREENS.**  
Former and Base, 5/-; 6 pin Base, 1/6. Former only, 4/-; Screen and Base, 8/6. S.P.H.F.T., 9/6. S.S. do., 9/6. 2 Monocil Coils, 18/-.

**LEWCOS, BOWYER-LOWE, MAGNUM SCREENED COILS.**  
Radio Micro Guaranteed genuine.  
3.5-v. .06-a., G.P. . . 6/11  
1.8-v. .2-a., G.P. . . 6/11  
3.5-v. 3-a., Power . . . 8/6  
3.5-v. 1-a. . . . . 9/8  
1.8-v. 2-a. . . . . 10/6  
Double Grid 5-pin D.E. for Undyne or other circuits, 3.5-v. .06, A.T.5 to 20-v., 10/6. Beware of imitations.

**3-VALVE SET (D. & 2L.F.)**  
with Coils and Valves. Tax paid. (Carr. and packing, 7/6) **£5 15 0**  
With accessories as mentioned, with 2 Valve Set. (Carr. and packing, 10/-) **£8 18 6**

**COLVERN SCREENED COILS, BASES AND SCREENS.**  
Former and Base, 5/-; 6 pin Base, 1/6. Former only, 4/-; Screen and Base, 8/6. S.P.H.F.T., 9/6. S.S. do., 9/6. 2 Monocil Coils, 18/-.

**L.F. TRANSFORMERS**  
Ferranti A.F.3, 25/-; A.P.4, 17/3; Eurcks Convent, 25/-; 2nd Stage, 21/-; Baby 1st or 2nd, 15/-; Reflex, 15/-; Formo shrouded, 10/6; Success (Black), 21/-; Royal 20/-; Ormond newest model, 15/8; Wates' Supra, 10/6; Crox 5-1, 3-1, 4/6; Marconi, "Ideal", all stages, 25/- each. C.A.V., 15/-; Pyc, 22/8; Gansbell, 2 stages, 25/8; Ideal Junior, 18/0; R.I., 25/-; Multi-Ratio, 25/-.

**JACKSON BROS. (J.B.)**  
S.L.F. .0005, 11/6; .00035, 10/6. Brass Valve 4-in. dia. Geared, Sq. Law, Twin Gang stocked.

**FIXED CONDENSERS.**  
Dublier, .0001, 2, 3, 4, 5, 6, each 2/6. .001, 2, 3, 4, 5, 6, each 2/6. Grid Leak, 2/6. Edson Bell, .001, .0001, 2, 3, 4, 5, 1/-; .002, 3, 4, 5, 6, 1/6. .0003 and grid leak, 2/-; McMichael with clips, .001 to .00005, 2/6 each. .001 to .006, 3/- each.

**GRAHAM FERISH WEST END DEPOT.**  
Sold on Money Back Guarantee. Fixed Condensers, 1/-; 1/6; .0003 and Grid Leak, 2/- for Series and Parallel, Grid Leak 1/3 each.

**R.I. AERIAL TUNING INDUCTANCE** — With variable reactance, a new unit for panel mounting, covering the wave-lengths from 175-4,000 metres. With efficient aerial reaction over the whole of the range, 21/9/6 each. R.I. Permanent Detector, 5/-; 1-Hole Fixing, 6/6. Multi Ratio L.F., 25/-; Standard Ratio, 25/-; Reactive Anode Unit, 25/-; New H.F. Choke, 12/6.

**VALVE HOLDERS (B.B. Non-microphonic).**  
Harley, 1/8. Kay Ray, 1/6. Lotus, 2/6; with Terminals, 2/6. Benjamin, 2/6. Burndept, 2/6.

**Mullard Ever-Resi Valve** Wound Anode Resistance (80,000 and 100,000 ohms), 5/-; complete with Holder, 6/6.  
**MULLARD Grid Leaks and Condensers:** Type Grid B 0-5 to 5.0 ohms, 2/6. Type Grid B combined with .0003 mfd., Condenser Type MA, 5/-; Type MA Condenser, .0001 to .0009 mfd., 2/6. Type MB Condenser, .001 to .01 mfd., 3/-.

