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# Amateur Wireless

Every Thursday 3<sup>d</sup>

# And Electrics

Vol. XI. No. 277

Saturday, Oct. 1, 1927

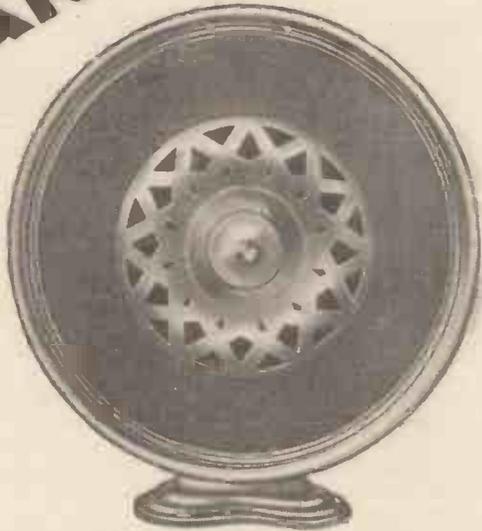
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- L.T.+
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MARCONIPHONE

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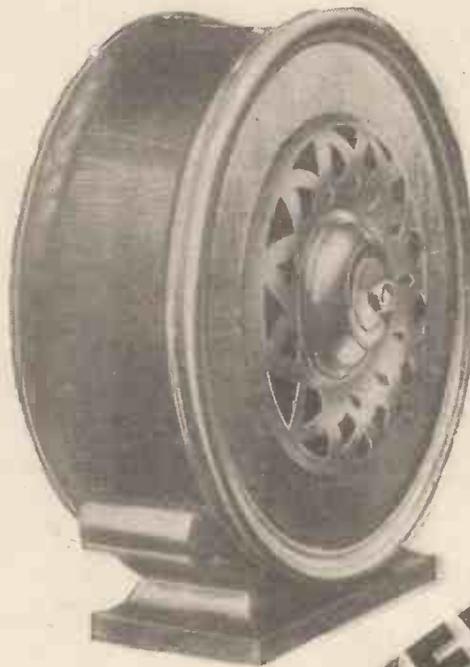
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The two Cone Speakers, the Marconiphone Model 75 and the Marconiphone Cabinet Cone, represent a long-sought success in sensitivity, up to now a weak point in cones, compared with horn speakers.

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# CONE SPEAKERS

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

# Amateur Wireless

## and Electrics

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Vol. XI. No. 277

Edited by BERNARD E. JONES  
Technical Editor: J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

October 1, 1927

### Gramo-Radio—Keep It Up B.B.C.!—A Strange “Listener”—Next Please!— Who said Daventry Junior!—“The Gods Applaud.”

#### Gramo-Radio

ON page 440 of this number is the article giving full constructional details of the combined broadcast receiver and electrical gramophone reproducer of which J. H. Reyner, B.Sc. (Hons), A.M.I.E.E., our Technical Editor, gave some preliminary notes last week. The fidelity of reproduction obtained by the new means is truly wonderful, and all gramophone enthusiasts are bound to try it sooner or later. Again, every such enthusiast must have chafed sometimes over the small compass of his records, however large his selection. But now even this drawback is abolished, for, with one movement, he can convert his “gramophone” into a broadcast receiver!

#### Next, Please!

A RUMOUR is afoot that Manchester is the next locality likely to be provided with “hi power” under the B.B.C. regional scheme. There are many reasons why the rumour may prove to be true, for Manchester is ideally suited for a station of the “Daventry Experimental” type. But don't scrap your long-range sets yet, Mancunians, for the B.B.C. refuse to confirm the rumour at the time of going to press!

#### Putting Bellmore on the Map

A STATION which will probably be brought in easily over here is the Bellmore, Long Island, 50-kilowatt, now in course of construction, which is to replace W.E.A.F. The plant incorporates all the latest ideas, the entire building being double-shielded. The eight acres occupied by the station are illuminated with flood lights to ward off mosquitoes, and 4,000 gallons of water are required per hour to keep the valves cool

#### FILAMENT VOLTAGE

Modern valves are very uncritical as to filament voltage, so much so, in fact, that variable filament rheostats are almost never used to-day. Instead fixed resistances or “resistors” are often used instead but in many cases no extra resistance whatever is used, the valves receiving the full voltage of the L.T. battery.

Now, although, say, a 2-volt valve will work well when connected directly to a 2-volt accumulator it is not economical to allow it to do so if, as is often the case, it will work just as well with a small extra resistance in series with the filament. The same, of course, applies to 4- or 6-volt valves. Detector valves especially will often work excellently with considerably less than the voltage at which they are rated across the filaments.

The slightest reduction of the filament current below the rated value very considerably increases the life of any filament. In fact running a valve filament at the lowest temperature consistent with good results may double or triple its life compared with the same filament run according to the maker's figures. Remember that the maker's rating is the maximum, which must not be exceeded, but which need not necessarily be reached.

#### Keep it up, B.B.C.!

EVERYONE will agree that the B.B.C. began the season in fine style with the “Proms.” and it certainly seems that they intend to “keep it up”—on the musical side at least. In addition to twelve “libretto” operas from the studio, there will be a number of relays of B.N.O.C. stage performances, together with four special relays of *La Traviata*, *Pagliacci*, *Cavalleria*, and *Rigoletto* from Manchester. Sir Henry Wood is giving twelve symphony concerts from the Queen's Hall; the People's

Palace, Mile End Road, is contributing eight, and at least eight of the Halle concerts will be relayed from Manchester.

#### A Strange “Listener”

A FIGURE of interest and compassion is the American man who has been deaf and dumb since he was six and now “listens-in” by resting his finger-tips on his cone loud-speaker. He is said to be able to trace the various instruments in an orchestra, and to differentiate between music and speech, although whether he understands the latter is not stated.

#### Who said Daventry Junior!

THE B.B.C. have now definitely decided to double the power of 5GB. This power, which will be about 30 kilowatts, will be first available with the new aerial—and within three weeks' time, too! So cheer up all ye who now listen in vain to the *alternative programme*!

#### “The Gods Applaud”

NOW that the B.B.C. music critic has seen fit to condemn the broadcasting of applause at the “Prom.” concerts, may not we expect the cessation of the wholly undesirable studio applause? The man who said he always judged broadcast variety turns by the noise the people made in the studio is acting as the B.B.C. would possibly wish him to!

#### The “Centre-tap Two”

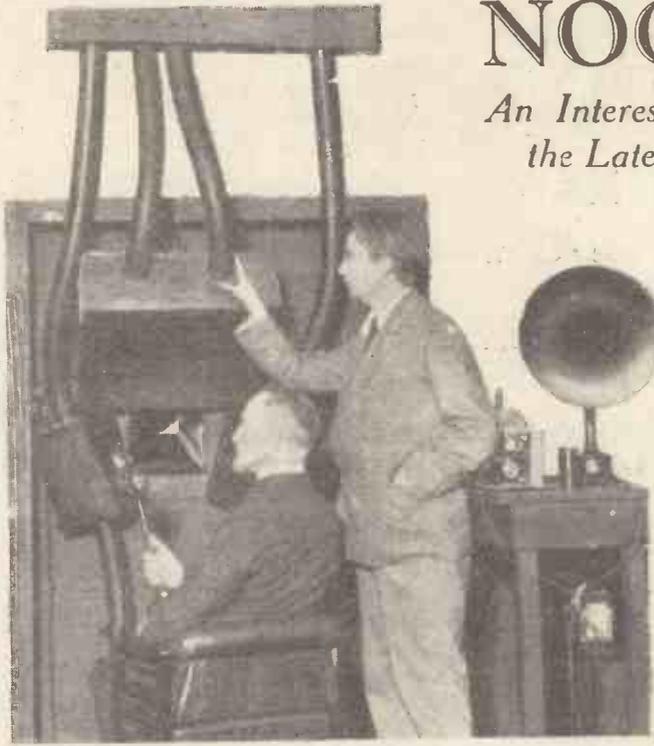
A REALLY good all-round set is the Hartley receiver described in this number. It is a two-valver employing one centre-tapped coil for both tuning and reaction. This system, together with the general design and efficiency of the circuit, gives the receiver surprising sensitivity, selectivity, and volume, and make it unusually easy to operate.

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# NOCTOVISION—

*An Interesting Account by an "A.W." Correspondent, of the Latest Development of the Baird Television System*



Mr. Baird (standing) at the Noctovision Transmitter

THE feature of the recent meeting of the British Association which caught the public fancy was undoubtedly Mr. J. L. Baird's demonstration of noctovision. Crowds pressed into his demonstration-room, and among them, of course, were many eminent men of science, including Sir Oliver Lodge.

Noctovision had never been publicly demonstrated before, whereas, of course, television had. Noctovision is similar to television, with one important difference. The word noctovision means seeing in darkness. In order that the reader may understand noctovision it is necessary first to describe briefly Mr. Baird's television apparatus.

## Long-distance Work

The television transmitter and receiver may be connected either by wireless or by a wire. The greatest distance so far covered by television in this country was from London to Glasgow, when Mr. Baird used a landline. At present he is trying to arrange to "televise" across the Atlantic. Mr. Baird's work is characterised by great ingenuity, and until recently he was working continually in the face of shortage of funds.

In transmitting the image of a person's face by television Mr. Baird sits the person in a bright light. The resultant light rays from his face affect a mechanical eye—the photo-electric cell. This is a device which turns light variations into electric current variations; in other words, a varying light thrown upon it will cause a current passed through it to vary accordingly. By means of a system of revolving discs each point on the face is subjected to the "gaze" of this mechanical eye in turn. The current from the cell then goes, by wire or wireless, to

the distant receiver, where it operates a lamp. The consequent fluctuating light passes through a system of revolving shutters which causes it to spread out over a small screen, and so the face is seen.

Mr. Baird courteously gave me a special demonstration for AMATEUR WIRELESS of his noctovision in Leeds. It is an uncanny business. Mr. Baird and I entered a room. A man was sitting in a chair before three black panels. Apart from this, nothing mechanical could be seen, though there was a steady hum of electric motors. Mr. Baird switched out the light. The room was in total darkness.

"Now," said the inventor, "come in the next room and see his face."

We went into the next room, where the receiving apparatus was installed. Looking at a large lens, I saw the face of the man sitting in total darkness in the next room.

## What Noctovision Is

It sounds very mysterious, but the explanation is simple. Everybody is familiar with the colour spectrum into which light can be divided by passing it through a glass prism. Each colour represents a light wave of different wavelength to each other colour. The eye detects these slight wavelength differences and so sees different colours. But there is one wave, a component, like the colours, of light, which does not affect the human eye. This is the infra-red ray or wave, which comes next to red in the spectrum. Although this is an ingredient of "white" light, just as much as any of the coloured lights, it is not seen by the human eye. It is seen, however, by the mechanical eye. The photo-electric cell responds to it in precisely the same way as it responds to visible light.

For noctovision Mr. Baird floods the subject in invisible infra-red rays. These come from the three panels referred to above. Being "visible" to the cell, they affect it in exactly the same way as the light in which the subject sits in television. The cell produces variations in a current.

At Leeds this was passed along a wire from one room to the next, but greater distances are, of course, possible. In the second room it operated a lamp, as in television.

Although the results are not as yet perfect, Mr. Baird has certainly achieved noctovision. The image seen at the receiving end is of a reddish colour and is constantly crossed by lines of light, like one of the early cinematograph films. When Mr. Baird entirely eliminates these flickers—which he is steadily doing—the results will be very good. As it is, the relief of the face is well reproduced and the subject can be recognised. One of the defects of noctovision, as compared with television, however, is that some of the colours on the face are not faithfully reproduced, this giving the image rather a livid aspect.

For normal purposes, television is used to transmit an image from one place to another, of course, there being no point in plunging the subject into darkness. But Mr. Baird sees a future for noctovision as a fascinating toy, as a possible instrument for seeing at night in wartime, and as a means of seeing through fog, in which it would be very valuable to ships at sea. The infra-red rays penetrate through fog fifteen times better than ordinary light rays.

L. BAILEY.

## PERMITTIVITY

WHEN an insulator such as glass or ebonite is interposed between two electrically charged surfaces, the mechanical stress or field of force existing between the two charges is reduced by an amount corresponding to the specific inductive capacity, or, as it is sometimes called, the "permittivity" of the insulator. For instance, the permittivity of ebonite is from two to three times that of air, according to the quality of the ebonite. It follows that a condenser with ebonite between its plates has double the capacity of an air-spaced condenser, because it will take double the charge of electricity to create a mechanical strain sufficient to rupture the insulation.

M. A. L.

## ADMITTANCE

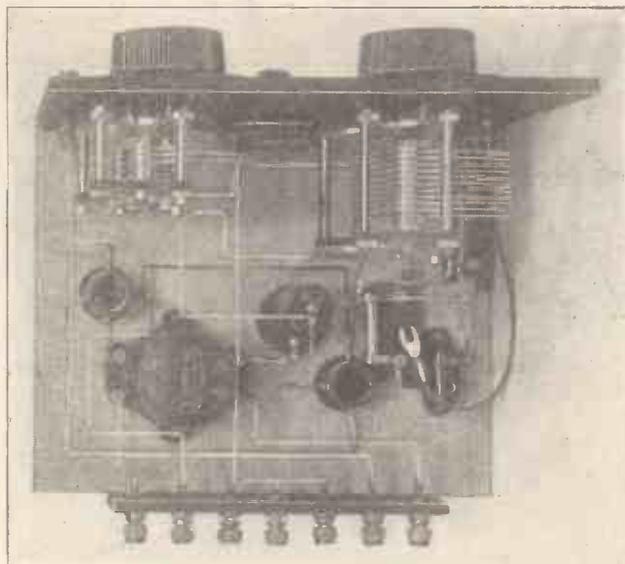
ADMITTANCE is the term used to express the reciprocal of impedance, just as "conductance" or conductivity is the reciprocal of resistance. The impedance of a condenser, for example, diminishes with the frequency of the applied current. At the same time, its admittance increases. In other words, the higher the applied frequency, the more current does the condenser "admit" or allow to pass through. On the other hand, the impedance of a coil increases with frequency, so that its "admittance" grows less, which is another way of saying that it acts as a choke.

B. A. R.



completed set also indicate how the components are disposed.

The terminal strip is screwed in a central position at the back of the baseboard. On this strip are mounted G.B.-, L.T.+, L.T.-, G.B.+, H.T.-, H.T.+1, and



A Plan View of the "Centre-tap Two"

H.T.+2 terminals, seven in all, in the order named, one inch apart. A closer examination of the baseboard layout will show that where possible the components are arranged to give short connections. This applies particularly to the grid condenser, the valve-holders, and the H.F. choke. Slight deviations of layout may be necessary if components other than those specified are used, but, generally speaking, the specification should be followed as far as is practicable.

As soon as the components are secured in position and the panel with its components, and terminal strip are fitted as indicated, the straightforward task of "wiring up" can be undertaken.

If a blueprint has been purchased, the

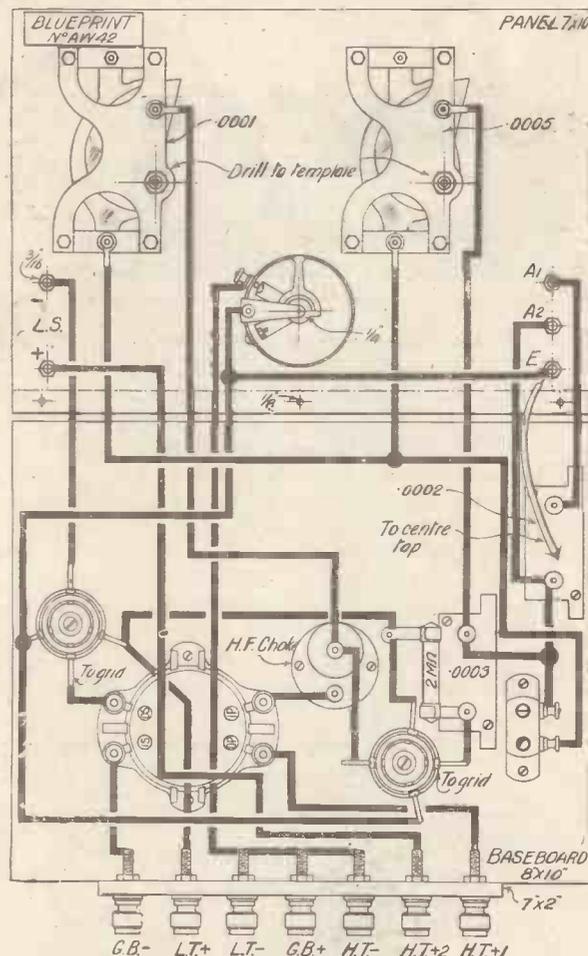
wiring is indeed simple, and to all those who have difficulty in following circuit diagrams or reduced reproductions, we can strongly recommend a blueprint as a solution to their difficulties.

Coloured Glazite wire was used in the original receiver, but if bare wire is used, we can recommend Junit. The centre-tap connection consists of a 7-in. length of rubber-covered Lewcos flex. One end is soldered to the earth terminal, and for convenience in changing coils the free end is screwed into a substantial Clix spade terminal.

In passing, we should like to mention that a supply of Clix wander plugs and spade and pin terminals, which were recently sent in by Lectro Linx, Ltd., of 254 Vauxhall Bridge Road, S.W.1, have proved extremely useful and efficient in this and other receivers. Separate flex leads, with suitable Clix attachments, form neat and permanent battery leads, or alternatively, a Lewcos multi-way battery cord can be used.

In our tests of this receiver a No. 60 Atlas centre-tapped coil was first tried, and later one of the new Lewcos centre-tapped coils. Lissen and Gambrell coils also came under test during the experiments, and all four makes proved satisfactory.

A DEL410 valve was used as a detector and a DEP410 as an L.F. amplifier. This combination gave very good results, as did combinations of Ediswan, Cossor, B.T.H., and Cosmos valves with similar



Reduced Reproduction of Blueprint (1/-) of the "Centre-tap Two"

characteristics.

Reports as to how this receiver performs in various parts of the country would be of value and interest.

### THE HALL EFFECT

**A**N American inventor has recently suggested the use of the Hall effect as a means for rectifying high-frequency currents. This curious phenomenon was discovered nearly fifty years ago, though up to the present it has found no useful purpose outside the research laboratory.

When a current is passed along the length of a strip or plate of metallic conductor, a transverse potential difference will appear between the sides or edges of the strip, if the latter is placed between the poles of a magnet. The strength of the Hall E.M.F. is directly proportional to the product of the longitudinal current and the strength of the applied magnetic field. With a strip of iron or zinc the transverse voltage is of opposite polarity to that which appears in the case of bismuth or nickel.

In the case of bismuth, the Hall effect is accompanied by a curious increase in the apparent ohmic resistance of the metal, the precise cause of which is not fully understood.

M. A. L.

### OXIDE RECTIFIERS

**T**HE rectifying properties of metal surfaces forced into close contact either with layers of powdered metallic oxides or, alternatively, with known rectifying crystals, offers a promising field for experiment, particularly in connection with battery-eliminating outfits for supplying filament current directly and economically from A.C. house mains. The chief desideration for low-tension or filament supply is that the rectifier should be capable of passing a comparatively heavy current, as compared

with the type of rectifier used for supplying the high-tension or plate current.

One type of oxide rectifier, invented by an American named Grondahl, consists of alternate discs of pure lead and oxidised copper, bolted together under considerable pressure. When used with a step-down transformer giving a terminal A.C. pressure in the neighbourhood of only five volts, the Grondahl rectifier is capable of passing a direct current of from one to two amperes. The Rubens rectifier is another pressure-contact device, in which the positive and negative units consist of metals or alloys belonging to different groups in the periodic table of elements.

B. A. R.

The deaf defendant in a law case recently held in New York, heard all the case with the aid of radio amplifiers.

# The A.C. Side of "Simpler Wireless"



Operating the System from A. C. Mains

Another Special Article by J. F. JOHNSTON

ALTHOUGH the "Simpler Wireless" system has been extremely successful in providing a simple solution to the problem of running a wireless set entirely from D.C. electric-lighting mains, its scope of usefulness would have been considerably limited had the system proved inapplicable to cases where the lighting supply is A.C. But this is not the case, and recent experiments seem to suggest that the A.C. side of "Simpler Wireless" may ultimately prove

as it does the D.C. problem. Naturally, as no set can work directly from an A.C. supply, rectification enters the question. Thus, even with a "Simpler Wireless" set, the man with an A.C. supply is not quite so fortunate as the D.C. user, but the necessary rectifying unit can be a very simple affair and need not be at all expensive.

As experiments are still going on to determine the best type and method of construction of a rectifying unit suitable for amateur use, it is only proposed, at the present juncture, to give readers some idea of the lines of these experiments and the nature of the results obtained.