**LEWCOS, BOWYER-LOWE, MAGNUM SCREENED COILS.**

**RADIO MICRO** Guaranteed genuine.  
3.5-v. .06-a., G.P. . . 6/11  
1.8-v. .2-a., G.P. . . 6/11  
3.5-v. 3-a., Power . . . 8/6  
3.5-v. 1-a. . . . . 9/8  
1.8-v. 2-a. . . . . 10/6  
Double Grid 5-pin D.E. for Undyne or other circuits, 3.5-v. .06, A.T.5 to 20-v., 10/6. Beware of imitations.

**VERNER DIAGNOSIS**—Fermo, 7/-; Indigraph (Igranlic), 7/-; Detex 5/9. Detex Verma, 4/8. Ormond, 10/-, etc. etc. Igranlic 4-in. Dial and Knob, 2/6. KAY RAY, 1/6. Trilolite 1/9. Standard Ebonte Dials, 10d. and 1/-.

**CALLER'S COLUMN**  
NOT SENT BY POST.  
EBONITE, GRADE A. Stock sizes: 6 x 6 and 7 x 5, 1/3; 8 x 6, 1/6; 9 x 6, 1/9; 10 x 8, 2/9; 12 x 6, 2/9; 12 x 8, 3/6; 12 x 9, 4/-; 14 x 7, 4/6. ALSO CUT TO SIZE while you wait at 4d. per sq. inch 3/18th; and 2d. sq. inch for 4 in. Special cheap panels for Crystal Sets.

**CABINETS.** — American type, solid polished hinged lid and baseboard. 8 in. x 6 in. x 7 in. deep, 6/11. 10 in. x 8 in. x 8 in. 7/6. Screen and Base, 8/6. 10/6 and 12/6; 14 in. x 7 in. 13/6; 16 in. x 8 in., 16/11. Any size made to order in a few days.

**GEARED COIL STANDS.** For panel or baseboard. Various designs. 2/3, 2/6, 2/11, 3/6, 3/6, 3/11, 4/6, 5/6, 5/6. Also back of panel from 2/11. All ebomite and best quality. Only need seeing. Penton, Newey, G.E.C. Lotus, Polar stocked.

**HEADPHONE COILS.** Good quality, 1/3, 1/6. Loud Speaker Coils, 1/9; 4-way Battery Leads, 2/-; 7-way, 3/6.

**H.T. BATTERIES.** All kinds of rubbish on the market, so buy here where only guaranteed and reputable makers. Adico, Pol. (highest test award), 60-v., 6/11; 100-v., 12/11. Dr. Nesper (the name is enough), 60-v., 7/11; 100-v., 13/11. For those that want a cheaper but still reliable, H.T., try the 60-v. 60-v. 100-v., 10/11. Ever-ready, Siemens stocked B.T.H. 1.5, 2/-; Adico, 1/8. Columbia, 2/8. Hellesen, 2/8. Hellesen 4 1/2 volts Super L.T., 10/6 (and worth it!) H.T. 66-v., 12/6; 99-v., 21/-; Flash lamp, 4/5. Adico, 4/6 doz. 6d. British, 5/- doz.; Dr. Nesper, 6d. each; 4/6 doz. Be sure you are at Raymonds.

**VARIOMETERS.** Ebomite wound with green silk, with knob, 2/6. Ball Rotor, Knob and Dial, 3/11.

**COIL PLUGS.** — Ebomite on Base, 6/1d., 7/1d. Lotus 8d. Burne Jones, 1/9. Low Loss, 8/6. Panel, 6/1d. Various stocked.

**AERIALS.** — 100 ft. 7/2d. Hard drawn, 1/11. Extra heavy, 2/2. Phosphor 49 strands, 1/-; Electron stocked. Special INDOOR Aerials, phosphor, with ebomite separator, and rubber rings (12 ft. x 8 strands), total 100 ft., 4/8. O.V., 2/6. 10 yds., 1/-; 10 yds., 1/3; 10 yds., 1/6. Extra heavy, 2d. and 3d. v.d. R. & B. Twin Pex (best), 6 yds., 10d.; 12 yds., 1/6; 36 yds., 1/6. O.V. Insulators, 2 for 11d. Ins. Staples, 4 a 1d. Earth Tubes, Copper, extra value, 2/3. Climax, 5/- (also at 2/6).