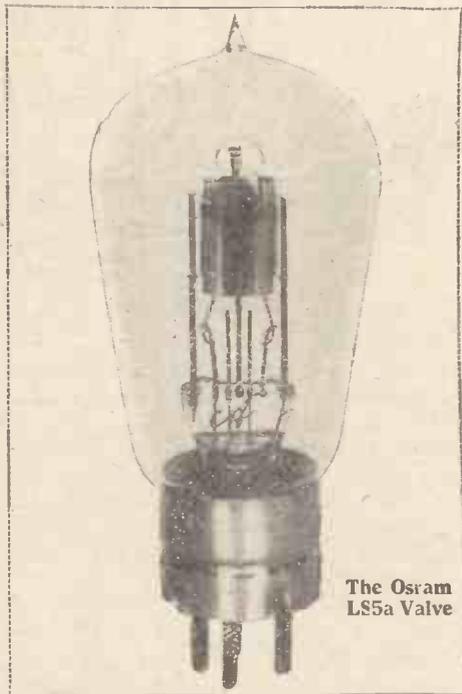
As it would obviously have been inconvenient to have to design two complete series of receivers—one for D.C. and one for A.C.—the best solution appeared to be to design a unit, if it were possible to do so, which would enable the D.C. sets to be worked from A.C. mains. As it had been decided to standardise the D.C. sets for a consumption of .1 amp. at 200 volts, it was obvious that the unit would have to give, with an A.C. input, 200 volts of smoothed and rectified D.C., and would, moreover, have to give this voltage when a current of .1 amp. was taken from the unit.

The circuit diagram of a unit which, when tested out, satisfactorily fulfilled these requirements is given on this page. Current from the A.C. mains is passed through the primary of a transformer which has a large and a small secondary winding, each centre-tapped. The large secondary winding provides the current to be rectified, while the smaller one is simply used for heating the filaments of the rectifying valves.

The valves must, of course, be able to rectify 100 milliamps between them. As a matter of fact, two Osram LS5A valves,

the plate and grid of each being joined together, have been found to answer very well indeed for this purpose. As each of these valves is capable of rectifying at least 80 milliamps, the 50 milliamps with which each is asked to deal in this unit is well within its capabilities.

The smoothing arrangement consists merely of a choke connected in series with the positive output lead and a large condenser connected across the output leads

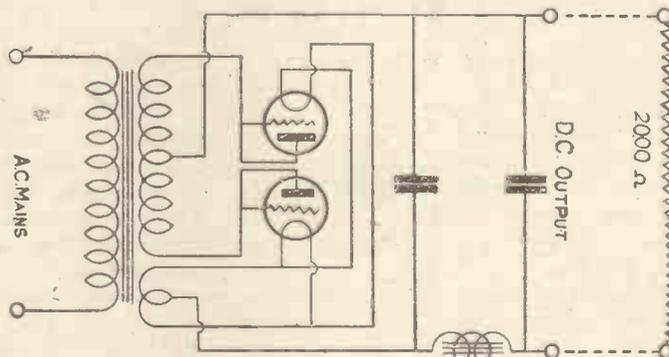


The Osram LS5a Valve

to be of even greater importance than its D.C. application.

There are, of course, several other ways in which current from a D.C. lighting supply can be used for wireless purposes—all more or less simple (though none are so simple as the latest system). All methods of utilising an A.C. supply, however, which have been put forward up to the present are so difficult, elaborate, or costly that most people would prefer to use batteries, even though an A.C. supply were available.

But the "Simpler Wireless" system now solves the A.C. problem quite as decisively



Circuit Diagram of Rectifier Unit

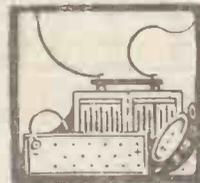
both before and after the choke coil. The first of these condensers—the one before the choke—acts as a reservoir, and as the current being taken from it is comparatively large (100 milliamps, of course) this condenser should have a fairly large capacity. Four microfarads will do, but 6 or 8 microfarads is a better value. The capacity of the other condenser is not so important, and 2 microfarads is ample.

The 2,000-ohm resistance shown connected across the output terminals of the unit (by means of the dotted lines) represents the filament circuit of a D.C. "Simpler Wireless" set. It is required to maintain a steady potential of 200 volts across this resistance, so that .1 amp. flows through it. The large transformer secondary must be so designed that this voltage is maintained across the 2,000-ohms resistance after allowing for the voltage drop across the smoothing choke and across the rectifying valves.

(Continued on page 454)



# PRACTICAL ODDS & ENDS

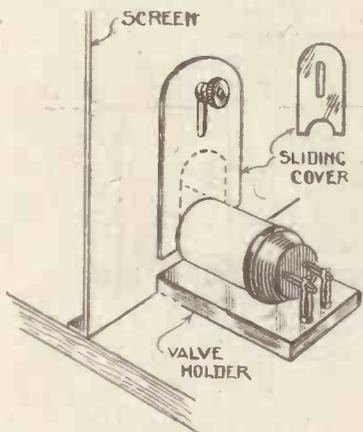


## Screening the New Valve

WHEN the new screened-grid valves are mounted on the baseboard of the receiver, and are thus beneath the other components, it is especially essential for the top of the valve to be well screened.

When the old-type holders are being used, however, this is just where the shielding is cut away, owing to the vertical movement required to clip them home. Some means of completing the screen, once the valve is in position, is obviously required.

The "drop-gate" method, illustrated in



A Novel Tetrode-valve Screen

the drawing herewith, is a very satisfactory method of doing this. It is rigid and neat, and occupies little space, and is thus preferable to several other methods.

The "drop-gate" should be cut from fairly thick brass. Two corresponding slots are cut in the gate and the screen. An ordinary terminal through the slots is used to hold the gate wherever it is required.—E. A.

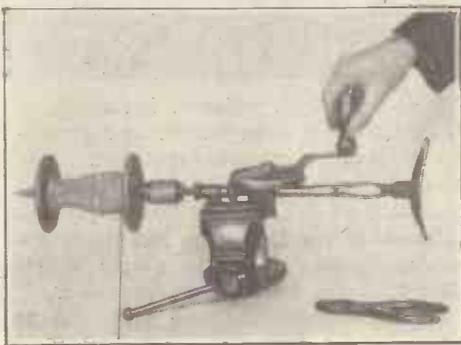
## Drill Sizes

IT is, perhaps, not generally known that the larger sizes of metal drills are indexed with letters and not with numbers. Drill numbers range from 60, which has a diameter of only .04 in., to drill No. 1, with a diameter of .228 in.

Above these are the letter drill sizes, ranging from A to Z, and when selecting drills for panel work for heavy components it is with the letter sizes that the amateur will be most concerned. Typical sizes are E, diameter 1/4 in.; N, diameter .3 in.; and Y, diameter .4 in.—B. B.

## A Simple Winder

IN the photograph given below there is shown a simple gadget for winding or unwinding chokes and solenoids, etc.,



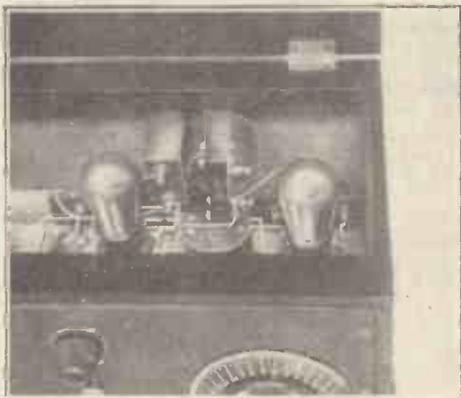
A Simple Winder

which has saved the writer from many a tedious hour. Although originally put together for unwinding a large coil which had burnt out, it has repeatedly come in useful for winding chokes and solenoids which require more care.

It consists simply of a 2BA threaded rod secured in the chuck of a drill, the body of which is held rigidly in a vice. The bobbin or former is secured on the rod by a couple of lock nuts. For winding solenoids a couple of end plates are required.—A. R.

## Protecting the Speaker

IN valve receivers there is often a voltage of 150 or more across the loud-speaker. Although the windings of most loud-speakers can take this, it is just as well to take some precautions for protecting them.



An Easily-fitted Loud-speaker Filter

A few minutes spent in putting together the gadget described below will result in long life for the loud-speaker.

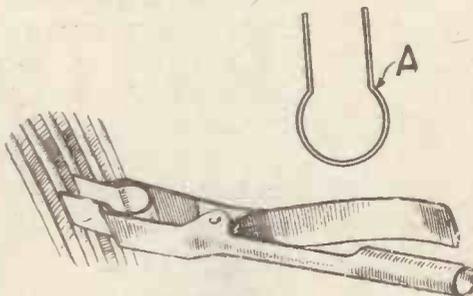
It consists of an L.F. choke put across

the output terminals of the receiver, and of a condenser of at least 2-microfarads capacity connected in series with the loud-speaker, the arrangement being in parallel with the choke.

In most receivers there is little room left on the baseboard for additions of this sort, but a convenient position can usually be found on the back of the cabinet, as the photograph shows. This position has the advantage of being near the terminal strips, enabling the new connections to be kept short.—P. E.

## A Useful Clip

THE hint given below will come in useful during many little difficult



A Useful Clip

soldering jobs. Soldering a tapping to a short-wave coil, for example, causes a great deal more annoyance and waste of time than it should.

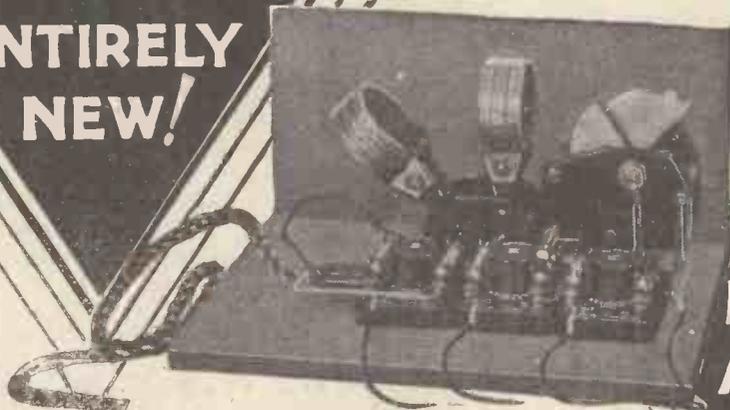
The spring clips which are available everywhere usually have little gripping power, as their "jaws" meet at an angle. If, however, a piece of springy brass is bent into the shape shown in A and is used in conjunction with the clip, this difficulty disappears.—A. E.

## Ebonite Quality Test

A PART from the usual tests for quality of ebonite, such as appearance and smell of sawn-off shavings and the "feel" of the material when drilled, a very good indication of quality is given by weight.

A square foot of good-quality ebonite sheet, 3/16 in. in thickness, should weigh approximately 20 oz. The addition of adulterants to the ebonite composition would account for the weight being considerably more than this figure, and if the weight of a panel appears excessive, it would be well to apply further tests before drilling it for a receiver.—K. B.

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Price ..... £3 0s 0d

No. 5—Head Telephones. Light  
weight and extremely sensitive,  
these phones are eminently suit-  
able for long range reception.  
Price ..... 15s 0d

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guaranteed instrument which  
gives a high, uniform amplifica-  
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Price ..... 15s 0d

Nos. 7 & 8—B. T. H. Valves—  
2, 4 and 6 volt.  
General Purposes  
Bright Emitter ..... 5s 0d  
Dual Emitter ..... 10s 6d  
H.F. Amplification ..... 10s 6d  
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No. 9—Anti-Microphonic Valve  
Holder. A holder to ensure  
complete absorption of vibrations  
Price ..... 2s 6d

No. 10—Resistance Capacity  
Coupling Unit. A complete am-  
plifying stage, less the valve.  
Price ..... 10s 6d

No. 11—3-Valve Resistor Recei-  
ver. An extremely efficient  
receiver giving perfect loud-  
speaker results.  
Price ..... £8 0s 0d  
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batteries.)

Royalties extra ... £1 17 6

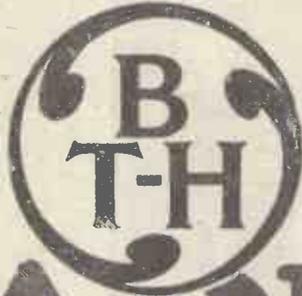
The above prices are applicable  
in Great Britain and Northern  
Ireland only.

**T**IME is always short at Exhibitions,  
so make at once for Stands 138 and  
139 and see the most interesting things  
first. Whatever you may have  
to miss, do not fail to see the  
B.T.H. exhibits, and particularly  
the new apparatus illustrated  
and described on  
the opposite page.



You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

# at YOUR Show



# RADIO APPARATUS

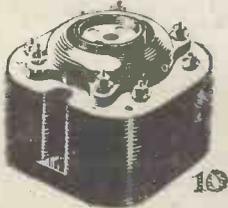
**STANDS NOS. 138 and 139**

## New Apparatus

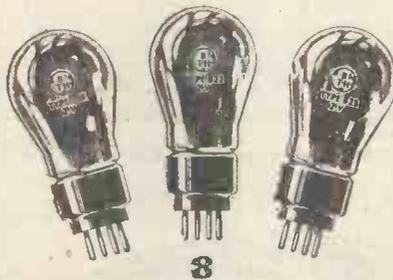
Below is illustrated *new* apparatus which merits your special attention whether you are interested in components or receivers.



The B.T.H. Anti-Microphonic Valve Holder is a holder mounted on rubber which ensures perfect absorption of shocks.

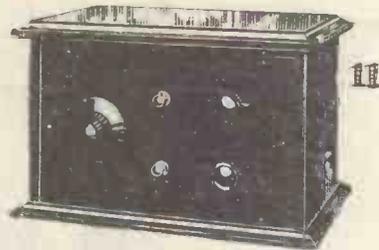


The B.T.H. Resistance Capacity Coupling Unit. This is a complete amplifying stage, less the valve, and used in conjunction with the B.T.H. B8 Valve will give perfect amplification over an extremely wide range of frequencies.



**B.T.H. 2-VOLT VALVES**  
The new B.T.H. series represent the latest development in the design and construction of 2-volt Valves.

B21 H.F.	0.1 amp.
B22 G.P.	0.1 amp.
B23 Power	0.2 amp.

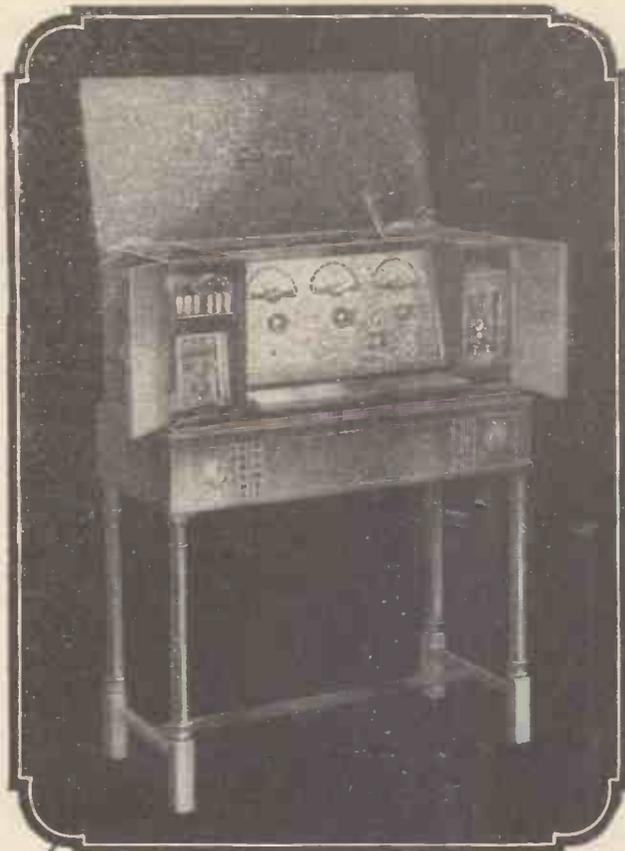


The B.T.H. 3-valve Resistor Receiver. An extremely efficient Receiver, employing resistance coupling, which gives perfect loud speaker results. It employs B.T.H. B8 Valves in the detector and first L.F. stage and a B.T.H. B23 in the power stage. Changing from low to high wave lengths is carried out by a simple movement of a switch—no coil changing.

Advertisement of The British Thomson-Houston Co., Ltd.

2800

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention



# MET-VICK

(COSMOS)

Wireless Sets  
and components  
for the new season

The illustration shows the new Met-Vick 5 with the eliminators contained in the side cupboards. It can be plugged into a lighting circuit just like any other electric appliance. If used with H.T. and L.T. batteries these can be accommodated in the cupboards. The circuit employs two phase-balanced and stabilised H.F. stages before the detector, and two resistance-coupled L.F. stages.

Operation is extremely simple, the local station can be easily cut out and a wide range of alternative programmes obtained. Special attention has been paid to running costs, which are remarkably low.

The Met-Vick 5 is a really beautiful instrument, and while a distinct advance on any 1926 model it still remains at a reasonable price. Obtain Leaflet 4117/9.

## MET-VICK

### BATTERY ELIMINATORS

"Met-Vick" Battery Eliminators are supplied in two models. The H.T.-C.B. Model can be used on various supply voltages of 40-100 periods. Grid Bias tapings are provided at 5, 10, 15 and 20 volts. A high voltage (up to 250 volts) can be applied to the last valve. The L.T. Model gives an output of 5 amperes at volts without hum.

List 7117/8

### A.N.P. (Astatic-Non-Parasitic) COILS

These new "Met-Vick" products provide a clever solution of a difficult problem. They overcome, simply and efficiently, the three difficulties associated with H.F. amplification, namely, Magnetic coupling between coils, Stabilisation, and Parasitic Oscillation.

List 4117/8

### RESISTANCE COUPLING UNITS

"Cosmos" ("Met-Vick") Resistance Coupling Units are well known to all wireless enthusiasts. The "V" type can now be obtained fitted with new "Met-Vick" A.C. Valve-holder. The latter is also supplied separately.

List 7117/8

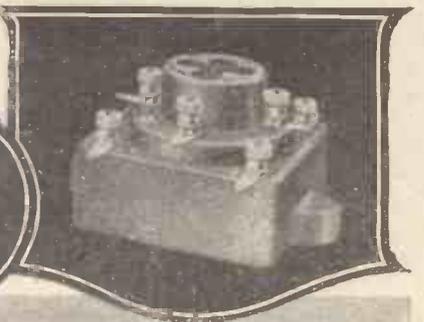
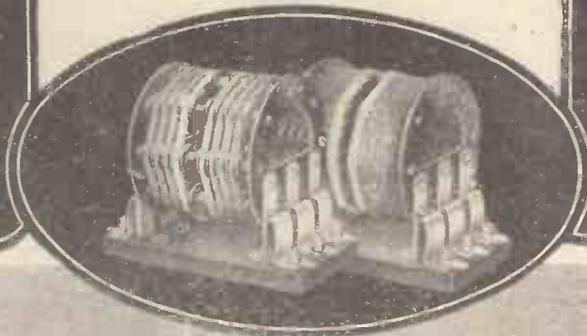
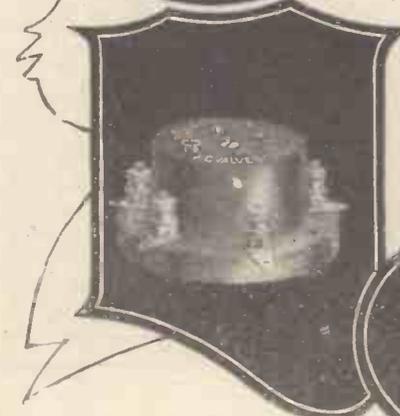
The various literature mentioned above gives full details and prices. Ask for your copies.

## METRO-VICK SUPPLIES, LTD.

(Proprietors: Metropolitan-Vickers Elec. Co., Ltd.)

155 Charing Cross Road, LONDON, W.C.2

STANDS Nos. 155-156



R1  
P87.

Please Mention "A.W." When Corresponding with Advertisers

# On Your Wavelength!

## The Success of the "Proms."

WHAT is the secret which has turned the Promenade Concerts from an undoubted failure to a substantial success? Throughout the season, on Wagner and Beethoven nights, the "house-full" boards were out, while on other nights the hall appeared to the eye to be packed. Such a change needs some explanation. The old supporters of the Queen's Hall were there in full force, but the more eager faces among the vast audience came from the far-flung suburbs of the metropolis. They had come to hear *their* concert, for to the listener a sense of proprietorship exists. Have they not encouraged, helped, criticised their broadcast service during four long years, and now, when radio is rapidly coming into its own, they flock in their thousands to see and applaud the creators of these wonderful concerts?

There is another aspect. Among the mass of listeners exists a hungry, starved army of musical natures to which the last four years has been a godsend. Out of touch with the music, these people pined in isolation. Slowly they have been nursed back to health by a careful diet, and now, when given the opportunity of musical concerts of the value of which they are intimately aware, they have flocked in their thousands to the Queen's Hall. It is a foregone conclusion that these concerts will be a permanency when it must be remembered that to the above enthusiasts must be added the large number of young people whose musical tastes are being given a sound elementary training by Sir Walford Davies' brilliant and interesting progressive instruction.

## The National Concerts

I feel that at the commencement of the season of National Concerts to be given in the Queen's Hall and the People's Palace, Mile End Road, it is a pity that these performances could not have been distributed throughout the large industrial centres of the United Kingdom. The difficulties and expense of such a proceeding is obvious, but when the pleasure and musical education the course would afford to the provincial listener is estimated, the balance would be on the credit side.