**SWITCHES.** — On porcelain DPDT, 1/3; SPDT, 10d. Superior articles. Nickel, Panel, Ebomite handle. DPDT, 1/6; SPDT, 1/-; Push and Pull, 1/6 and 1/9. All Lissens stocked.

**TERMINALS, Etc.** — Nickel W.O. Phone, Pillar, 1/- doz.; 3 for 4d. Brass do., 10d. doz.; 1d. each. Nickel Valve Legs, 2 for 11d. Stop Pins, 2 a 1d. Spade Tags, 6 a 1d. Soldering, 3d. doz. Ormond Pins, 2d. doz. Washers, 12 a 1d. Ray 1/-; B.A. Rod, 3d. ft. Only the best sold here. Screw Spades, 2 for 11d. Pins do. Valve Pins, 2 a 1d.

**PERMANENT DETECTORS.** — Liberty, 3/6. Red Diamond (a topper), 2/-; Lion Micro, latest cannot be equalled, 2/6. Browne, 2/6. Washers, 12 a 1d. Ray 1/-; 1/3. Service Micro-meter, with crystal, 2/6. Burndept, 4/-; Mic Met, 4/6.

**RED & BLACK Winder Plugs, Ed. and Ed. pr. Spades, 3d. pr. Pin, Ed. jr. Plug & Socket, 3d. Clk. Wandler Plug, Ed. Igranlic, 2d.**

**27 & 28a, LISLE STREET, LEICESTER SQUARE, W.C.2**  
Back of Daly's Theatre, Nearest Tube, Leicester Square. Phone: Gerrard 4637.



**Simpler Wiring**

NO NEED any longer to wire up Condenser, Grid-Leak and Valve Holder separately—they can be obtained as complete units. Less space is required, mounting is made easier, troubles arising from faulty connections and spacing are avoided. Also, the cost of Grid-Leak clips and mounting screws is saved.

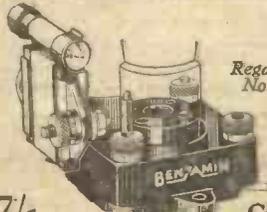
Remember, too, that the BENJAMIN Anti-Microphonic Valve Holder is not only infinitely superior to all its imitations in design and finish, but in actual performance too.



Read. Design No. 722528

**5/3 Complete**

**VALVE HOLDER & GRID-LEAK**  
A Dubilier Dumetohm 2 meg. Grid-Leak is fixed on to a rigid insulating bar by means of nickel-plated copper clips.



Read. Design No. 722529

**7/- Complete**

**VALVE HOLDER, GRID-LEAK & CONDENSER**

Nickel-plated copper clips carry a Dubilier fixed Condenser (.0009) in addition to the Grid-Leak. Series or parallel.

**BENJAMIN VALVE HOLDER**  
without Leak or Condenser **Price 2/9**

From all good Dealers

**BENJAMIN**

BRITISH MADE

Clearer-Tone, Anti-Microphonic  
**VALVE HOLDER**

THE BENJAMIN ELECTRIC LIMITED  
Tottenham, London, N.17

**ADVICE FOR INVENTORS**  
(Continued from page 167.)

average inventor are many, but I should say that there are three which stand out and which deserve particular attention:

In the first place, the inventor invents the wrong kind of things, and has little or no idea of the possibility of commercial development, or of the problems or difficulties inherent therein.

In the second place, the inventor may seek to conduct his own business negotiations, which is very undesirable from several points of view: for one thing he is seeking to undertake work for which (in 999 cases out of 1,000) he is entirely unfitted, and for another thing he is running the risk of upsetting and disturbing the inventive mentality which alone may be his greatest asset. In other words, he is liable to become "a jack of all trades and master of none."