The devotees of symphony concerts will be charmed with the acoustic properties of the People's Palace. There has yet been no opportunity of testing this when the hall is packed to capacity, as it undoubtedly will be, but it is safe to say that the microphone tests, already carried out, give appreciably better results than the Queen's Hall, good as the latter undoubtedly are. I think it will be found that much greater

expression will be achieved from the People's Palace.

## Schemes of National Opera

We are again being treated to various plans for putting opera in English on to a successful footing. There are some three or four different schemes, all with different exponents and uncompromising ideals. All require the public support in one form or another. Each school believes that with the failure of its individual effort, opera in England will suddenly die. What is the position of broadcast opera (and with this section can be incorporated the B.N.O.C.)? Sir Thomas Beecham has stated that he will rely on the support of 150,000 of the public, and from this section of the public he will require a substantial guarantee; thus with all these personal schemes. Now, during the broadcast year we have a minimum of about twenty operas, a large number of operatic programmes, and some dozen or so relays of the B.N.O.C. One might safely estimate the budget for this enormous output at £15,000, or somewhere round that figure. It surely can be argued that if the B.B.C. can turn the "Proms." from failure to success as regards attendance, the same could be done with opera productions in the various theatres of London and the provinces.

## Subsidies

It is stated that a subsidy of approximately £60,000 is needed to float operas in this country successfully. The B.B.C. are already on a conservative estimate, spending some £15,000. This leaves a further debit of £45,000. It is safe to say that, with unified control, the publicity of the microphone and the feeling of ownership that wireless gives to the listeners this debit would be brought down to the modest sum of £20,000.

Thus it can be argued that, in the hands of the B.B.C., English opera would be firmly planted in our theatres for the extra expenditure of some £20,000. I think this little forecast will prove very near the mark in the next few years. Radio in such matters has, unfortunately, to wait until the individualists have exhausted their efforts and decide the musical talent of England. I am convinced that in radio we have the key to the successful production of opera in our theatres.

## PCJJ

To the numerous radio fans who are interested in the reception of short-wave stations, the following information regarding advance dates and times at which the PCJJ (Eindhoven) station will broadcast on 30.2 metres, may be found useful. The

special tests will be carried out in order to ascertain the effect of both light and time on the transmissions, and although the broadcasts are primarily destined to the Dutch West Indies, reports from listeners in the British Isles will be greatly appreciated. Concerts will be sent out on Friday, September 30, from 3 to 4 a.m.; on Tuesday, October 4, and Tuesday, October 11, from 5 to 8 p.m.; and again on Thursday, October 13, from midnight until 3 a.m. It should be borne in mind that from October 2 the above-mentioned times have already been reduced to *Greenwich Mean Time*.

## The Many Kinds of Interference

So far as I have been able to judge from personal experience, apart from some interference occasionally caused by unconscious oscillators on the broadcast band, generally speaking the reception of our local transmissions do not suffer to a very great degree. Fortunately for us, the use of high-frequency electro-medical massage has not developed in this country to the same extent as has been the case in Germany and Austria. In the latter country matters have now reached a crisis, and it is officially stated that the Vienna Broadcasting Company, unless effective steps are taken to counter a growing evil, will be faced with a general strike of listeners in the province of Carinthia at the beginning of the year. As licences are dated from January 1, it is expected that measures will be taken by the broadcasting company to induce manufacturers to modify electro-therapeutic apparatus with a view to abating the nuisance.

## Some Remedies

As an alternative it has been suggested that massage of this description should not be carried out during broadcasting hours. Similar complaints were made in Germany last year in respect to interference from electric trams, with which Continental cities are, unfortunately, more liberally equipped than is the custom in this country. Following a series of experiments, however, in many instances improvements have been made, and complaints from radio fans have steadily decreased.

If at any time you have been called upon to work a wireless receiver in a building of flats provided with electric lifts, you will readily sympathise with all sufferers of this or any other kind of interference. If you add to this an all-night service of electric trams on your threshold and the possibility of trouble from a massage establishment or beauty parlour next door, the life of the most patient wireless amateur must become unbearable. No wonder the Carinthians have decided to strike!

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## On Your Wavelength! (continued)

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**A New Station**

When searching the ether during the last week, on many nights I have picked up a new station which, although it has not yet announced itself, I take to be that of Bourges (France), a newcomer to the Paris Posts and Telegraphs broadcasting system. Over a year ago a wavelength of 500 metres was allotted to France for this proposed transmitter, and the tests I have picked up in some instances were clear of Daventry 5GB and just below *Radio Belgique*. Up to the present, no mention of this transmitter has been made in the French wireless press, but this is not a matter to cause surprise, as, for the moment, the State and the French broadcasting world do not appear to be on very friendly terms.

Of the other PTT relays, Lyon-la-Doña seems to have got lost in the background of 5GB, Marseilles is received at times, Bordeaux is but little heard, and personally I only picked up two tests of Limoges and Rennes, since which they have vanished from my ken. On the other hand, Lille, which on some evenings broadcasts its own programme, is fairly well received in this country. On recent nights, however, its wavelength has somewhat varied, with the result that it is suffering from an heterodyne with either a German or Polish station. For the present the PTT relay of Grenoble only broadcasts on Wednesdays and Saturdays, as local financial resources, I understand, cannot afford a more liberal service. From what I read in the French newspapers, but little good can be said of the official station at Toulouse. If it were not for its big competitor, *Radio Toulouse*, the south-eastern district of France could only turn to German and English transmissions for its wireless entertainments.

**A Confession**

Somebody once said that science is measurement. I do not know whether I can claim to be a scientist, but I have what amounts almost to a passion for measuring instruments. I believe that if somebody left me a fortune (readers who are thinking of making wills can obtain my address from the Editor) I should spend quite a large part of it in buying some of the beautiful instruments that I have always longed to possess. I must admit that I already lay out far more than I really ought on such things and that I have already a fairly good collection. Lately I have added to it one of the prettiest things that I have come across for a long time. The basis is a very sensitive moving-coil galvanometer with a long and clearly marked scale. With this instrument alone one can obtain readings of 10 microamps or of a fraction of a millivolt.

Then I have a pretty complete set of

shunts and resistances which give me altogether fifteen different ranges from millivolts to hundreds of volts and from microamperes to quite a hefty number of full blown amps. When I first saw the thing I hardly believed that real accuracy over a large number of ranges could be obtained. But after spending a long time in testing it out against standard instruments I am delighted with its precision as well as with its extreme handiness. An instrument of that kind is a thing of beauty and a joy for ever. You know the old test for telephones? The one about putting a drop of water on a penny, placing one of the tags in the water and touching the metal with the other. So sensitive is this instrument that one can actually measure the amount of current that flows when this is done.

**The "And" Ebonite**

I have often remarked that there was ebonite and ebonite. That of the baser sort is really horrible stuff, but one is fortunately able to avoid it as a rule, since there are many guaranteed brands on the market. Sometimes, however, one has to purchase a piece of ebonite in a hurry and may be put off with something pretty bad. There are two chief ways in which ebonite of bad quality is produced. Ebonite, as all the world knows, is sold by weight, and good stuff is comparatively light; so that quite a lot of it goes to a pound. Makers with no morals mix in with the "dough" certain heavy substances known as fillers, slate being largely used for the purpose. Filled or loaded ebonite is not difficult to tell if you see it being cut. The dust or shavings instead of being of a chocolate brown colour are dead black. It chips very easily and generally has a dull lifeless kind of look. Another bad sort of ebonite is made from scrap material such as old tyres and so on. This stuff will not take a proper polish and is of a brittle nature. If you cannot get guaranteed ebonite when you want a piece for some rush job the best tip is to use temporarily, hard wood such as seasoned mahogany or teak. The insulating properties of such woods are a good deal better than those of many brands of inferior ebonite.

**How It Is Done**

Whilst away for a holiday recently I found that I needed a new grid battery for a portable set and dropped into a shop in whose window there was a substantial display of electrical goods in order to purchase a flashlight refill for the purpose. The

LET "Amateur Wireless" solve your Wireless problems

assistant produced one of the well-known make for which I had asked and was preparing to hand it over when I suggested that I would like to see what the voltmeter had to say about it. The voltmeter, which was a good moving-coil instrument, recorded 3.2 volts instead of 4.5 volts. The next battery read only a tick over 2 volts and a third was a shade under 4 volts. This last the assistant assured me was quite all right. On my venturing to doubt his statement he told me that that particular make never had a voltage of more than 4-volts—which is probably perfectly true if they have been in stock for a couple of years or so!

**Another Attempt**

I decided to try elsewhere. The next shop visited offered a refill of the same excellent make. When I asked for it to be tested by a voltmeter the assistant managed out a moving-iron instrument of the double-range variety reading both volts and amperes. Even with this kind of atrocity a battery in good condition should show 4.5 volts, but none of those in the shop would give more than a little over 3 volts. This time I was assured that that was the proper voltage for refills of this make as they contained only two dry cells! On my pointing out that three could be distinctly felt through the wrapper I was informed that the correct E.M.F. for a dry cell was 1 volt. As a kind of afterthought the assistant placed the battery on the ampere range of his horrid instrument. The needle flashed up towards the top of the scale and than fell rapidly back towards zero. When I mildly suggested that he had short-circuited the battery he was quite indignant about it and told me that that kind of treatment was exceedingly good for flash-lamps since it increased the activity of the cells. You may think that I am romancing. Word of honour this is an absolutely true account of what happened.

**The Melbourne Broadcast**

Although rumours were circulated to the effect that the B.B.C. had declined to cooperate in a broadcast from 3AR, Melbourne towards the end of October, it has been ascertained that the objection made by the Corporation was solely to the use of a wavelength of 55 metres. As the broadcast is to take place at 1 p.m. Greenwich time, the B.B.C. from experience, consider that the chance of obtaining good reception in England on that wavelength in the middle of the day is not a good one, but that if a wavelength of 25 metres or lower could be adopted, there are hopes of a successful reception and relay to their own transmitters. In the opinion of the engineers, a 55-metre transmission might be satisfactory if tried at 9 p.m. G.M.T.

THERMION.

# TO BE SEEN AT THE EXHIBITION

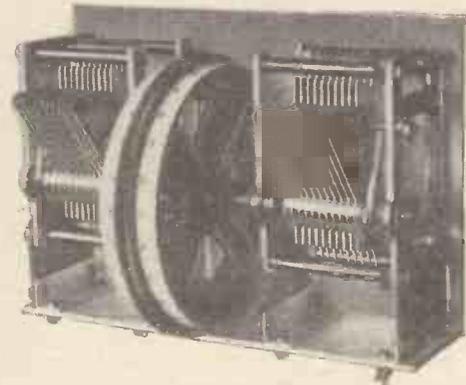
SATURDAY, SEPTEMBER 24 to  
SATURDAY, OCTOBER 1

OLYMPIA, LONDON, W.

DAILY, 11 a.m. to 10.30 p.m.  
ADMISSION 1/6

## Cyldon Thumb-control Condenser

ON the Cyldon stand one of the interesting exhibits noted was the thumb-control condenser, a photograph of which is shown below. This consists of one, two or more Cyldon Log Mid-line condensers (square law if required) mounted on a stout



Cyldon Thumb-control Condenser

aluminium angle-plate bracket, so that when mounted flush to the receiver panel the angle plate forms an effective anti-capacity shield. With the condenser so mounted a perfect mechanical balance is obtained.

It is interesting to note that the moving plates, fixed plates, and shielding plate are all electrically separated one from the other so that the unit can be used in every type of circuit.

The 4 3/4-in. diameter control drum, which is a novel feature of the condenser, is provided with readily detachable scales, reading from 0-180 degrees.

The general utility of the unit is enhanced by the provision made for locking together the condenser sections if desired, thereby making a "gang" of the unit.

## A New Trickle Charger

The home charging of accumulators, whether they be 2-, 4- or 6-volts, has been greatly simplified by the introduction of the Ferranti permanent trickle charger, which was a feature of the Ferranti stand. If you have A.C. electric-light supply, with

a voltage between 200 and 250 volts, and a periodicity between 40 and 60 cycles, this charger will have an especial appeal.

It consists of a step-down transformer designed for operation from the A.C. mains, feeding a Westinghouse metal rectifier.

Simple and safe in operation, the unit has no valves, moving parts, or chemicals—it is a "stay-put" affair. The D.C. output is rated at 1/2 amp., and this is supplied continuously to 2-, 4- or 6-volt accumulators.

*Last week we gave a general survey of the National Radio Exhibition, which is being held in the New Hall at Olympia from September 24 to October 1. This week some of the outstanding exhibits are reviewed more fully. The components illustrated and described here are, of course, but a few of the many new products which are now on view at the various stands at Olympia. Remember that the closing date of the show is Saturday, October 1.*

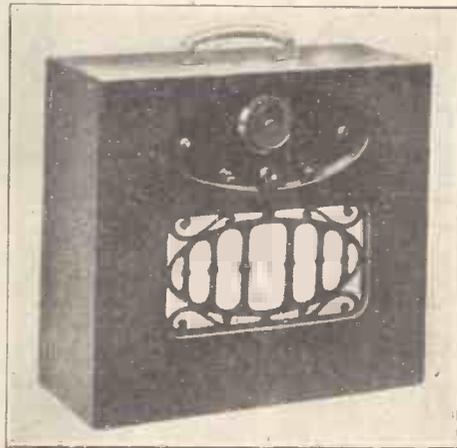
A fully-charged accumulator can be maintained in such a condition by replacing each night by means of the charger the amount of current withdrawn when the receiver is in use.

As mentioned by the makers, the fact that the charging rate is 1/2 amp. means that, with an average three-valve receiver, the charger will need to be in action about

the same length of time during a week as the receiver is used.

Simplicity of operation is an outstanding feature of the charger. Apart from the two leads to the accumulator from the unit, there is just an input plug to fit into an electric-light socket.

Over eighty hours' charging are obtained for the price of one unit of electricity. Ferranti, Ltd., of Bush House, Aldwych, W.C., should be applied to for further information concerning this charging unit.



The Portola Receiver

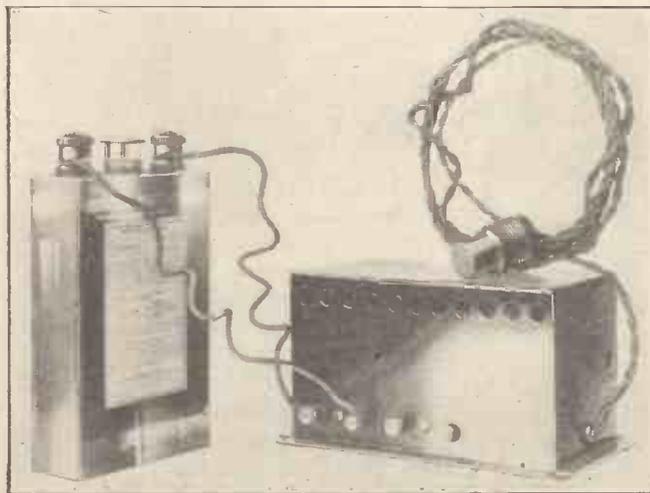
## The Portola

On page 382 of the Exhibition Number last week was an illustration of the Portola cabinet, made by W. & T. Lock, of Bath. The illustration here-with shows how the complete receiver looks when made up into the cabinet.

## The New KH1 Valve

As a companion to the KL1 valve, with independently-heated filament, the Marconi Osram Valve Co., Ltd., are manufacturing the KH1 valve, which is marketed by the General Electric Co., Ltd., as the Osram KH1 and by the Marconiphone Co., Ltd., as the Marconi KH1 valve.

In principle the KH1 and KL1 valves are similar, both having large cathodes (replacing the filament in the ordinary valve) independently heated by a "heater"



The New Ferranti Trickle Charger for A.C. Mains

## To Be Seen at the Exhibition (Continued)

element deriving the necessary current from the secondary of a suitable step-down transformer fed from A.C. mains. The L.T. accumulator is thus eliminated. With 40 to 60 volts on the anode and a positive grid bias of  $1\frac{1}{2}$  volts, the KH1 makes an excellent grid-leak detector, while the anode-bend method of rectification may be used with excellent results if the anode voltage lies between 60 to 150, with a grid bias of  $1\frac{1}{2}$  to  $4\frac{1}{2}$  volts. The characteristics of the Osram KH1 valve are as follows: Heater volts, 3.5; heater current, 2 amps.; anode volts, 150 max.; amplification factor, 40; impedance, 30,000 ohms; slope, 1.33 ma/volt; its price is 22s. 6d.

For the very high amplification factor of 40 the impedance of 30,000 ohms is exceedingly low.

### Some Unique Loud-speakers

Amongst the many and varied designs of the loud-speakers on show at Olympia are those invented by the Marquise de Andia-Trarrazaval. Two examples of these exceptionally artistic loud-speakers are shown in these pages, and it will be agreed that they represent a radical departure in loud-speaker appearance. Not only artistically are they of interest, but also from a technical point of view they merit attention.

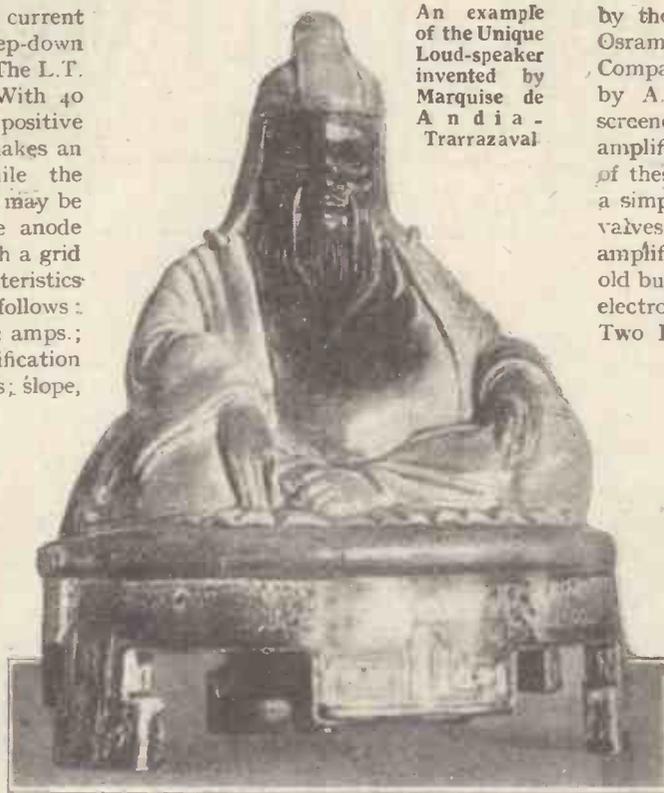
### Dubilier Fixed Condensers

Mica-dielectric fixed condensers assumed an added importance when R.C. coupling came into its own. The wide range of the



Dubilier Mansbridge Condenser

capacities of Dubilier mica condensers on show at the Exhibition is such that, no matter what value of coupling condenser is required, there is almost sure to be a Dubilier available. The Mansbridge condenser illustrated has a value of 1 microfarad, and would be suitable across the H.T. battery or as part of a loud-speaker filter circuit.



An example of the Unique Loud-speaker invented by Marquise de Andia-Trarrazaval

Readers of an experimental turn of mind, as well as constructors, will appreciate the substantial terminal and soldering tag connections on each condenser. The capacities are very clearly marked and the general finish is excellent.

### G.E.C. Gramophone Pick-up

One of the most noteworthy features of the Gecophone receivers, manufactured by the General Electric Company, is the means by which each set can be used as an amplifier for the Gecophone gramophone pick-up, a device which, when substituted for the sound-box of any gramophone, will give pure reproduction from gramophone records via the amplifier of the receiver and loud-speaker. In this manner Gecophone sets in conjunction with the gramophone pick-up will give better reproduction than even the most expensive gramophone. Particularly is this so with the latest gramophone records which are themselves recorded by electrical means. A good idea of the general appearance of the Gecophone pick-up is given by the photograph on this page.

### The Screened-grid Valve.

In view of the great interest aroused by the introduction of the screened-grid four-electrode valve, it was not surprising that the stands at the Show where these new valves were exhibited attracted a great number of enthusiasts. As our readers probably know, this valve is now marketed

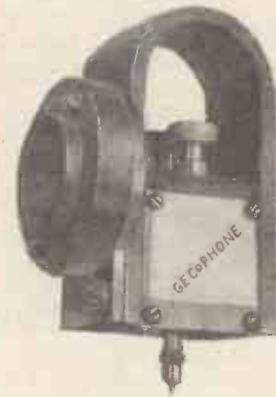
by the General Electric Company as the Osram "S" valve, by the Marconiphone Company as the Marconi "S" valve, and by A. C. Cossor & Co. as the Cossor screened-grid valve. A new era in H.F. amplification is assured by the introduction of these "S" valves. In conjunction with a simple tuned-anode circuit, one of these valves is capable of giving terrific H.F. amplification with absolute stability. The old bugbear of feed-back through the inter-electrode capacity has been eliminated. Two H.F. stages incorporating two "S" valves gives an overall H.F. magnification of nearly a thousand!

No wonder, then, that one stage of L.F. amplification—and R.C. coupled at that—is all that is needed in an average receiver to give loud-speaker results! Readers who have followed Mr. Reynier's articles on the subject of screened-grid valves will need no further bidding to try them in the "Tetrode Three," described in *AMATEUR WIRELESS* No. 274.