In the third place the average inventor invariably places a most disproportionate estimate upon the share of the rewards which ought to come to him, and is usually most obstinate in failing to realise or to appreciate the part—and the very important part—played by the commercial man in the production and marketing of an invention.

It is for this reason that a business man who has had any experience in the development and marketing of inventions prefers to deal with some agent of the inventor rather than with the inventor himself. This, in fact, brings us back to the first of the fundamental characteristics of the inventor which I mentioned above, namely, that the average inventor is not a commercial man.

**The Three Chief Mistakes**

**N**OW let us turn to the first of the three principal mistakes which, in my opinion, are commonly made by inventors—the inventing of the wrong type of article. Perhaps I can best illustrate what I mean in this connection by the aid of examples. Suppose a man came to me with an invention for a new type of (let us say) connecting wire or busbar for connecting together the components of a wireless set.

Unless the wire had some very extraordinary quality or property—and it is difficult to conceive in this case what it could be, in view of existing types of this product

(Continued on page 191)

**COMBINE EFFICIENCY & ECONOMY**

Use the **COPEX "POPULAR MODEL"** Copper Coil Screen and Base



This screen and base is made from high-grade copper—the best metal for screening coils. Terminals are arranged in such a manner that it is impossible to "short" them when replacing screen. Perfect electrical and self-cleaning contact. Screen with interchangeable 6-pin base (Patent No. 259,469); **9/6**

**Special Six-pin Base**



To replace the more expensive standard screened coil base in sets where the actual screen is not required. Standard spacing with terminals arranged for easy accessibility **2/9**

**Keystone Fixed Resistors**

No. 4 for .25 amp. valves with 6-volt accumulator. No. 17 for .06 amp. valves with 4-volt accumulator.



Price **2/6**

**Keystone Neutralising and Balancing Condensers**

Used in all the popular circuits this season. These condensers have been designed by experts, and they are suitable for neutralising the electrode capacities of all types of valves. Very low minimum capacity. The wide spacing of the vanes renders accidental "shorting" impossible. Very well made from best quality material and beautifully finished.



Board mounting .. **5/-**

Panel mounting .. **6/3**

Balancing Condenser, similar to the illustration, but having two sets of fixed vanes instead of one. Equally well finished .. **7/6**

**WE SUPPLY PARTS FOR ALL "MODERN WIRELESS" SETS—AND WE GUARANTEE GOOD RESULTS**

If you are building a set, you cannot do better than avail yourself of the famous Pilot Service. Under this Scheme you are absolutely guaranteed success, and our Technical and Service Departments are ready to help you at all times should you encounter any small difficulties. Do not attempt to build a set without this guarantee of technical assistance.

Send 6d. in stamps for a copy of the "Pilot Manual," which gives full particulars of this Service, and illustrated details of the latest and most popular receiving sets.



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# GAXTON WIRELESS CABINETS

All Polished with new enamel that gives a glass hard surface that cannot be soiled or scratched. Ebonite or Radion Panels Supplied and Perfectly Fitted at low extra cost. **SENT FREE.**—Catalogue of Standard Wireless Cabinets in various sizes and woods.

## THOUSANDS OF SATISFIED CUSTOMERS.

**ELSTREE SOLODYNE.** Panel 21" x 7" fitted 16" Baseboard, drop down Beaded Front Door. Fumed Oak 61/-. Dark Oak 65/-. Mahogany polished 68/6. Raised Panel 5/- extra. Packing Case 5/- extra.

**ELSTREE SIX.** Panel 42" x 9" fitted 13 1/2" Baseboard. Open Type. Fumed or Dark Oak 80/-. Mahogany polished 90/-. Packing Case 7/6 extra.

**MONODIAL.** Panel 14" x 7" fitted 14" Baseboard. Fumed Oak 33/6, Dark Oak 35/-. Mahogany polished 39/6. Packing Case 6/- extra.

**NIGHT HAWK.** Panel 16" x 8" fitted 14" Baseboard. Open Type. Fumed Oak 33/6, Dark Oak 35/-. Mahogany polished 39/6. Packing Case 7/- extra.