### Marconiphone Mains Set

We have just completed tests of the new two-valve receiver and D.C.I. mains unit shown by the Marconiphone Co., Ltd.

The receiver is built into a well-made mahogany cabinet. The panel, which is of wood, is backed by a metal screening plate. The lid hinges completely to give access to the interior of the receiver, while at the back a terminal strip carries the aerial, earth, and loud-speaker terminals.



The Gecophone Magnetic Pick-up

All the batteries are connected by means of a multi-way battery cord, which enters the bottom of the cabinet and is attached to eight screw terminals mounted on a strip of ebonite fixed to the baseboard. The battery cord is supplied in different patterns, according to the power supply.

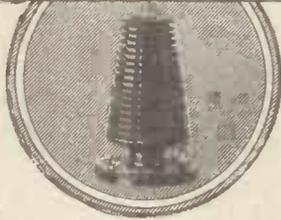
A simple circuit is employed, consisting

**UNIVERSAL H.F. CHOKER**

The ideal H.F. Choke, its special sectional winding keeps distributed capacity at a minimum, but it will efficiently operate wave-lengths from the shortest to the longest.

List No. 288 .. 9/-

**Universal H.F. Choke**

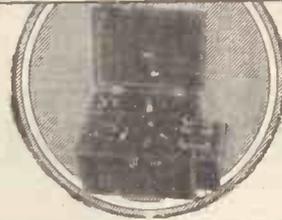


**WHITELINE VALVE HOLDER**

A great advance over all previous types of springy valve holder. Ideal for Super-Het. and short-wave sets. "Whiteline" for safety.

List No. 282.. 2/3

**Mark II Wavemeter**



**MARK II WAVEMETER**

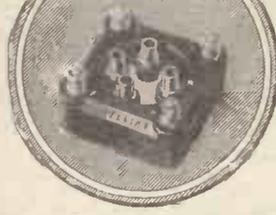
Covers all wave-lengths between 150/2000 metres. Fitted with a buzzer, self-contained battery, and a lamp to indicate resonance for transmitting and other uses where more convenient. Tuning is very sharp.

List No. 226—  
In oak case £6 0 0  
In walnut case 6 10 0

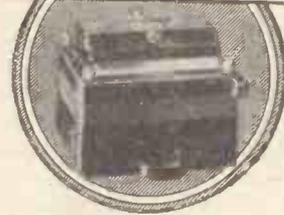
**Two Speed Dial**



**Whiteline Valve Holder**



**L.F. Transformer - Choke**



**SETTING the STANDARD**

**FOR**

**1928**

**TWO SPEED DIAL**

Manufactured under Burndapt Patent 243,218. This Dial is of polished Bakelite 3 1/2" diam. concealing a double reduction friction epicyclic gear, giving a reduction of 18 to 1 or a direct drive.

Fits 1/2" or 3/4" spindles.

List No. 253. Complete with Station recorder .. 9/-

**LOW FREQUENCY TRANSFORMERS AND CHOKE.**

Owing to recent developments we can now supply these transformers at an economic price, and for those who want the best possible reproduction there is no other choice. Supplied in two ratios for first and second stage.

List No. 284. Ratio 3-1 .. .. . 22/6

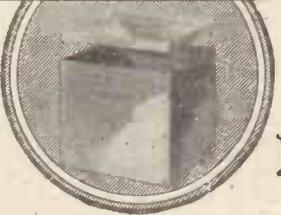
List No. 285. Ratio 6-1 .. .. . 25/-

Also in Multi ratio giving 1.8, 3, 3.66, 4.5, and 6 to 1.

List No. 286 .. .. . 27/6

Also Low Frequency Choke. List No. 287 20/-

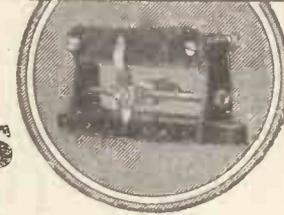
**Square Screening Box**



**BOWYER-LOWE**



**Variable Resistor**



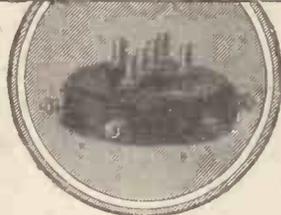
**NEW COMPONENTS**

**SQUARE SCREENING BOX**

Matt finished aluminium, supplied with baseboard and fixing screws. Packed flat and can be assembled in a few minutes.

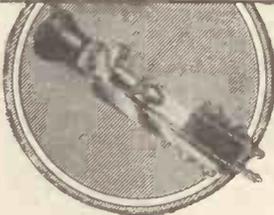
List No. 283. .. 6/-

**Six Socket Base**



**NATIONAL RADIO EXHIBITION OLYMPIA STAND NO 124**

**Jack Switch**



**VARIABLE RESISTOR**

Better than the panel rheostat and an advance on the fixed resistor, for use on baseboard. Wound under tension on a non-shrinking former and providing maximum aircooling.

List No. 289, 5 ohms 3/-  
List No. 290, 30 ohms 3/-

**SIX SOCKET BASE**

Has sockets to the standard "Southern Cross" arrangement, and is for use in the Square Screening Box or when the six pin coils and transformers are to be used without a screen.

List No. 291 .. .. . 3/6

**SEND FOR THIS BOOK TO-DAY**

**THE BOWYER-LOWE STANDARD SEVEN AND EIGHT VALVE SUPER-HETERODYNE.—How to Build and Operate.**

A fully illustrated description of this new Receiver which covers all wave-lengths from 35 to 2,000 metres. May be built as a 7-valver, and the 8th added when required without any re-arrangement of parts. Embodies the new valves. Full size blue prints included with the book.

**JACK SWITCH**

Fills the need for a simple and positive On and Off switch.

List No. 281 .. .. . 3/-

THE BOWYER-LOWE Co., LTD., LETCHWORTH, HERTS.

Please send me a copy of "The Bowyer-Lowe Standard 7 & 8 Valve Super-Het," for which I enclose my remittance for 2/-

NAME .....

ADDRESS .....



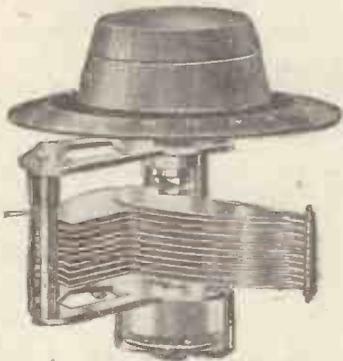
Advertisers Appreciate Mention of "A.W." with Your Order



STAND  
162

# THE NEW DUBILIER PRODUCTS

Amongst the several new products which we have put on the market this season, we reproduce here particulars of four. The enthusiastic reception which has already been accorded to these products makes it certain that they will be amongst the most popular components of 1928. If you have not already visited Olympia be sure to inspect Stand 162 and ask for your copy of our interesting and useful booklet "The Story of the Toroid and the K.C."



The Dubilier K.C. Condenser, max. capacity .0005 mfd., slow-motion reduction 200 to 1.

## The Dubilier K.C. Condenser

A beautifully finished instrument in which both electrical and mechanical efficiency have been minutely considered. When used in conjunction with either of the Dubilier Toroids, this condenser will give perfectly even spacing of stations all round the dial—no crowding and difficulty in selecting the desired station. Maximum capacity .0005 mfd., one-hole fixing, and a slow-motion adjustment giving a reduction ratio of 200 to 1.

In every respect a first-class condenser at a very modest price.

Price 12/- each

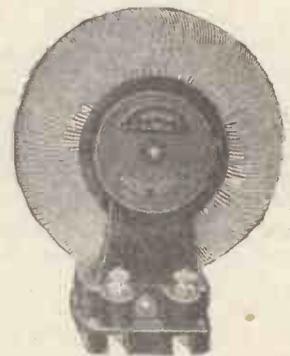
## The Dubilier Toroids

These can be used either as high-frequency transformers or as couplers in crystal or valve sets.

Owing to the special ingenious way in which they are wound, they have no external electro magnetic field. Consequently, two or more Toroids can be fitted in a set close together without possibility of interaction. Metal screens with their attendant losses are obviated. Another important point is that Toroids are unaffected by even powerful oscillations from a neighbouring station—this ensures the maximum stability in working. Dubilier Toroids are made in two ranges, to cover 230 to 600 metres and 750 to 2,000 metres respectively when shunted by a .0005-mfd. condenser in each case.

Complete with terminal and solder tag base, they cost only

Price 10/6 each



The Dubilier Broadcast (Red) Toroid, complete in holder with terminals and solder tags.



DUBILIER



# ARE BEING WIDELY DISCUSSED

## Dubilier H.T. Supply Units



The Dubilier H.T. Unit,  
Model No. 1, for D.C.  
mains.

Made in models suitable for all voltages and frequencies and to supply large or small valve sets.

The particular feature of these units is the generous margin of safety, especially as regards condensers provided for in the design. They comply with the wiring rules of the Institution of Electrical Engineers, a feature upon which Supply Companies will shortly insist.

Model No. 1, for D.C. supply and for sets employing a small number of valves. Three different H.T. supplies available, one of which is variable.

Model No. 2 (De Luxe), for D.C. supply where large multi-valve sets are used. Extra special filtering. Two variable and two fixed H.T. voltages available.

Model No. 3, Rectifying Unit, to be used in conjunction with No. 1 or No. 2 above on A.C. supply.

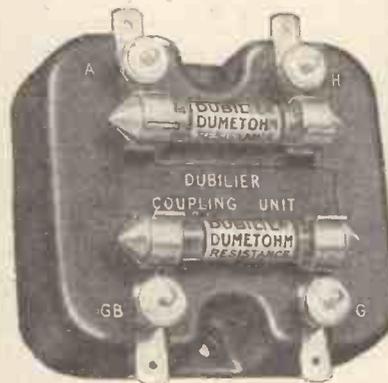
Model 1 (D.C.)	-	£4 12 6
Model 2 (D.C.)	-	£8 10 0
Model 3 (A.C.)	-	£6 6 0

## The Dubilier R.C. Coupling Unit

A highly efficient Resistance Capacity Coupling Unit which, introduced a few weeks ago, has met with an overwhelming reception. It employs the famous Dumetohm Resistances, whose constancy and noiseless working under variations of temperature and load are guaranteed. Self-capacity and self-inductance are infinitesimal. You are recommended to use them in conjunction with such high amplification factor valves as the B.T.H. B8, the Osram DEH610, 410 and 210, etc., and you will obtain perfect amplification over the entire range of audible frequencies.

The Dumetohms supplied, being detachable, can be replaced by values to suit your own wishes.

Price 7/- each



The Dubilier R.C. Coupling Unit.  
Standard dumetohms are: grid,  
3 megohms; anode, 1 megohm.



T.C.45



DIAGRAM, SHOWING INTER-CHANGEABLE BOBBIN

# EFESCA

## VARIFORM

(PATENT)

### L.F. TRANSFORMER

The Efesca "Variform" is designed to meet the necessity for matching the impedance of the primary of a transformer with that of the valve to which it is coupled. It is made with the primary and secondary windings on separate bobbins, the primary bobbin being detachable and interchangeable with others of different impedance values. The secondary is permanent and is wound to sufficient resistance to prevent grid current flowing, variations of ratio being obtained by interchanging the primary bobbin.

Price 20/- each, including one primary bobbin, specify ratio required; or with complete set of 4 interchangeable primary bobbins 25/-

Spare interchangeable bobbins, 2/- each.

Always ask your dealer for Efesca Components.



HIGH TENSION BATTERY ELIMINATORS

for H.T. current direct from your electric-light supply.  
PRICES  
£1 15s. and £4 10s.

WRITE FOR COMPLETE CATALOGUE NO. 573/3



REGENERATIVE AERIAL TUNER

Does the work of a whole set of plug-in coils. Perfect reaction.  
PRICE 25s. each

FALK STADELMANN & CO., Ltd.

EFESCA ELECTRICAL WORKS

83/93 FARRINGDON ROAD, LONDON, E.C.1

and at Glasgow, Manchester, Birmingham, Dublin, Newcastle, Cardiff.

WE ARE EXHIBITING AT THE NATIONAL RADIO EXHIBITION, STAND 147, NEW HALL, OLYMPIA, SEPT. 24th to OCT. 1st 1927.

THE LOUD SPEAKER THAT WILL GIVE PERFECT RESULTS ON ANY SET CAPABLE OF WORKING AT LOUD SPEAKER STRENGTH AT ALL

Note carefully that very definite statement and then this question: Is YOUR set mismated? It may be a perfectly good set, yet coupled with a loud-speaker which can never do it justice—one on which quality has been sacrificed to cheapness, or one which, while good in itself, cannot operate satisfactorily on the power you can give it. If that is so, your greatest need is for the speaker which is described above, and has never been equalled for beauty and purity of tone—the

Ethovox



You can buy it at a round £3.

Write us for descriptive booklet now.

BURNDEPT

WIRELESS APPARATUS.

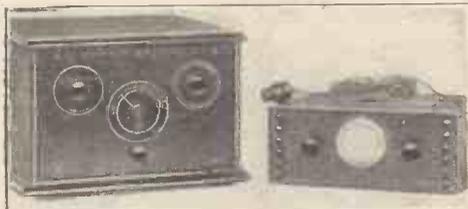
BLACKHEATH LONDON S.E.3

Olympia, No. 127

# To Be Seen at the Exhibition (Continued)

of a detector valve with reaction, followed by a transformer-coupled L.F. valve. The transformer is a Marconi Ideal, with a ratio of 4 : 1.

There are three controls on the panel,

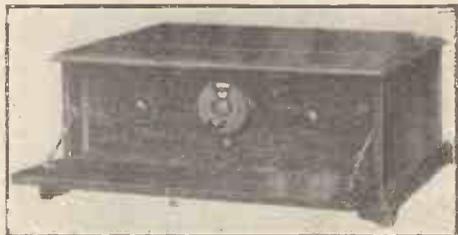


Marconiphone Mains Receiver with Eliminator

the right-hand one is a combined range and on-off switch. This increases the wavelength range up to 550 metres. The centre control is the tuning condenser. This is a "Miniloss" condenser, with the usual vernier dial. That on the left is the reaction control, and is the standard Marconiphone aerial reaction unit. The wavelength range of this unit, which is interchangeable, is 250-550 metres, while a second unit is available with a wavelength range of 1,000-200 metres. The valves are mounted on a shock-absorbing valve-holder.

The D.C.I. mains unit supplied with the set is built into an enamelled case, with a vertical moulded panel. A meter is fitted, with a red line at 0.1 ampere, and the filament current may be adjusted to this value by means of a variable high resistance (right-hand knob). Three H.T. tappings are available. For the detector a switch (left-hand knob) gives 30-100 volts in fixed tappings; H.T. +1 gives 60-120 volts, obtainable by altering a connection inside the unit; H.T. +2 gives 120 volts at 20 milliamps. This output is quite enough for ordinary power valve use.

The receiver and the supply unit were tested on 200-volt mains in a building noted for bad interference, due to numerous motors, etc., working in the vicinity,



Peto-Scott "Five-fifty One"

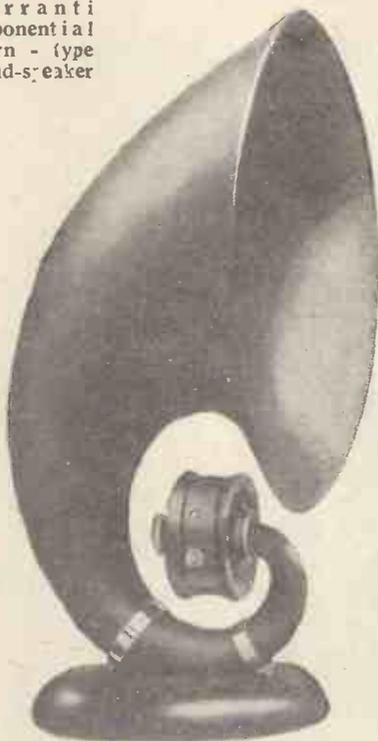
Results were very satisfactory. Hum from the mains was absent, while crackling, due to sparking at the commutators of the motors, was nearly inaudible. Using a D.E.L.410 as a detector and a D.E.P.410 as a power valve, volume from 2LO three miles from London was more than suffi-

cient for an ordinary-sized room. The quality obtained from the receiver was exceedingly good.

### The Ferranti Loud-speaker

A well-thought-out instrument is the new Ferranti loud-speaker illustrated in these pages and shown at the exhibition. Its unusual shape is due to the incorporation of the exponential principle in shaping, which, according to many engineers, is destined to have a great effect on the design of horn-type loud-speakers. The

Ferranti Exponential Horn - type Loud-speaker



shape of the sound-box in conjunction with the tone conduit ensures an entire absence of "resonance" effects.

The low resistance of the loud-speaker-unit windings (1,300 ohms) has been obtained by using a comparatively heavy gauge of wire, resulting in added immunity from breakdown.

A good magnet adjustment on the unit is provided, but once the element has been adjusted to give best results, without the diaphragm rattling, this should not be varied as a "volume control."

### The "Five-fifty One"

A great feature of the Peto-Scott stand is the "Five-fifty One," a complete five-valve receiver operated by one dial, which,

it is definitely claimed, will bring in fifty stations at full loud-speaker strength. The single tuning dial controls a 3-gang condenser, which in turn tunes three circuits simultaneously. There are no rheostats to adjust, and there is no coil changing to be done, in spite of the fact that two wavebands are covered, one the 250-550-metre band and the other the "Daventry" waveband of 1,000-2,000 metres. The change of wavebands is effected by means of a switch fitted immediately underneath the condenser dial.

Using all five valves, the selectivity is such that at a distance of one mile from 2LO this station can be cut out in favour of other stations whose wavelengths are near the local wavelength. A useful feature which has been incorporated is a switch to cut down to two valves when only the "local" is being received.

### The Junit Soldering Iron

Constructors of wireless receivers should be particularly interested in the Junit Peerpoint soldering iron illustrated here.

A full test report of this appeared in AMATEUR WIRELESS No. 259, but a brief description of its purpose will be of interest. As the illustration shows, the iron proper is provided with a sheath, which is made of copper, and this is arranged so that a simple thumb movement sheathes and unsheathes the iron at will.

By unsheathing the iron, heating in a gas flame or coal fire, and then sheathing the hot iron, perfectly "clean" soldering can be achieved by means of the independently heated sheath. This is a very satisfactory arrangement which we have every confidence in recommending.

### A G.E.C. Screen Loud-speaker

The General Electric Company included in their exhibits a new screen cone-type loud-speaker, fitted in a polished walnut fire-screen which is said to improve the acoustic properties by reason of the sound-



The Junit Soldering Iron

ing-board effect of the screen. We fully appreciated how effective is this novel and attractive addition to the range of high-class loud-speakers.

A good idea of the striking appearance of the "screen" loud-speaker is given by the photograph shown at the bottom of the next page of these notes.

# To Be Seen at the Exhibition (Continued)

## A New Gecophone Four-valver

The illustration of the compact four-valver given will show that a wireless set can be a thing of beauty as well as "a joy for ever." Mounted in an attractive all-enclosing mahogany cabinet and selling at a moderate price, this receiver is capable of



A Gecophone Four-valver

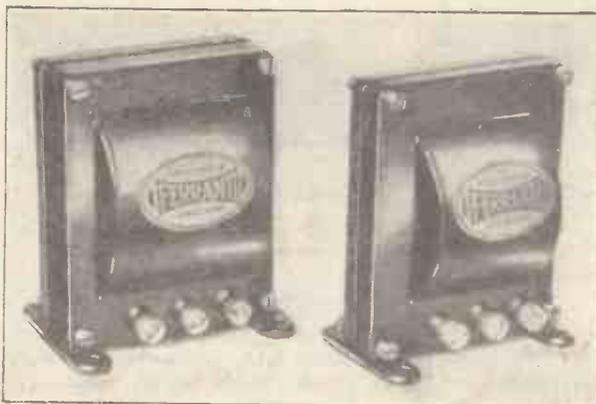
being used with a Gecophone gramophone pick-up, and gramophone records can be reproduced with exceptional clarity.

## Push-pull Transformers

The system of L.F. amplification known as "push-pull" has been engaging the attention of the Ferranti engineers, and their practical interpretation of the system, in the form of Ferranti push-pull L.F. transformers, should appeal to seekers after improved L.F. amplification.

These new transformers are similar to the standard audio-frequency types AF3, AF4, and AF5; but, in addition, they are provided with mid-point tapings on their secondary sides. (The corresponding output transformers have mid-point tapings on the primary.)

The advantages of push-pull



Ferranti Push-pull Transformers



Lewcos Double-decker Coil

L.F. amplification are probably well known to readers, who will recall that with quite small valves loud signals can be handled



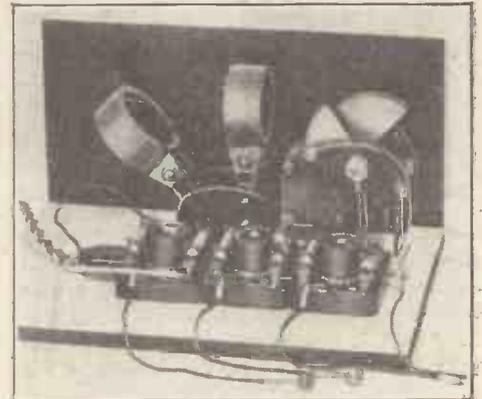
Another Example of the Loud-speaker Invented by Marquise de Andia Trarrazaval

without over-loading and its consequent distortion. The makers themselves state that the push-pull system is far superior to the standard arrangement, and that it is well worth the extra first cost involved.

## Lewcos Double-decker Coil

A radical departure in coil design is represented by the new Lewcos dual screened coil, which attracted much attention at the Lewcos stand.

These coils comprise the standard short-wave coil of 250-550 metres, and the long-wave coil of 1,000-2,000 metres, the change-over being effected by means of a lever (in the case of the Reinartz aerial coil) and by a single-panel control in the case of the other sets of coils. Thus the trouble of

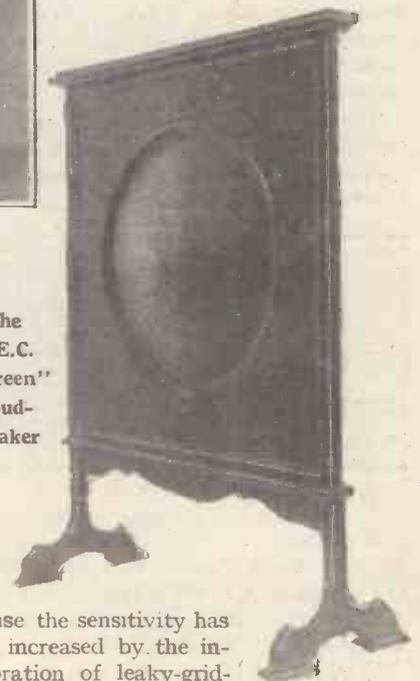


The New Ediswan R.C. Threesome

changing coils and removing screens in a multi-stage H.F. receiver has been overcome in a particularly neat and ingenious way.

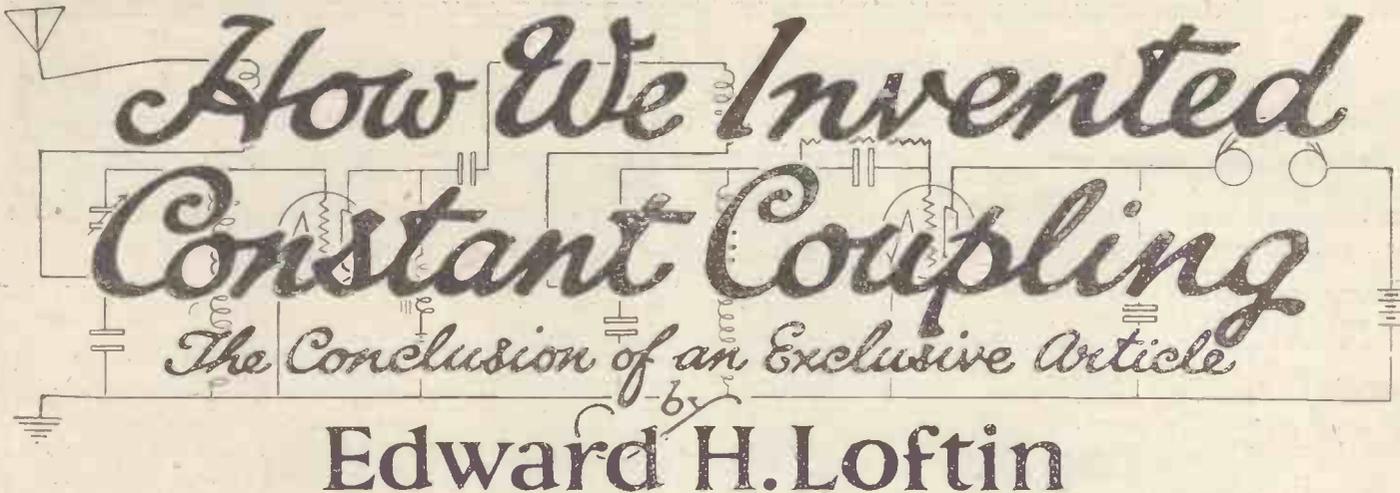
## The New "R.C. Threesome"

A special feature noted on the Ediswan stand was the new and improved model of the Ediswan "R.C. Threesome." By the incorporation of most ingeniously arranged coupling units the construction is simplified. Essentially a "local-station" set, the "Threesome" can be used as a "DX getter,"



The G.E.C. "Screen" Loud-Speaker

because the sensitivity has been increased by the incorporation of leaky-grid-condenser rectification and reaction.



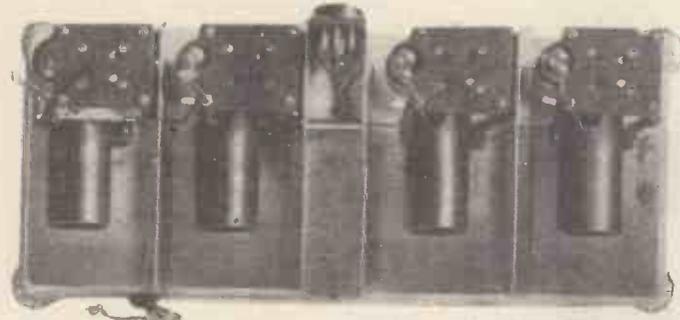
# How We Invented Constant Coupling

*The Conclusion of an Exclusive Article*

by  
**Edward H. Loftin**

NO trouble has been spared to make the four-gang condenser an electrically permanent affair. Thin, springy plates have been discarded for massive stay-put plates mounted into rigid units by heavy spacer elements, and the whole mounted on a shaft so heavy as to leave no possibility of bending; even the further precaution is

made between a unit in one compartment and the unit in a succeeding compartment, and one wire connection between each unit and the gang condenser unit in the corresponding compartment. In other words, the haphazard, unsightly and difficult wiring of radio receivers has been eliminated, in this design, giving a product that is substantially free from loose connection troubles.



A view of the Base of the Arborphone, a Receiver embodying Constant Coupling

taken in linking the drive mechanism to the shaft to prevent the driving operation bending the shaft. And yet the whole condenser unit is maintained in such small dimensions that it is a perfect fit for the small shield box.

The inductance and coupling coils, choke coils, coupling condensers, and phasing condensers peculiar to the Loftin-White circuit for each stage are built into compact units around a valve socket, with most of the electrical connections between these elements included as permanent structures rather than the usual interconnecting wires soldered to clips of the average radio receiver. Each of these units is the counterpart of the other, so that they can be assembled before insertion in the receiver and tested, thereby ensuring accuracy of assembly and freedom from imperfect connections such as arises in receivers, where soldering must be done in out-of-the-way places after the numerous parts are located in the cabinets or shielding compartments.

Four of these perfectly assembled and tested units are then mounted on a chassis that forms the base of the shield box, and there is then but one wire connection to be

due to constant coupling it maintains this high efficiency throughout the full broadcast band, 200 to 550 metres. This is made possible by the Loftin-White coupling, as it can be so tight between stages that sufficient energy is transferred to make up for the absorption losses.

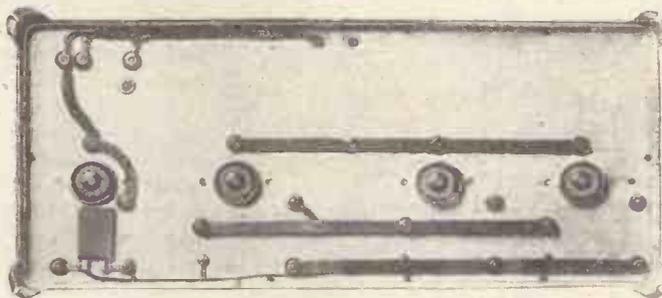
With the ordinary receiver to attempt to do this tends to create oscillations on the short wavelengths to such an extent that the degree of coupling is limited. The Loftin-White method of stabilising by control of plate-circuit reaction, permits the use of any degree of coupling desired with absolute stability.

With any other circuit it would also be impossible to include the three-stages of radio-frequency amplification in such closely located and small-proportioned compartments. While the apparatus of each compartment is fully shielded from the apparatus of all other compartments so far as a metallic housing is concerned, yet

there is necessarily a feed-back along the wires which interconnect the compartment as well as feed-back due to eddy currents set up in the metallic elements of the shields, which, with high amplification and close spacing would produce oscillations where other circuits are used. With the Loftin-White circuit, it is possible to introduce a slight reverse feed-back through the internal capacity of the valve by proper control of the plate-circuit reaction, with the result that a receiver with high amplification and close spacing can be fully stabilised without undue difficulty.

### Selectivity

This new design is extremely selective, and is ideally adapted for present broadcasting conditions, particularly in cases where high selectivity is essential. The Loftin-White principle of control of plate circuit reaction introduces a selectivity characteristic not previously obtainable with other circuits and this is a most valuable feature in a closely shielded receiver, where absorption losses tend to lessen selectivity. In addition, the constant-coupling feature makes the selectivity uniform throughout the broadcast band instead of broad on the short wave-



View of Under Side of Base Showing Substantial Connections

lengths with increasing selectivity on the longer wavelengths as with other systems.

To the delight of ratepayers, the Southwark Guardians have decided that money is not to be taken from the rates to provide a radio set for the Dulwich hospital. A public subscription fund is to be started

## "A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

### Detex Lowwave Coil

THIS Lowwave coil is intended for use in sets of the old-fashioned type where a simple parallel-tuned circuit is used, the aerial and earth being connected directly across the coil. To fit the coil the connec-



Detex Lowwave Coil

tion from the aerial side of the coil-holder is removed and a flexible connection is taken in its place to a terminal mounted on the coil itself. The coil is then simply plugged into the old socket, when it is claimed that sharper tuning will result.

The coil is actually wound with 50 turns connected between one of the pins and the terminal, while the other pin is connected to a tapping on the coil at about two-fifths of the way along. Thus the introduction of this coil converts the system into an auto-coupled aerial circuit, so that the selectivity will be increased.

It is obviously necessary that the coil shall be inserted in the holder in such a manner as to give the required connection, and to this end the coil itself is provided with two sockets having a removable pin. With the pin in one position, the coil is inserted and tried out, and if the circuit does not tune satisfactorily the pin is inserted in the other socket, which should give the correct results.

In places where there is difficulty in cutting out the local station, this system affords a simple method of improving the selectivity. Messrs. Detex Distributors, Ltd., Detex House, 125-9 Rosebery Avenue, E.C.1, are the manufacturers.

### Siemens L.T. Cell

A SACK Leclanché-type L.T. battery, which has been received from Siemens Bros. & Co., Ltd., Woolwich, S.E.18, is a large-size wet cell intended for supplying low-tension filament current in outlying districts where the charging of accumulators is a matter of difficulty.

The cell itself consists of a large earthenware pot, 6 in. in diameter and 7 in. high. Inside this is the customary carbon rod surrounded by the depolariser in a sack, the whole assembly being 3½ in. in diameter, the connection being taken to a

terminal in the centre. Surrounding this is a large zinc plate, which does not extend for the whole depth, but is cut away in a particular manner which has been found by experiment to give the most economical working. A wooden cover is placed over the top, so that the completed cell is quite neat in appearance.

The cell was received dry, the electrolyte being in the form of a white powder. This was made up into a saturated solution and the cell filled with this solution. It was then put on a discharge test of a quarter of an ampere.

The initial voltage of the cell was between 1.3 and 1.4 volts, and at the time of writing the cell has been on discharge for a little over 200 hours, at the end of which time the voltage has fallen to 1.1 volts. This corresponds to a discharge of over 50 ampere hours. As far as one can



Siemens Leclanche-type Cell

judge from the performance of this type of cell generally, at least another 50 ampere-hours' life will be obtained before the voltage of the cell falls below .8 volt.

This test, of course, is a laboratory test, and constitutes a heavy drain on the battery, since it has no time to recuperate. If the cell was used for a few hours every day, and allowed to recuperate for the remainder of the time, the life obtained would be two or three times as great, i.e., in the neighbourhood of 300-ampere hours, which would correspond to the use of the cell for three or four hours a day at the discharge quoted of a quarter of an ampere for the best part of the year.

### NEXT WEEK

THERMION ON

"My Impressions of the Exhibition"

A REVIEW OF WIRELESS PROGRESS

The advantage of such a cell in outlying districts is considerable, and we can recommend it to readers.

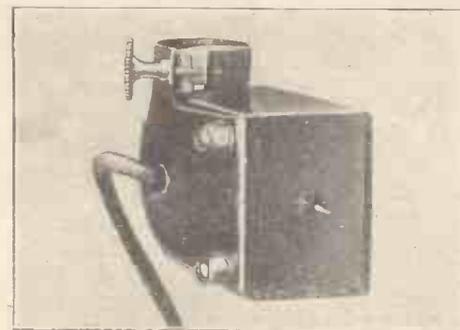
### Phonovox Gramophone Pick-up

A PHONOVOX gramophone pick-up, produced by the Igranic Electric Co., Ltd., 149 Queen Victoria Street, London, is built on simple lines. It consists of two sets of U-shaped laminations enclosing a coil. The magnetic circuit is completed by a soft iron armature which runs through the centre of the coil. This armature is clamped at one end, being held between rubber washers, and the pick-up needle is attached to the end of the armature. The movement of the needle thus causes the armature to alter the magnetic flux in the circuit and so set up currents in the coil.

The sensitivity of the arrangement is increased by the provision of a strong permanent magnet which sets up a large steady magnetic field, the effect of the needle being to cause vibrations in this field.

The whole instrument is thus very simple. The assembly is clamped up together and housed in a suitable metal case provided with an arrangement for fixing it to the tone arm of a gramophone. On test the instrument was found to be sensitive and to give good results, and was pleasingly free from mechanical rattle.

The complete equipment includes a volume control, consisting of a high resistance, which can be shunted across the pick-up itself whereby the input to the amplifier can be cut down at will, while an ingenious adapter is provided which may be plugged into the detector socket of the receiver so that an ordinary set may be converted into a gramophone amplifier with the least possible trouble.



Phonovox Gramophone Pick-up

The whole equipment is well constructed and cheap in price, and we can recommend it to readers.

# WITHOUT FEAR OR FAVOUR



*A Weekly Programme Criticism by Sydney A. Moseley*

I THINK we have had a fair opportunity now of judging the respective values of the alternative programmes. Am I not right in assuming that the main, if not the whole, purpose of the experimental station was to give a programme in definite contrast to that sent out from the London station? If so, can it rightly be urged that this distinct contrast has been maintained? If it has, how comes it that I am perplexed night after night in making a choice between the two programmes?

For one thing, some features, such as the children's hour, the church services and others, coincide not only as regards what is transmitted, but they are sent over at almost the same hour. Whether two different sets of children's transmissions are necessary I take leave to doubt. But even if the plea is made, and it is hardly worth while switching back to London just for this one hour, there can be no answer to the criticism that a variation should be made in the times of these transmissions.

Particularly as regards the Sunday transmissions. In the past the B.B.C. had a difficulty in pleasing the great body of listeners who desired a formal church service, as well as another body which preferred to go to church and come home to listen to a musical programme. For instance, at my house there is an old lady who arrives back from church just in time to switch on to the wireless service. She is having a double dose of spiritual comfort; and good luck to her! But those listeners who prefer to pray in their own way are entitled to ask the B.B.C. to provide them with an alternative programme of music at an earlier hour on Sunday.

I cannot understand the reason why, during the week, when the majority of us are unable to listen to it, Daventry transmits some excellent concerts, but on Sunday, when so many people are bored with doing nothing, there is absolutely no relief given from either London or Daventry. I make this earnest appeal to the controller at Savoy Hill, and his able assistants, to go into this matter and justify the alternative programme by giving those who wish for it a programme of music and talks as equally as good as those given during the week.

While on this important question of Sunday transmission, I am bound to pay one more tribute to "Dick" Shepperd, the popular vicar of St. Martin's-in-the-Fields. Certainly he has what Fleet Street calls "the human appeal." And this has been particularly emphasised since his illness, when the remarkable demonstration of public sympathy would have turned the heads of most men. Dick Shepperd avoids being maudlin, even when his heart is overflowing with gratitude for the wonderful expressions of sympathy that are accorded him. And, of course, he is a sensible fellow.

His last address dealt with two points which were unanswerable. The first, a plea about drink, certainly deserved to be broadcast; and it is a curious fact that, with all the uplift talks we have heard over the wireless, this is one of the few occasions—if not the only occasion—on which the right thing was said about a subject fraught with so much vital interest to the country. His other point, not to jeer at those who prefer to believe, and not to rob such people of their idealism, is equally important, although I have no doubt that among listeners there would have been those ready to essay a reply to the learned preacher in this respect. As he put it, however, it seemed to me, as I say, unanswerable.

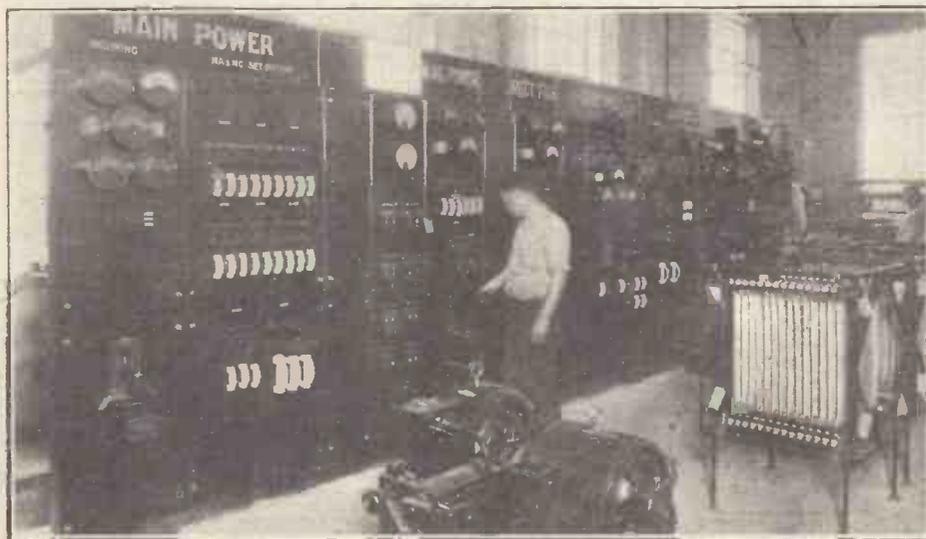
One wonders whether the charitably-

minded are getting tired of the broadcast appeals. At any rate, it was a good idea of Gerald du Maurier to try something fresh in asking for funds for the Royal National Lifeboat Institution. He and Mabel Terry Lewis unexpectedly acted the part of two witnesses to a wreck and a rescue by the lifeboat. I wager that even those wearied of well-doing put their hands in their purses that night.

One is ever ready to hear the overture to *Rienzi*. It was always a popular item at the Promenade Concerts, and I was glad to see it opening the military band concert from London studio recently.

Then there was Alice Moxon. This splendid soprano was in very fine voice in songs by Schubert, Grieg, and Dvorak, and I took care not to miss her subsequent three songs. These are occasions when one envies the privilege of the Promenade Concert audiences in being able to demand an encore!

I listened breathlessly the other night for the news bulletin, for I had heard that something of international importance from Geneva was on the tapis. Lo, then! "London calling! . . . First news bulletin. . . . The Royal Registrar of births has published his annual statistics. . . ." No, sir, I have nothing more to say!

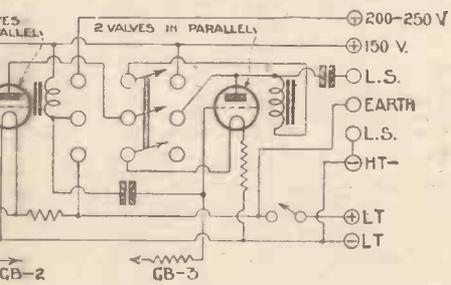


*A Marconi Beam Transmitter for communication with England is being installed by the Radio Corporation at Rocky Point, U.S.A. The photo shows one of the motor-generators, the power switchboard, and (extreme right, in corner) part of the transmitter frames.*

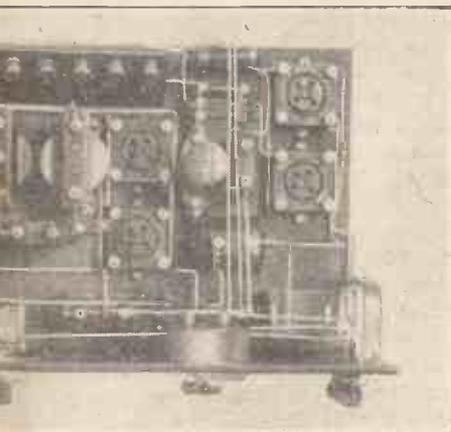




onal Article  
c. (Hons.), A.M.I.E.E.



(Only four valves are shown in this diagram  
onal two valves in parallel for the last stages)



W." Gramo-Radio

stage were used, even if the full 250 volts were applied to this stage, the voltage on the super-power valve would be reduced somewhat, and the value of grid bias would not be suitable, apart from which this particular valve would not be able to handle the same power as before, and this would constitute a limit in the operation of the receiver. It was decided, therefore, to use a choke-coupling, keeping the high-tension valve the same, so that the adjustment previously made with the three-valve arrangement holds good when the fourth valve is switched in.