**FIVE FIFTEEN.** Panel 24" x 7" fitted 8 3/4" Baseboard two Front Doors. Fumed Oak 40/-. Dark Oak 42/6, Mahogany polished 48/-. Packing Case 7/6 extra.

**THE 1927 FIVE.** Panel 27 1/2" x 7" Sloping Front, as originally described. Fumed or Dark Oak 38/-. Mahogany polished 48/-. Packing Case 7/6 extra.

**EVERYMAN THREE.** Panel 20" x 8" fitted 8" Baseboard. Fumed Oak 33/6, Dark Oak 35/-. Mahogany polished 39/6. Packing Case 6/- extra.

**EVERYMAN FOUR.** Panel 26" x 8" fitted 8" Baseboard. Fumed Oak 35/6, Dark Oak 37/6, Mahogany polished 41/6. Packing Case 7/- extra.

**CASH WITH ORDER. CARRIAGE PAID U.K. PROMPT DELIVERY.**

Packing Case Money repaid if Case returned within 14 days  
Carriage paid to Works.

## CAXTON WOOD TURNERY CO.. MARKET HARBOROUGH.

**WIRELESS.**—Capable, trustworthy men with spare time, who wish to substantially increase income, required where we are not fully represented. Applicants must have practical knowledge of installation of Set and Aerial, be householders or live with parents, and be able to give references; state age and experience. Address: Dept. 50, General Radio Co., Ltd., Radio House, Regent Street, London, W.1

### WET H.T. BATTERIES

British-made (round or square) Leclanche Glass Jars 2 1/2 by 1 1/2 for wet H.T. Units. Waxed 1/3 doz., plain 1/- doz., zincs 1/- doz. Grade 1 sacs 1/6 doz. Grade 2 sacs 1/3 doz. Special Non-Solder and Non-Corrosive Plug-Socket Connector and zinc combined, Reg. design. Each cell a tapped unit; 2/6 doz. Large sacs 3/- doz. Airt. proof varnish. 6d. Jar (Black). Carriage and Packing extra. Send 11d. Stamp for Instructions and List. Ask us about the "Unique" Voltmeter.

**ETON GLASS BATTERY CO.**  
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### ACCUMULATORS ON EASY PAYMENTS

High Tension Accumulators built up from 20 Volt sections 15/- each. Example: 60 Volt H.T. 45/- CASH, or 12/6 DOWN and 6 monthly payments of 6/-. Carriage Paid. Satisfaction or money back. Write for lists to DEPT. 12,

Covenary Direct Supplies, Ltd.,  
23, Warwick Row, Covenary  
Any Wireless Goods supplied on easy payments.

# REPAIRS

to HEADPHONES LOUD-SPEAKERS TRANSFORMERS COILS

First-class workmanship only. That is just the vital difference. We are specialists with almost 30 years' experience in every form of intricate and accurate coil winding, and we guarantee that work entrusted to us will be returned to you as good as new, if not better. This is no idle claim, but the unsolicited opinion of scores of satisfied clients.

**THE VARLEY MAGNET COMPANY**  
(Proprietors: Oliver Pell Control Ltd.)  
Bloomfield Road, Woolwich, S.E.18

Telephone Woolwich 688



## ADVICE FOR INVENTORS

(Continued from page 190.)

on the market—I should advise him that he was wasting his time in attempting to secure a patent or, if he had already secured the patent, in endeavouring to sell it. There would be several reasons for this advice.

In the first place, as I have already indicated, there would have to be some very remarkable feature in the invention. In the second place, the product ordinarily used is so satisfactory and so cheap that it would cost a good deal of money in advertising to convince the public of the merits of the patented article, and in view of the very low price of the article it would be necessary to do a large volume of the advertising outlay, or, to put the matter in another way, the total amount of the product purchased in a year by each customer represents so small a money value that it is in general not an article which lends itself to advertising.