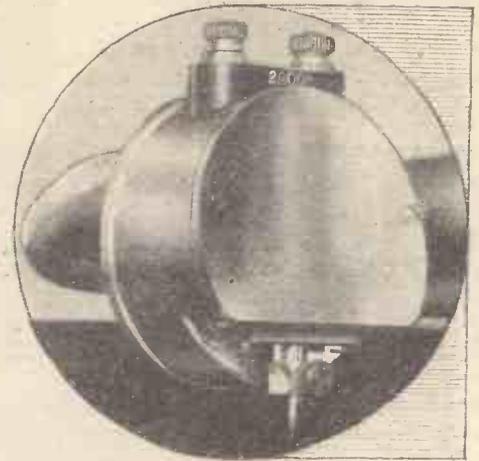
**Terminal Strip**

An innovation has been introduced in the use of an inclined terminal strip, as will be seen in the photographs and wiring diagram. The battery terminals have been mounted on a strip of ebonite placed at an angle of 45 degrees at the back of the baseboard. The leads can then be brought through a hole in the back of the cabinet straight on to the terminal strip. This method has the advantage that the terminal indications read correctly when one lifts up the lid of the cabinet, while at the same time it is quite simple to wire up the terminals.

**Components**

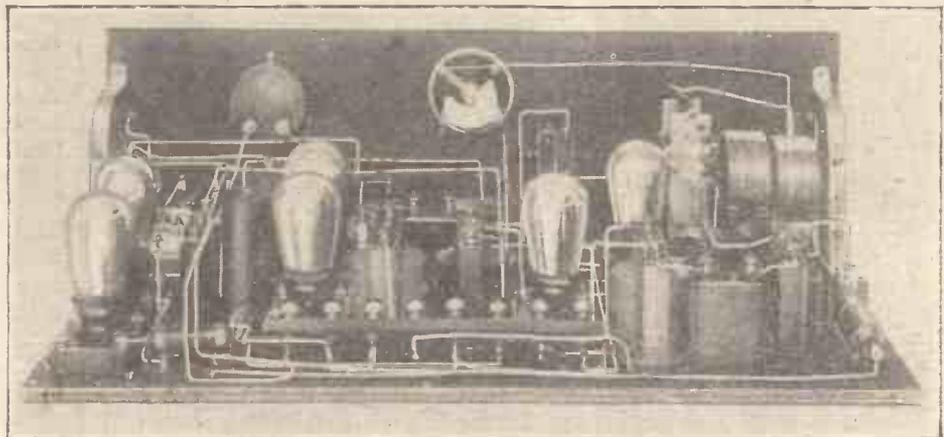
The components required for building the set are as follows:

- One panel, 21 in. by 7 in. by 1/4 in. (Peto-Scott, Ebonart, Beçol).
- Baseboard, 21 in. by 9 in. (Carrington).
- Two baseboard-mounting coil-holders.
- Six valve-holders (Benjamin, Lissen, Lotus).
- Two Trac-scale anode impedances (Formo).
- Two True-scale grid impedances (Formo).
- Three 0.1-microfarad mica condensers (Dubilier).
- One .0001-microfarad fixed condenser (Lissen, Dubilier, T.C.C.).
- One .0003-microfarad condenser with 2-megohm leak (Lissen, Dubilier).
- One output choke (Climax).



A Brown Pick-up

- One L.F. choke (Lissen, or R.I.).
- One H.F. choke (Wearite, Lissen, or Watmel).
- One 2-microfarad condenser (500-volt test) (Hydra).
- One 2-microfarad condenser (Lissen or Dubilier).
- One 100,000-ohm resistance (Ediswan or Dubilier, Lissen).
- One 50,000-ohm wire-wound resistance (R.I. and Varley or Dubilier).
- One 1/4-megohm leak, with holder (Lissen or Dubilier).
- One Phonovox pick-up (Igranic or G.E.C. Amplion, Brown).
- One .0005-microfarad condenser (Eureka, Cyldon, or Centroid).
- One slow-motion dial (Ormond).
- One .0001-microfarad reaction condenser (Peto-Scott, Bowyer-Lowe).
- Two fixed resistors, 1-ohm (Tempryte, Keystone, or Centroid).
- One single-pole change-over switch (lever type) (Utility).
- One three-pole change-over switch (rotary type) (Utility).
- One on-off switch (Igranic).
- (This switch must be of the quick break type owing to the arc formed when breaking the current in the moving coil speaker).



This Picture gives a good idea of the finished Set

- One milliammeter (0.50 ma.) (Sifam).
- One pair of panel brackets (Bulgin).
- Fifteen terminals (Belling & Lee).
- Wire (Glazite or Junit).

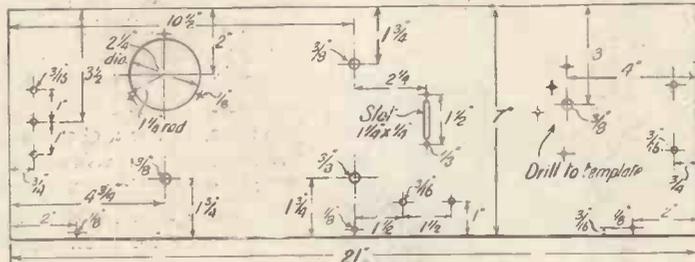
The mounting of the components on the baseboard will take little time, although care must be taken to keep them in the

denser this by-pass may not be adequate, and a small amount of H.F. may get through. The panel contains two terminals on the left-hand side for the aerial and earth, a further two terminals under the gramophone-radio switch to which the gramophone

choke is used, its effective impedance is reduced considerably by the addition of the loud-speaker. With the choke used in the present instance the loud-speaker only exercises quite a small effect, and the amplification curve is practically the same



Left: Front of Gramo-Radio  
Right: Drilling Diagram of Panel



positions Wireless. When mounting the two coil-holders at the left-hand side of the baseboard make sure that there is ample clearance between the coils and the condenser on the panel. The True-scale couplers (each consisting of an anode impedance and a grid impedance, coloured red and blue respectively) follow in ordinary sequence. Two valve-holders in parallel have been used in the third and fourth stages. Using 6-volt equipment, only one of these is normally required, but the extra valve-holder has been provided to enable two valves to be used in parallel if desired.

It will be noticed that a 100,000-ohms stopper resistance has been included in the grid lead to the third valve. This acts as a check to any high-frequency current which may have leaked past the detector circuit. Although the H.F. choke is normally quite effective, some by-pass for the high-frequency current is necessary. This is provided by the reaction circuit, but with small values of the reaction con-

phone pick-up is connected, and three terminals on the right-hand side. These last three are marked L.S.+, Earth and L.S.-. The L.S.+ lead comes from the end of the filter circuit, and the loud-speaker is connected between the L.S.+ and L.S.- terminals. The earth terminal is to enable a lead from the battery to be taken to the magnet pot of the moving-coil speaker, if any. This terminal is connected to L.T.+, so that between this terminal and the L.S.- we have 6 volts from the L.T. battery, which can be used for feeding the magnet winding of the loud-speaker. This voltage is connected to the push-pull switch, which controls the whole receiver.

**Output Circuit**

The output choke must be capable of handling a current of 30 to 50 milliamperes without saturation. The inductance of this choke need not be particularly high, because the loud-speaker is effectively in parallel with the choke; so that if the high-imped-

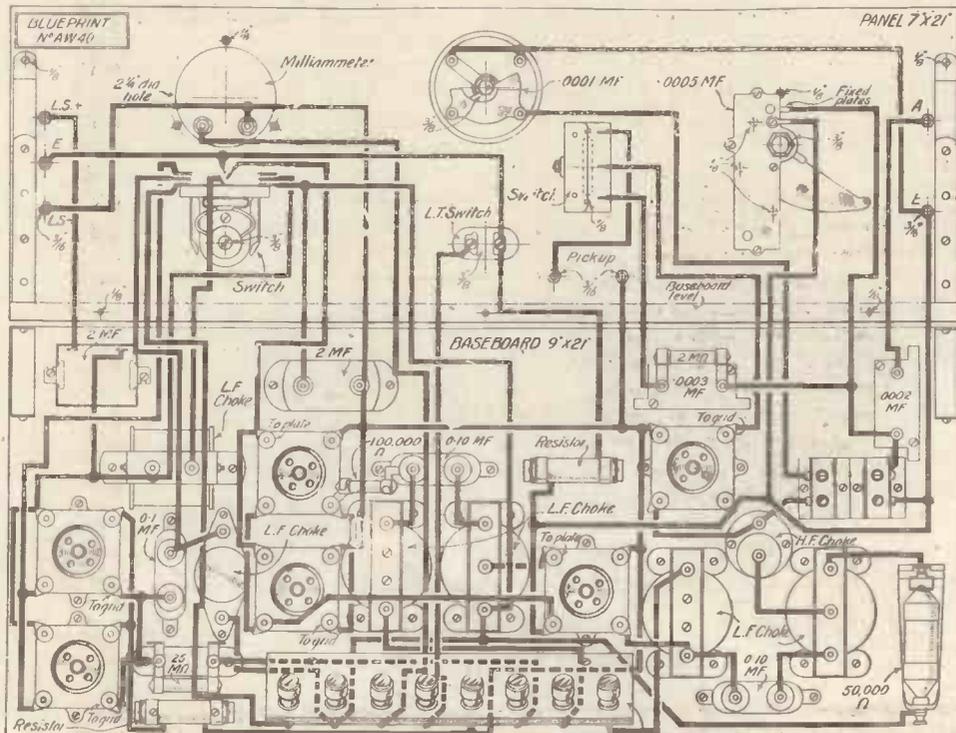
with or without the loud-speaker in circuit. A 2-mfd. condenser has been used to feed the L.F. to the loud-speaker, and this has a negligible impedance at the lowest frequency which the instrument is called upon to handle. A special condenser, capable of standing up to 350 volts and tested at 500 volts A.C., has been used in this instance, so that there shall be no danger of breakdown when the full high-tension voltage is applied.

A resistor of 1 ohm has been inserted in the L.T.+ lead to the first three valves as a safeguard against over-running. It can be omitted if desired. The resistor in the last circuit should depend on the valve in use. A resistance of 1 ohm is satisfactory for an LS5A, since there is always some voltage drop in the leads; and this, combined with the 1-ohm resistor, is about right in practice.

**Valves to Use**

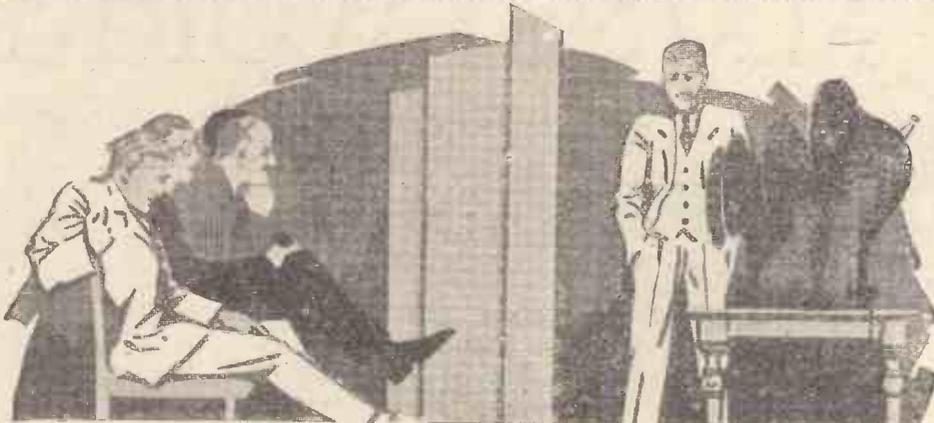
When the receiver has been completed and the wiring checked over, it may be tested out. The first matter is the insertion of suitable valves in the holders. The first valve should be a medium-impedance valve suitable for acting as a detector. It should not have too high an impedance, since the True-scale couplers are designed to suit a valve of low or medium impedance only. In the 6-volt series a valve such as the DE5B, PM5X, or similar type should be used. The second valve depends upon the circumstances, and I shall return to this point in a moment. The third valve should be a super-power valve having a very low impedance. A valve such as the Cossor Stentor 6 is very well suited in this stage, while the Burndepth LL525, the DE5A, the SP55/RR, or the PM256 are all suitable. This super-power valve will be capable of handling a grid swing of about 24 volts, and it should consequently be provided with a negative grid bias of at least 24 volts, with a high-tension voltage of 150.

Now to consider the intermediate valve in the stage. If adequate signal strength is available, the use of an ordinary power valve is preferable. A valve having an impedance of 7,000 to 10,000 ohms or



The Wiring Diagram of the Gramo-Radio. (Blueprint available, price 1/6).

(Continued on page 452).



## A CONVINCING TEST

—now build your own loud-speaker *this week-end*

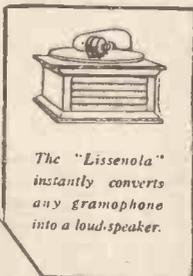
WHEN we first offered the public a full-powered loud speaking unit for 13/6 people were frankly incredulous. "No doubt it's excellent value for the money," they said, "but you can't expect it to equal an instrument costing several pounds."

So we invited four entirely disinterested judges to sit behind a screen while we carried out a simple test. We put on a well-known and expensive loud speaker, and carefully noted the quality and volume of reproduction. Then the horn was removed from it and attached to the "Lissenola" and the result again carefully noted. This was repeated with half-a-dozen expensive loud speakers. It was found impossible to say which gave the better result—the original loud speaker bases or the "Lissenola". This is a test you can make at home yourself.

The "Lissenola" is a universal fitment; you can attach it to any type of loud speaker horn or gramophone horn, or to the tone-arm of any gramophone, and get faultless results. You can easily follow the simple instructions and full sized diagrams enclosed with every "Lissenola" and make yourself—for a few pence—a handsome full-powered horn of tested and proved efficiency, giving you a complete loud speaker equal to any high-priced senior model you can buy and saving you many pounds.

### SEVEN DAYS' TEST AT HOME.

Your dealer will demonstrate, but better than all, take the LISSENOLA home—put it on your set—put it on your friend's set—try it with the horn of an expensive speaker fitted to it—test it for seven days—then if you are not satisfied take it back to your dealer's or send it back to us.

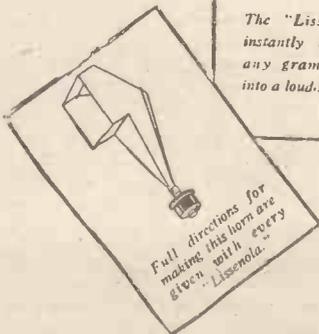


The "Lissenola" instantly converts any gramophone into a loud-speaker.

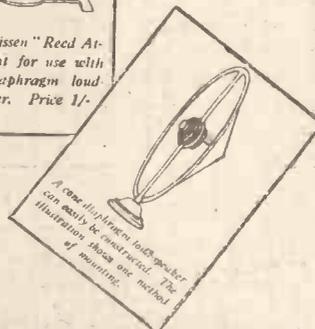
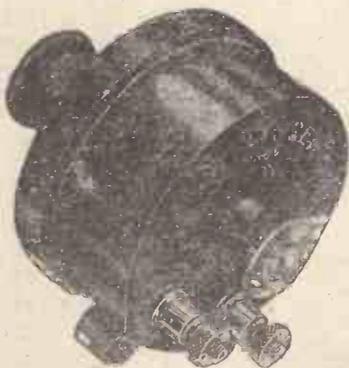
13/6



The "Lissen" Reed Attachment for use with cone diaphragm loud-speaker. Price 1/-



Full directions for making this horn are given with every "Lissenola."



A cone diaphragm loud-speaker can easily be constructed. The illustration shows one method of mounting.

## THE LISSENOLA

Hear it before you buy at your dealer's—*this week-end*  
LISSEN LTD., 16-20, Friars Lane, RICHMOND, SURREY.

Managing Director: THOMAS N. COLE.

L66.



# MAINS WORKING

The Fourth Article on Coupling the Receiver to the Mains

By H. J. BARTON CHAPPLE, W.H.Sc., B.Sc. (Hons.), A.C.G.I., D.I.C., A.M.I.E.E.

WE now come to another ingenious smoothing arrangement which has been suggested by Dr. James Robinson. This method makes use of a two-electrode valve and a short explanation of the principle will be of interest to readers. Fig. 15 illustrates the familiar characteristic of a two-electrode valve (or three-electrode valve with grid and plate joined together) and shows the manner in which the plate current increases with increase of plate voltage until a steady state is reached,

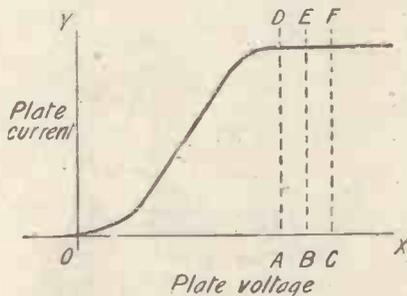


Fig. 15.—Characteristics of Two-electrode Valve

as far as the current is concerned. It will be noticed that after a certain voltage, represented by OA in Fig. 15, the current remains quite steady irrespective of the increase of voltage and the value of this current (AD) is known as the saturation value. In the case under review this property is of extreme importance, for suppose we adjust the plate voltage to the point B, then any increase or decrease of voltage such as BC or BA will be ineffective as far as

current changes in the plate circuit are concerned, for the flow of electrons between anode and cathode is at its maximum.

Here then is the nucleus of an efficient smoothing device and the *modus operandi* of the apparatus will be made apparent with the aid of Fig. 16. Connect a resistance  $R_1$  between the positive main and the plate of the valve, the negative main being joined to one filament leg. Then adjust the filament current so that the plate voltage on the valve is at least 10 volts (preferably more) above the saturation voltage previously shown as OA in Fig. 15.

An example will perhaps make this clear. Suppose with the valve employed the saturation current is 10 milliamps and is brought about with 80 volts on the plate. Then if we allow 100 volts to be across the valve, giving 20 volts safety margin above saturation value, then with 240-volt D.C. mains we shall have 140 volts across  $R_1$ . But the current flow under these conditions is 10 milliamps, hence, by ohms law:—

$$R_1 = \frac{140}{.01} = 14,000 \text{ ohms.}$$

Similar calculations can be made for other conditions.

There is thus available across  $R_1$  a steady potential of 140 volts, for suppose the main's voltage for some reason should rise or fall by as much as 5 volts, the current flowing through the circuit cannot alter since 105 or 95 volts across the valve still gives the same saturation current. With the resistance remaining constant we can look upon the valve as "absorbing" the fluctuating voltage, and ripples on the mains are thus eliminated.

Any reduction of  $R_1$  will not alter the current flow, but obviously will reduce the voltage available across its extremities. On the other hand, increasing  $R_1$  above a certain limiting value will affect matters. This limiting value can be calculated quite easily. Taking 80 volts, as before, for the limiting saturation voltage this will leave 160 volts across the resistance, and

with the 10 milliamps current we have:—

$$\text{Maximum } R_1 = \frac{160}{.01} = 16,000 \text{ ohms.}$$

An increase above this causes the valve to operate at a lower current, so we are not using the apparatus in the correct manner. Naturally when putting this method into practical effect, it will be advisable to insert a milliammeter in series with the plate of the valve and the resistance so as to ensure that the current does remain constant for all voltage changes present in the circuit.

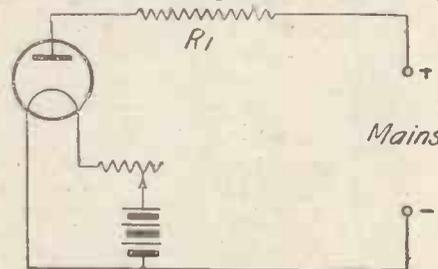
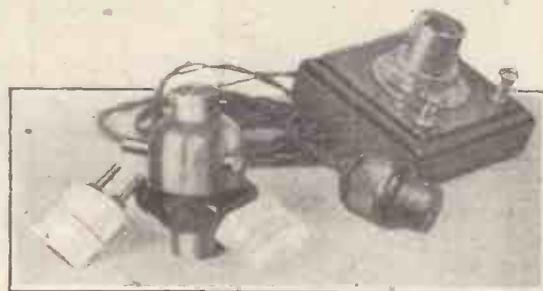


Fig. 16.—The Robinson Smoothing Arrangement

There is no practical reason why the filament of this smoothing valve should not be rendered incandescent by current from the mains provided a large enough resistance is placed in series. One form of resistance is an electric lamp which passes the



Special Plugs are Available for Mains Connection

same current as the valve (or of course two lamps in series or parallel), while failing this a high-resistance potentiometer that can carry the required current without overheating, will suffice. For example, with a quarter-ampere power valve as the smoother, the required resistance is:—

$$\frac{240}{.25} = 960 \text{ ohms.}$$

(To be continued)

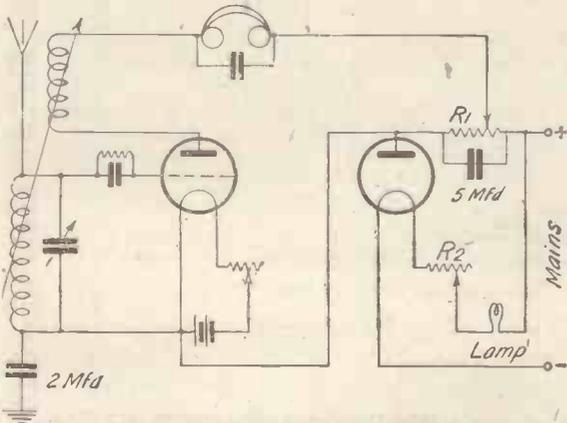


Fig. 17.—Simple Single-valve Circuit operated from Mains

# LISSEN TRANSFORMER



**B**ESIDES being the most efficient transformer on the market, the new LISSEN can be used with equal success as an L.F. Choke. You merely connect the O.P. and I.S. terminals together.

Acclaimed by tens of thousands as the finest amplifying transformer and preferred by LISSEN themselves (all the previously high-priced LISSEN transformers were withdrawn in its favour), it has only been possible to sell the new LISSEN for 8/6 because—

**FIRSTLY:** The immense facilities of LISSEN have been concentrated on the production of this one type.

LISSEN LIMITED, 16-20, FRIARS LANE, RICHMOND, SURREY.

**SECONDLY:** This transformer, like all LISSEN products, is sold direct to the retailer, and so wholesalers' profits are cut out.

**WE MAKE THIS OFFER:** If within 7 days of purchase you can find any transformer or choke—at any price—which you prefer to LISSEN, you can return the latter and your money will be refunded.

*Turns ratio 3 : 1. Resistance Ratio 4 : 1.*

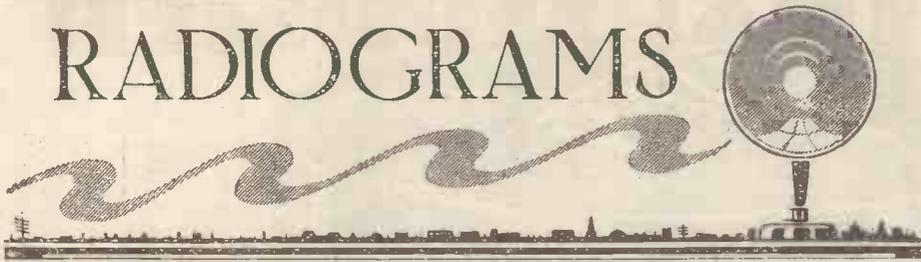
Amplifies fully every note, every tone, every overtone, every harmonic. Guaranteed for 12 months.

*You can use 3 in cascade.*

*Managing Director:  
THOMAS N. COLE.  
L.281*

Stand Nos. 158 and 160, National Radio Exhibition, Olympia, Sept. 24th to Oct. 1st

# RADIOGRAMS



AS an experiment in broadcasting, six plays are to be included in the transmissions to schools from 2LO, 5XX, and other main and relay stations during the present term. The plays are to be given by a representative company of radio players, in which it is hoped to include members of the "Old Vic." The dates of transmission are as follows: *Abraham Lincoln* (John Drinkwater), September 30; *Twelfth Night*, October 14; *Prunella* (Housman), November 3; *The Tempest*, November 18; *She Stoops to Conquer* (Goldsmith), December 2; and *Richard II*, December 16.

Nelson Keys will broadcast from the Bournemouth station on October 3, and will also contribute to an all-star variety programme which will form the main feature of the 2LO evening entertainment on October 13.

Listeners to 2LO and 5XX will hear Mr. Winston Churchill in an appeal for the Royal Infant Orphanage, Wanstead, on October 9.

*My Lady Molly*, a musical comedy, by Sidney Jones, which took London by storm some years ago, is to be broadcast from London and Daventry on October 10.

"Oh! Listen to the Band" is the title of a series of imaginary conversations specially written for the B.B.C. by Miss Mabel Constanduros. These short sketches, with music arranged by Mr. John Ansell, will be broadcast from 2LO and 5XX on October 11.

On the demand of listeners, a repeat performance of *The Dogs of Devon* will be transmitted from 5GB through the Birmingham studio on October 14.

With Mr. R. E. Jeffrey, dramatic producer of the B.B.C., Mr. Jeffery Farnol has been discussing the possibility of dramatising some of his well-known novels. It is expected that the first presentation will be that of *The Amateur Gentleman*, and an endeavour will be made to give to this broadcast the realistic atmosphere of the period.

The fifth of the series, *Memories in Theatreland* will be broadcast this month from the Cardiff station; it centres around the Gaiety Theatre, London, and includes excerpts of such popular musical comedies as *The Sunshine Girl*, *Our Miss Gibbs*, and *To-night's the Night*.

Since September 26, Daventry (5XX) has been working from 11 a.m. to 2 p.m. and London from 12.30 to 2 p.m. A revision

of the Saturday times will begin on October 1, when both 2LO and 5XX will broadcast from 1 to 2 p.m.

The visit of Judge Rutherford, president of the International Bible Students' Association, to Glasgow was responsible for a petition, signed by 26,000 people, asking

## DO-YOU KNOW?

1. What is empire tape, and for what purposes it is generally used?
2. What is meant by the "mu" factor of a valve.
3. What is the usual proportion of water to acid for accumulator electrolyte?
4. In what order should the liquids be mixed to prevent danger of acid spraying?

Puzzle your friends with these queries: the answers will be given in next week's issue of "A.W."

Answers to Last Week's Queries: (1) Standard Wire Gauge. (2) A resistance material having a specific resistance slightly higher than that of pure iron. (3) Hertzite, lead sulphide. (4) October, 1924.

that his lecture in St. Andrew's Hall should be broadcast. To their disappointment, however, the B.B.C. was unable to accede to the request.

The Scottish National Players are broadcasting two plays by John Brandane on October 1. *The Changeling* strikes a note of sadness, but the other play, *Rory Afore-said*, is probably the most amusing that Mr. Brandane has yet written.

A well-known Scottish football inter-

nationalist of the old days, Walter Arnot, is speaking from the Glasgow studio on October 1 on incidents of early Association football.

Broadcasting has caused lovers of Burns and his speech some apprehension. They have, however, been reassured by Sir John Reith, who expresses the desire that the B.B.C. should broadcast in the form of plays or otherwise the kind of Scottish speech which is both beautiful and descriptive to listen to. On the other hand, he considers that local patois, e.g., so-called Glasgow speech, is a travesty of the real thing, and not a matter for pride!

The number of wireless communications to the Foreign Office is now so great that the department is to have its own receiving apparatus. Hitherto transmission and reception has been done by the Admiralty.

The estimated number of receivers in Argentina is 159,000, a large proportion being crystal sets.

Cologne Cathedral has been equipped with loud-speakers, being, it is stated, the first cathedral to have them. These instruments will make the sermons, which are at present almost unintelligible owing to the poor acoustics of the building, plainly audible in every corner of the great building.

The Ministry of Health has sanctioned an application made by the West Ham Council for a by-law under which it will be an offence to operate any wireless loud-speaker or gramophone so as to cause an annoyance. The new law imposes a penalty not exceeding £5 on any person who "in any street or public place or in any shop, business premises, or place which adjoins any street or public place, and to which the public are admitted, shall operate or cause or suffer to be operated any wireless loud-speaker or gramophone in such a manner as to cause annoyance or disturbance to occupants of any premises.



The ONLY authoritative book on the New Valve

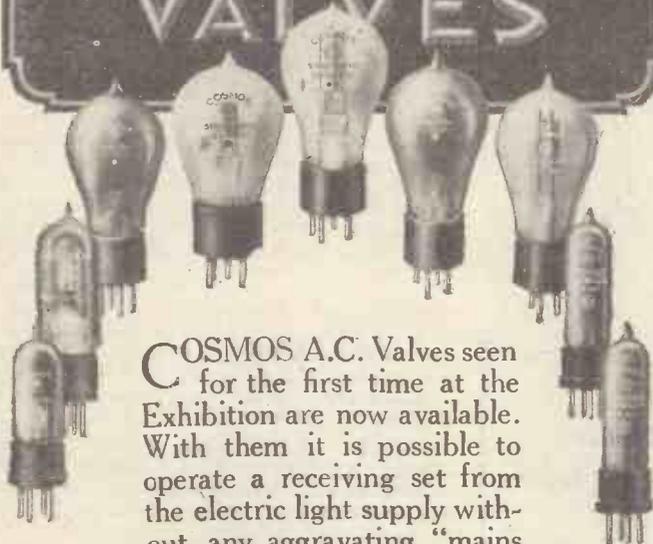
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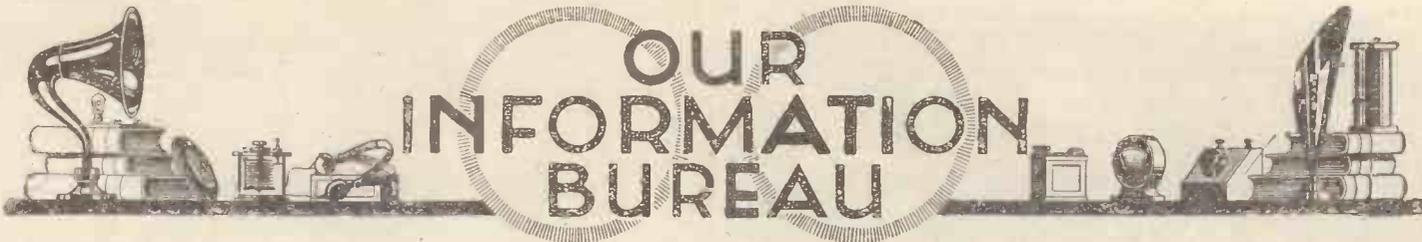
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**Sparking Troubles with Commutator-type Rectifier.**

**Q.**—I experience trouble through sparking at the brushes of a commutator-type rectifier. The commutator is driven by a synchronous motor, and there are two dead segments between the two live ones. The brushes are mounted on a rocker and can be adjusted to give the position of minimum sparking and maximum output, but even then the commutator soon gets dirty and a black patch appears on the trailing edge of the live segments. The troubles can be cured by cleaning off with fine carborundum paper, but in course of time the commutator gets grooved and has to be skimmed up again. A. W. (Hampton).

**A.**—You are charging at a 4-ampere rate, sometimes on 8 volts and sometimes on 16 volts. It is scarcely possible to get a commutator-type rectifier to work sparklessly under variable conditions of charging volts for the following reasons. An alternating current consists as everyone knows of a wave more or less of a sinusoidal form first in the positive and then in the negative direction. The function of the rectifying commutator is to change the circuit connections periodically so that the alternate half-waves are all commuted into the same direction, the result being pulsating uni-directional current; that is to say there are two points where the current value is zero and it will be continually fluctuating in value between maximum and minimum. When speaking of alternating or pulsating currents it is best to regard them as E.M.F. waves, since potential difference must exist before current can flow. Now if a pulsating E.M.F. of this nature is applied to a circuit containing a steady opposing E.M.F., such as an accumulator on charge, it is not difficult to visualise what happens. All the time the charging E.M.F. is in excess of the battery E.M.F. current will pass through the battery in the correct direction for charging. But as the pulsating wave of rectified E.M.F. drops to zero, a point is reached where the charging and the discharging E.M.F.'s balance in opposition to one another, and if the current is free from inductance there is an instant when no current passes either way. The moment after, when the pulsating E.M.F. has dropped below the battery E.M.F., and from there onwards until it has risen on the next half-wave to battery value again, the accumulator will be actually discharging. To avoid this loss a "dead" or insulated segment is inserted between the two live segments, for the purpose of interrupting the charging circuit as soon as the charging volts have dropped to the value of the discharging volts. It is quite obvious, therefore, that the width of the dead segment controls the "cast-off" point in the charging wave, and must bear a definite relation to the E.M.F. of the battery being charged, since the time element comes into consideration and the wider the dead segment the higher will the charging E.M.F. have become before the circuit is re-established. Even the alteration in the counter E.M.F. of a battery between the start and the finish of the charge is sufficient to destroy the balance between these opposing E.M.F.'s and, theoretically, sparkless operation is impossible unless the make and break points are established

at the precise instant when the value of the current passing is zero. For a given width of dead segment in the rectifying commutator, there will always be a particular charging voltage that gives the least sparking at the brushes, and it should be the aim to discover what this is from experiment and then keep to the corresponding accumulator voltage when charging.—A. H. A.

**When Asking Technical Queries**

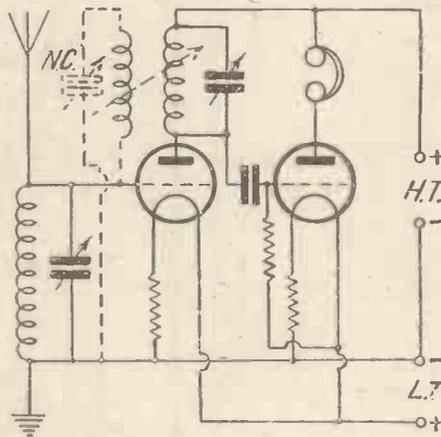
**PLEASE write briefly and to the point**

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped, addressed envelope and the coupon which will be found on the last page.

Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

**Stabilising a Two-Valver.**

**Q.**—I have at present a two-valve set, plain tuned-anode and detector, and am troubled by self-oscillation, even though I do not use reaction. I believe that there is a method of neutralising the



**A Stabilised Two-valve Circuit**

H.F. stage of such a set which consists merely of adding a coil and neutralising condenser without altering the wiring of the present set in any way. If so, can you show me what it is?—H. L. T. (Ipswich).

**A.**—Your present circuit is shown by the full lines in the circuit diagram given herewith, and the necessary addition is shown dotted. The extra coil and the neutralising condenser, in series with each other, are connected across the grid and filament of the H.F. valve. The coupling between the new

coil and the present anode coil should be variable, as it is necessary that this coupling should be of the right sense and degree of closeness in order that neutralisation may be obtained by this means. The best size for the new coil must be determined by experiment and will vary with different sizes of anode coil.—G. N.

**Protecting the Loud-speaker.**

**Q.**—I am using 150 volts on the plate of my last valve, and as this is of the power type, I am rather afraid that the anode current may burn out the windings of my loud-speaker. How can I ensure against this?—D. J. F. (Exeter).

**A.**—The steady anode current flowing through the loud-speaker windings can be reduced to the practicable minimum by applying as much negative grid bias to the last valve as is consistent with distortionless reproduction. A more certain way of protecting the loud-speaker would be to employ an L.F. choke coil and large-capacity fixed condenser in the following manner: Remove the lead that at present connects the plate of the last valve and one of the phone terminals and join these two points through the condenser. Next connect the L.F. choke coil between the plate of the last valve and the loud-speaker terminal which goes to positive H.T.—G. N.

**Rectification and Modulation.**

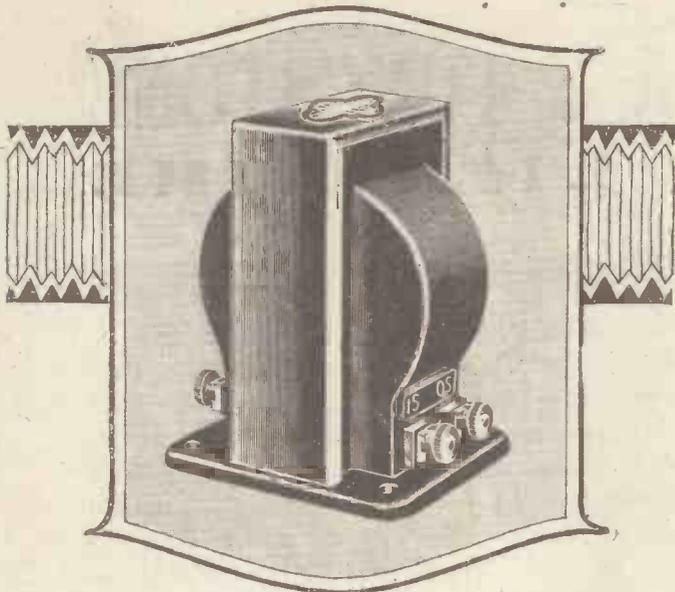
**Q.**—I cannot follow the explanation of how a crystal works which is usually put forward. It is said that the crystal contact suppresses one-half of each of the H.F. alternations and the resultant current then has a low frequency. How can this be? If there are, say, one million complete H.F. oscillations a second, even after rectification, there will still be one million half-oscillations.—F. L. (Essex).

**A.**—You overlook the fact that the circuit on the L.F. side of the crystal is not an oscillatory circuit, but contains the high inductance of the phone windings across which is the capacity of the telephone condenser, if one is used, or, at least, the capacity between the telephone leads. This capacity and inductance smooths out the impulses or half-cycles of H.F. current and makes them run into each other, and the resulting current would be a steady one if the amplitude of the H.F. oscillations was constant. But it is not; it rises and falls in accordance with the sound-waves reaching the diaphragm of the transmitting microphone. This gives rise to fluctuations of the rectified current flowing through the phones and it is these fluctuations which are at low frequency.—G. N.

**Phones in Series.**

**Q.**—How can two pairs of phones be connected in series to a valve set so that there is no danger of either pair being demagnetised by the current from the H.T. battery?—T. P. D. (Doncaster).

**A.**—The positive tag of one pair of phones should be connected to that phone terminal on the set which is internally connected to the H.T. positive terminal. The positive tag of the other pair of phones should then be connected to the negative tag of the first pair. The negative tag of the second pair of phones is then connected to the remaining phone terminal on the set—the one which is internally connected to the plate of the last valve.—G. N.



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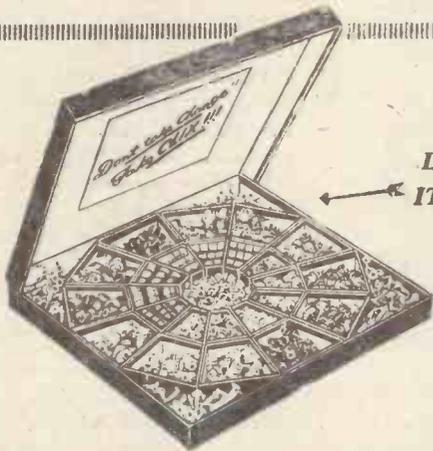
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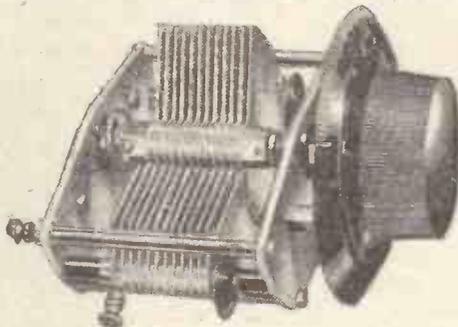
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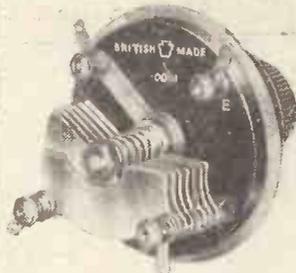
No other condenser can compare with the Keystone Universal for sheer value for money. It is adaptable to every type of circuit. Two or three single condensers can easily be ganged together to form a double or triple gang. Alternatively, a Keystone gang condenser may be converted for use as single units. The patented vernier capacity adjustment greatly facilitates "trimming" between H.F. stages.

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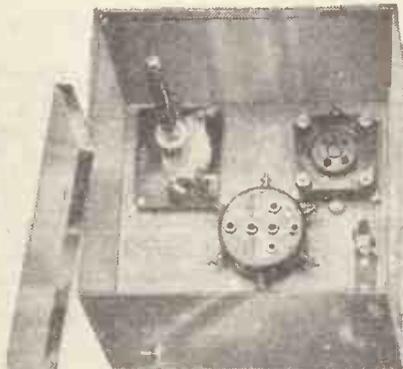
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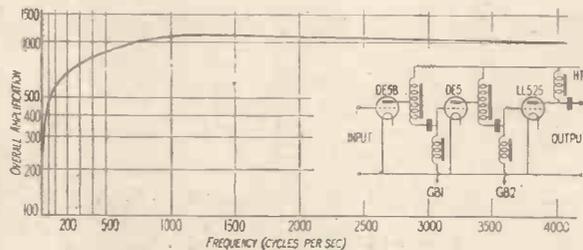
(Continued from page 142)

thereabouts is quite satisfactory. Such a valve would have an amplification factor of about 7. Owing to the impedance of the anode circuit, practically the full amplification would be obtained from the valve, while a further 2-1 step-up brings the total amplification on the stage to something of the order of 12. The actual grid swing on the second valve, therefore, is only of the order of 2 volts, which is well within its capabilities.

If, on the other hand, the signal strength is a little weak, an L.F. valve can be used having a slightly higher impedance. This will result in a somewhat greater amplification on that particular stage, so that the grid swing which the valve will have to handle will be less than 2 volts, and this is well within the capacity of the ordinary L.F. valve having an impedance of 15,000 to 20,000 ohms. With such a valve, however, some of the lower notes will undoubtedly be lost, and the use of a lower-impedance power valve is preferable on the score of quality. In any case, it will be seen from the figures just given that a grid bias of 3 volts is adequate for this valve, although this value may be increased to 4½ or 6 when a power valve is used, since this will have the effect of reducing the high-tension current consumption slightly.