In the third place, if a manufacturing company had to pay such royalties as would total in a year, on an article of this kind, a sum which the inventor would feel satisfied to accept, such royalties would represent a very heavy percentage charge on the article. This then is a fair example of a type of article to which it would in general be inadvisable for an inventor to devote his time.

### A Concrete Example.

**N**OW let us go, by way of comparison, to the other end of the scale and take an article such as a wireless valve. Here we have an article which eminently lends itself to advertising, since the total price received for each article is, say, something between 10s. and £1. Thus each time a valve is sold there is a (retail) turnover of that amount, and so it pays to advertise a valve, whereas it might not and probably would not pay to advertise a pin or a screw or some other article of very small value (unless, of course, each customer purchased a quantity of such small articles of reasonable monetary value). Moreover, the total number of valves sold per annum throughout the world is very large, and consequently a royalty of 1d. per valve, or even a fraction of a 1d. per valve, on the output of any successful valve-

(Continued on page 192.)

### Don't pay more!

Only a small deposit is necessary for you to have any "Modern Wireless" Set you like from our varied stock. Whether you want a set, or accessories, or merely advice, our catalogue "M" will prove of great value to you. Write for it to-day to

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PLEASE be sure to mention "MODERN WIRELESS" when communicating with Advertisers. THANKS!







## The little brown box that brings Valve results to Crystal users

WHERE is the owner-of-a Crystal Set who has not longed for the results enjoyed by his friend the valve user? Who has not envied those able to fill their whole room with the music and speech of the night's broadcast? But now since the advent of the little 'brown box', anyone with a Crystal Set living within fifteen miles of a broadcasting station [or eighty miles of Daven-try] is on a complete level with the Valve Set owner. The **Brown Crystal Amplifier**, brings to the Crystal Set user the priceless



boon of Loud Speaker reproduction without any of the upkeep cost and trouble inseparable from the valve. Get your Dealer to demonstrate the Crystal Amp-lifier to you on one of the nine **Brown Loud Speak-ers**. You'll be charmed. Most probably you'll agree with most people that Wireless reproduction is at its very best when the Crystal Amplifier and a **Brown Loud Speaker** is used. A purity that is unrivalled. Volume full and adequate. A fidelity of reproduction which is almost uncanny. Yours for £4 4s. 0d.

### **Brown Crystal Amplifier**

*puts Crystal users on a level with the Valve Set owner*

and whichever **Brown Loud Speaker** you desire.



The Disc.

2000 ohms.  
Black and gold  
£7. 7. 0.

Oxydised Silver  
£8. 8. 0.



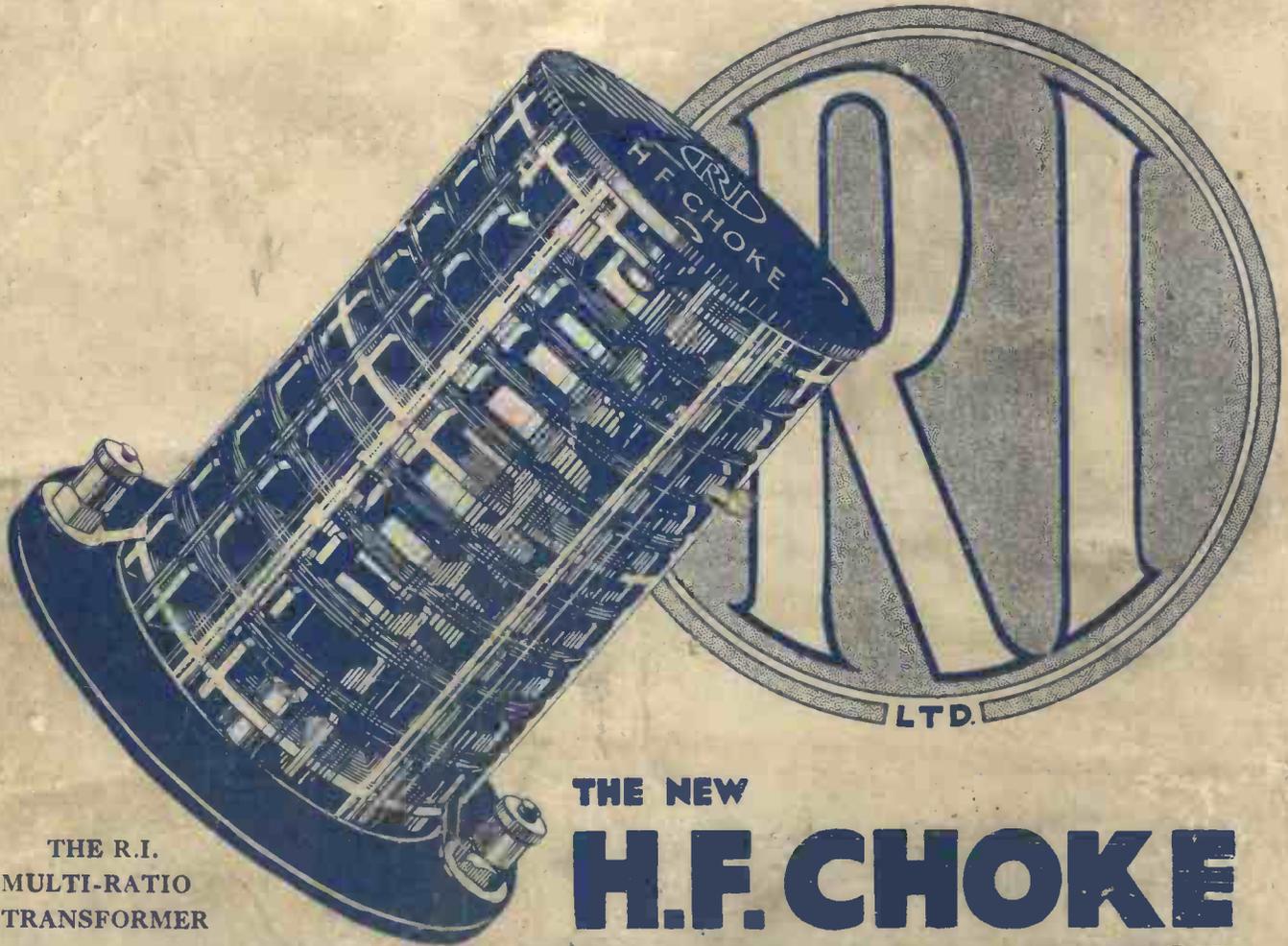
The H1.

120 ohms. £5. 5. 0.  
2000 ohms. £5. 8. 0.  
4000 ohms. £5. 10 0.

S. G. BROWN, LTD., Western Avenue. North Acton, W.1.

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Gilbert Ad. 7200



**THE R.I.  
MULTI-RATIO  
TRANSFORMER**

with its seven ratios and three impedance values is undoubtedly the perfect L.F. coupling unit. The design is recognised as an advance on any previous transformer for intervalve coupling. Suitable for use in any circuit and with any valve, it gives a degree of pure powerful amplification under any conditions impossible to obtain with the usual single ratio instrument.

**THE NEW  
H.F. CHOKE  
WILL BE THE BIGGEST  
FEATURE THIS YEAR**

Here is another remarkable R.I. component designed for circuits where a tuned-grid circuit is employed.

Being an R.I. product it has all the features necessary to give improved working of this circuit, for, as it is used virtually in parallel with the tuned circuit it is important that the high-frequency resistance and self-capacity are negligible in order to maintain selectivity and efficiency.

Hence the New R.I. H.F. Choke possesses a high impedance value and is wound in well-spaced sections on a low-loss skeleton former. For wavelengths of from 50 to 4,000 metres it is quite suitable and no observable increase in the H.F. resistance of the parallel tuned circuit will result.

It is a precision instrument well in keeping with the sound engineering tradition of R.I. Ltd. Perfect in design and workmanship it is an outstanding example of the dominating influence of this progressive company in the wireless field.

**PRICE 12/6**

*Write for the R.I. Green and Gold Catalogue.*



**Price 25/-**

**THE MARK OF BETTER RADIO**

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