Performance Curve

As I have already indicated, the performance of this amplifier on actual signals is very gratifying, and although my experiments indicate that there is some cut-off occurring, the percentage of low notes is ample for practical purposes and very pleasing reproduction is obtained. I thought that it would be interesting, however, to obtain concrete evidence of the



Performance Curve of the Gramo-Radio Receiver capabilities of the amplifier, and consequently a performance curve was taken of the complete amplifier, including the output circuit.

This curve is reproduced. In order to take this curve a special low-frequency oscillator was connected across the input terminals of the set. The gramophone pick-up terminals were used for this, so that the input was placed directly across the grid and filament of the first valve, and the output developed across the loudspeaker terminals was measured with a Moullin voltmeter.

The oscillator in question has been specially developed for testing low-frequency coupling devices generally, and gives a constant output of pure wave form, the frequency being rapidly variable from about 5 cycles per second up to over 5,000 cycles per second. This covers the whole range of audio frequencies required in ordinary practice, and since the input is constant in strength, any variation in the output voltage is due to cut-off or resonances occurring in the amplifier itself. An ordinary transformer-coupled amplifier tested in this manner shows a very poor amplification until a frequency of about 200 cycles per second is reached. The amplification then rises quickly to a fairly high value, after which it is maintained more or less constant according to the type of transformer in use.

Middle C on the piano occurs at a frequency of 256 cycles per second, so that all the bass notes lie below this frequency. The curve reproduced shows that the output from the amplifier is maintained particularly well at frequencies as low as 60 or 70 cycles per second, the cut-off proper occurring a little below 50 cycles. The amplification at 100 cycles is about sixty per cent. of the maximum, which is quite a high proportion, and results in a quality which is normally quite unobtainable.

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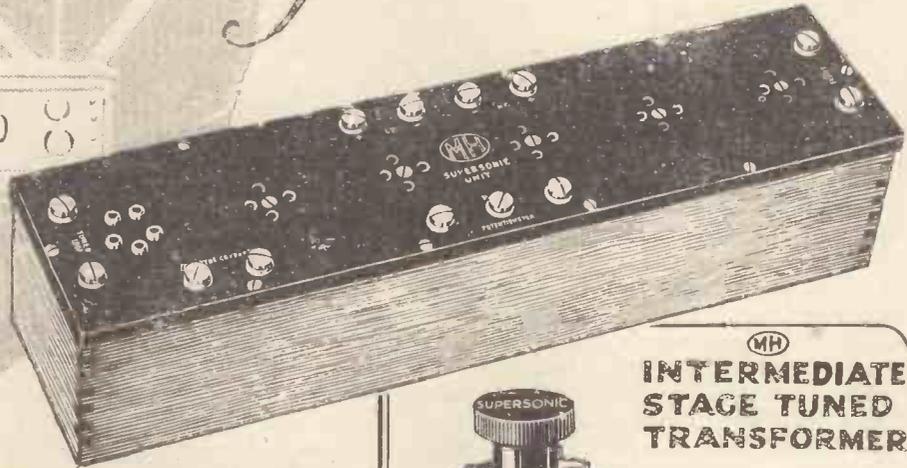
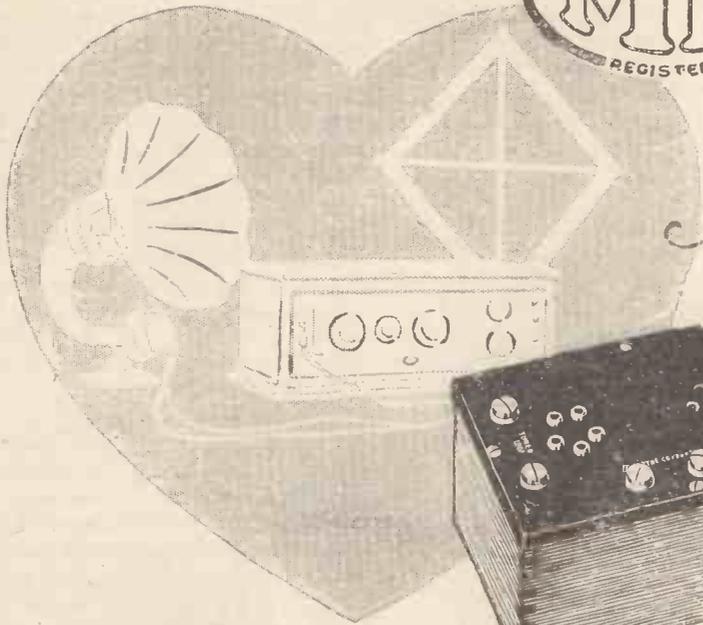
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The MH SUPERSONIC BLOCK UNIT for RECEPTION on SHORT WAVES Short wave enthusiasts will be well advised to give this serious consideration. Here are a few points of advantage:

1. Simple Control.
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This unit forms the nucleus of the Six-Valve Receiver used by Mr. Allen, A.M.I.R.E., for the direct reception of the Australian Broadcast Programme, a distance of 13,000 miles.

Report of this success appeared in the "Daily Mail," September 5th, 1927.

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No. 0 has a range of 145-330 M.  
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No. 2 (for Daventry) has a range of 600/2000 M.  
Price 10/- each.  
Complete with Reactor, 17/6.

**THE A.C. SIDE OF "SIMPLER WIRELESS"**

(Continued from page 421)

In practice, good results have been obtained by using a transformer each half of the secondary of which gives 450 volts. This means that there is a difference of potential of 900 volts between the extreme ends of the winding, but if the centre-tapping is earthed (as it very well might be) no point of the winding could be more than 450 volts positive or negative to earth. But in the case of a unit for everyday use it would be advisable to enclose the transformer in some kind of case and make arrangements so that the primary circuit is broken automatically as the case is opened. In this way risk of shocks could be entirely avoided.

The results obtained in practice when using this unit and a D.C. "Simpler Wireless" set in every way came up to expectations. There was no trace of "hum" and reception was quite as good as if the lighting supply had been exceptionally smooth D.C. When working from A.C. mains in this way it is necessary to provide a wireless "earth" for the set, and this should preferably be done directly and not through a fixed condenser. The proper point to earth is the negative end of the filament circuit or, what comes to exactly

the same thing, the centre tapping on the large secondary winding.

As regards the cost of working from the A.C. mains, this will, of course, be higher than when the supply is D.C., but will still be so low as to be practically negligible. In the case of D.C. working, the whole of the power taken from the mains is actually used in the set itself, but when working from A.C. mains some of the power is naturally wasted during the rectifying and smoothing processes. In the case of the unit just described, each half of the large secondary supplies 50 milliamps at 450 volts. That is to say, the whole winding delivers a power of 45 watts. To this must be added the wattage of the filaments of the rectifying valves and the losses in the transformer itself, which latter will be very slight in the case of a good instrument.

In any case, not more than about 60 watts should be taken from the lighting supply, which is about the same power as that consumed by the average electric lamp. This will result in a running cost, when the electric light charge is normal, of a little more than a farthing per hour.

On the A.C. side, "Simpler Wireless" has many advantages over all other methods of working wireless sets entirely from A.C. mains. It is, of course, much cheaper than any other method. Also, it does not require special valves to be used; on the other

hand, it enables 2-, 4- and 6-volt valves to be mixed freely in one and the same set. Then, again, only one full-wave rectifier is required to provide an ample supply of both H.T. and L.T.

One point especially worthy of notice is that it overcomes the difficulty of smoothing the L.T. supply. Mr. Reyner, in his article "Why L.T. Smoothing is Difficult," in last week's AMATEUR WIRELESS, drew attention to the fact that it is extremely difficult to smooth the L.T. supply if this is rectified at a low voltage. In the "Simpler Wireless" A.C. system all the current is rectified at high voltage. Any ripple that gets through the smoothing arrangement is then automatically reduced to one-hundredth of the amplitude at which it appears across the filaments of the valves, if these latter are of the 2-volt type.

The Commission appointed some time ago to inquire into wireless matters has advised the Australian Government that the patent and royalty charges of the Amalgamated Wireless Company are excessive, and if these are not lowered the Government should assume complete control of the company, in which the Government already own a half share. A reduction in the present copyright charges for music is also recommended by the Commission.

**BETTER THAN WIRE WOUND**

**THE RESISTANCES**



NEW PROCESS

STAND  
218G  
OLYMPIA

These Resistances are an improvement on anything hitherto produced—they are superior to wire-wound—hermetically sealed in Bakelite—dead accurate—cannot vary—guaranteed for ever.  
Megite - Grid Leaks  
Ohmite - Anode Resistances

MEGITES  
2/-

1-5 Megohm

OHMITES any size 2/3

**GRAHAM-FARISH CONDENSERS**  
MICA BAKELITE CASE



Still the finest Condenser at any price—upright or flat mounting—series or parallel G.L. Clips. Guaranteed.

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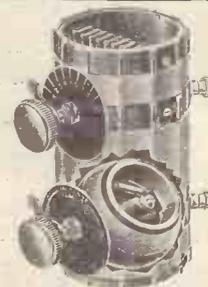
1/-

.003—.006 - 1/6  
.007—.01 - 2/6

Advert. of the Graham-Farish Mfg. Co., 17 Masons Hill, Bromley

*Certainty!*  
**5GB - 2LO - 5XX**  
**& OTHERS**  
with **BRITISH GENERAL**

**AERIAL TUNING UNIT**



DE LUXE MODEL

STANDARD MODEL  
**18/6**

**30/-**

Any wavelength from 250—2,000 metres by means of a simple 10 Stud Tapping Switch. No plug-in coils required; reaction smooth over entire wave-band. Simple two-hole fixing.  
Can be obtained from all reputable dealers or direct from:—

**British General Manufacturing Co. Ltd.**  
BROCKLEY WORKS - - - LONDON, S.E.4  
See our Stand No. 111 at the Wireless Exhibition

You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

# WHY MAINTAIN THE DRY BATTERY HABIT ?

The AIR FORCE started it for Wireless during the war. It is essential to have a portable battery on an aeroplane, even if it means extra cost and reduced efficiency.

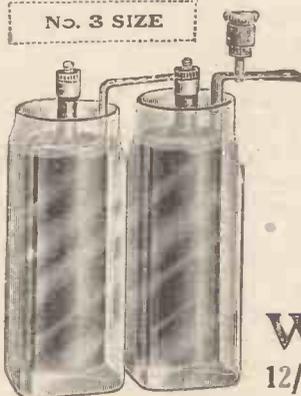
The POST OFFICE, with their vast experience, always use the WET SAC LECLANCHE where conditions permit. They KNOW it gives better results and costs less in upkeep.

The Dry Cell, with its paste electrolyte, is a retrograde step when applied to Wireless Reception. The paste and depolariser are liable to expand and causes electrolyte to ooze from cells. The pots, when eaten away, will allow electrolyte to go between cells, with the result that crackling noises are often heard.

The Standard Wet Cell has none of these disadvantages. The fluid electrolyte and general construction is such that an even current is given off during the whole life of the elements. At no time is there any noise of any sort. Again, the fluid electrolyte allows of increased efficiency.

The Cells will give a considerably increased output to that of a similar size depolariser in a dry cell.

The battery is one that can be maintained at home. Only used-up parts need replacing. The results in reception show a **WONDERFUL IMPROVEMENT, BOTH IN POWER AND CLARITY.** Our Booklet explains exactly how the battery is made up, with details of maintenance and upkeep, etc. The assembling of the Battery is a simple and interesting job.



Prices of popular model, 60 Cells No. 1 size, 90 volts, Sacs with brass caps **21/9**  
 for soldering .. .. .  
 Ditto, with Detachable Terminals, no soldering required .. .. . **25/1**  
 Trays for above, **7/-**

*In sending for Booklet state number and type of valves. We will recommend suitable battery.*

No. 1 Cell for current up to 7 milliamps. No. 2 Cell for current up to 14 milliamps.  
 No. 3 " " " " " 30 " L.T. " up to 300 milliamps.

STAND NO. 16 RADIO EXHIBITION, OLYMPIA.  
 STAND NO. 74 MANCHESTER RADIO EXHIBITION  
 and BRITISH INDUSTRIES FAIR, 1928.

**WET H.T. BATTERY CO.**  
 12/13, BROWNLOW STREET, HIGH HOLBORN W.C. 1

*Instal  
 once & for all  
 A STANDARD WET  
 H.T. BATTERY*

**GUARANTEE**

All goods supplied are guaranteed to be up to standard, otherwise your money will be refunded without question or quibble on goods being returned as sent. Satisfaction and Service are the keynote of this business.



Everything in Radio is stocked by Cecil Ridley and everything supplied under guarantee given above. You may order by post with confidence, knowing that your requirements will be carefully and accurately supplied.

**POST ORDERS**

Give full details as set out in list given below. All orders dealt with promptly, and the utmost care is taken to supply any special needs. If requirements not stated below, ask—we can supply anything.

**FREE** To every purchaser of goods to the value of 20/- a Worthmore Coil Winder, value 5/-, will be given Free.

.0005 SLF Variable Condensers .. each 5/-	Loud Speaker Horns for Lissenola Unit .. each 7/6	Dundas Loud Speaker .. each 25/-	Six Pin Coil Bases .. each 1/3
.0005 Atlas Square Law Condensers .. 3/9	4 1/2-in. Condenser Dials .. 1/9	Cone Type Speakers .. 20/-	Six Pin Coil Formers .. 4/-
60-v. M.A.L. Batteries H.T. .. 4/11	2-way Coil Holders .. 1/6	2-v. Triotron Power Valves .. 8/6	Cleartron Valves .. Half Price
100-v. M.A.L. Batteries, HT .. 8/6	2-way Coil Holders, back of panel .. 2/6	4-v. Triotron Power Valves .. 7/-	Coil Plugs .. each 1/4
4.5-v. Flashlight Batteries, d.z. 3/6	9-v. Grid Bias Batteries .. 1/-	4-v. Triotron Super Power Valves .. 7/6	Lead in Tubes, 6in., 9in., 12in. .. 1/-
Banana Plugs and Sockets each 2	Slow Motion Dials .. 4/6	Basket Coil Holders .. 9/-	Bell Wire .. yard 1/6
2-v. Triotron Valves .. 3/11	Base board coil plugs .. 3	Micro-Radio Rheostats .. 1/9	26 DCC Wire .. 1 lb. 1/-
2-v. .06 Nowak Valves .. 4/-	HF Chokes .. 4/6	Transfers, per packet .. 5	28 DCC Wire .. 1/-
2-v. Power Valves .. 6/-	Variable Grid Leaks .. 6	Trix On-Off Switch .. 1/-	Neutron Crystal .. each 1/3
Croix Transformers 3-1 and 5-1 .. 3/6	Anti-Phonic Valve Holders .. 1/-	Loud Speaker Plugs and Sockets for room wiring .. 1/6	Screwed Rod 4BA, 2BA length 2/6
Sopranoist Transformers 5-1 .. 3/6	Pulleys .. 4	Peerless Rheostats 30 and 60 ohm .. 2/6	Permanent Detectores .. each 2/6
Induction Coils 35 .. 1/2	Rheostats 6 ohm-30 ohm .. 1/-	2-v. Metal Valves, .06 .. 6/-	Ebonite Knobs .. 2
" " 50 .. 1/4	2 MFD Condensers .. 2/3	2-v. Metal Power Valves .. 7/6	Screw Drivers .. 3
" " 75 .. 1/6	2-v. OVD Carriers .. 8	Wander Plugs .. 1	Large Shell Insulators .. 3
" " 100 .. 1/9	Insulated Tinned Wire for wiring .. for 20 ft. 1/6	SPDT Switch-on Porcelain .. 8	Bell Insulators .. 2 a 1d.
" " 200 .. 2/6	16-Gauge Tinned Wire per 1/2 lb. 1/-	DPDT Switch-on Porcelain .. 1/3	Headphones (1 year guarantee) .. pair 3/11
" " 250 .. 2/9	Aerial Wire, Copper per 1/2 lb. 1/9	Fusolda .. per tin 1/3	Wooden Accumulator Carriers .. each 2/6
Centre Tapped 1/- extra.	Red and Black Flex .. yard 1 1/2	Loud Speaker Cords .. 1/-	Derwin Leather Accumulator Carriers .. 1/9
	60-v. Battery Boxes .. each 1/11	Galvanized Earth Tubes .. 2/6	Voltmeters, 0/15 .. 2/9
		Ultra Phones .. 11/6	

FOR EVERYTHING IN RADIO WRITE TO RIDLEY

**CECIL RIDLEY**  
 "RADIO HOUSE," MIDDLESBROUGH

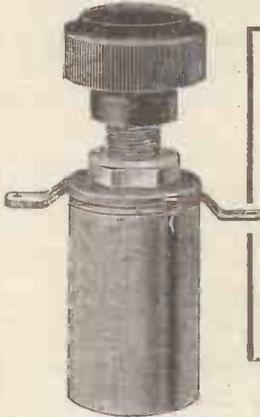
SPECIAL REQUIREMENTS QUOTED FOR—WRITE NOW

Please Mention "A.W." When Corresponding with Advertisers

Don't be put off  
with "just as goods"  
**INSIST on**

**Utility**  
GUARANTEED  
**COMPONENTS**

The "Utility" finish is better, the design is better, the material is better, and actual performance incomparable! Moreover, every "Utility" component is sold at a reasonable price—every one guaranteed against defect!



**"Utility"**  
**ON and OFF**  
**SWITCH**

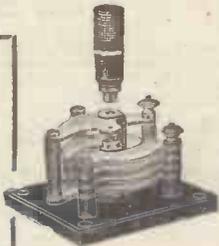
A really efficient main switch for cutting off L.T. supply. Push-pull design and 12-point contact—to reduce resistance to the minimum! One-hole fixing and nickel-plated finish! Superior to any similar switch on the market!

Price 2/- Each

**"Utility"**  
**NEUTRODYNE**  
**CONDENSER**

Mounts above, or below, the baseboard. Rigid—no end play! Ball-bearing centre spindle—sufficient tension to prevent misadjustment. Detachable key.

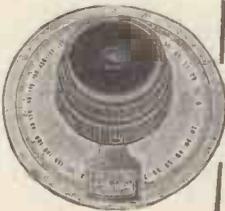
Price 5/- Each



**"Utility"**  
**MICRO DIAL**

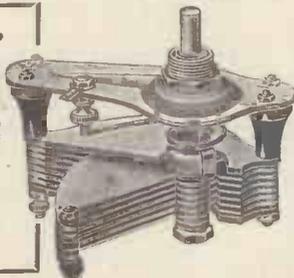
An improvement on last year's model—which we still supply—in that an aluminium dial, with hair-line cursor, is incorporated for easier reading. Read clockwise or anti-clockwise.

Price 7/6 Each



**"Utility"**  
**LOGARITHMIC**  
**CONDENSER**

With light thinble solid dielectric (walls only 1/32in. thick!). One-hole fixing. Vernier pattern is fitted with our Micro Dial. Three capacities, from 7/6 up. Write for details.



All good Dealers stock Utility

If by any chance you can't obtain in your district, we can execute your orders by return of post. Write for Lists.

**WILKINS & WRIGHT LTD.**

"UTILITY" WORKS, KENYON STREET, BIRMINGHAM



**Transmitting Licences**

SIR,—I have been experimenting with "sparkers" since 1918, and I was a first-class signaller in the Army, and have kept up the practice. I possess three micro-phones and enough apparatus to build a first-class low-power transmitter, and have all the means at my disposal, including knowledge and cash, to make a good job of it if only I had the chance; but—and here comes the snag—I can't get a licence. I have made repeated applications since 1922, but have never been successful. If you can help me you will clinch a friendship that has existed for years.

—G. D. (King's Lynn).

**A Possible Cause**

SIR,—With reference to Mr. Sydney Moseley's remarks with regard to an announcer "hissing" when pronouncing the letter "s," I think he may find that this is caused through a connection in or outside the set having become slightly loose.

A short time ago I noticed that not only one announcer, but other speakers, "hissed" on such words as "speak," "stop," and "civil"; in fact, on all words where the pronunciation of the letter "s" was emphasised. This puzzled me for a time, until I discovered that the connection to one of my wander plugs was loose. After tightening this up the "hissing" entirely disappeared.

On another occasion I discovered that a connection to my aerial coil was not absolutely tight, and this produced the same effect.—K. E. G. C. (Teddington).

**A "Mains" Point**

SIR,—With reference to the articles in connection with using the electric-light mains, I should like to raise a point with regard to "shocks" which has apparently been overlooked.

In the three-wire system of distribution I believe the live wire is positive and negative in alternate houses.

Taking a house where the positive is the live wire, the return becomes automatically the earthed negative. The earphones in this case are connected directly to the live wire (via the smoothing and resistance circuit) and should any part of the wire, either on or connecting the two bobbins, come into contact with the earphone casing, the wearer would form a direct return to earth with serious results.

This could, of course, only happen where the headbands and the stirrups are not insulated, but as eighty per cent. of the earphones on sale to-day are not insulated from the headbands, the point is well worth noticing.—H. R. (Stroud Green).

**In a hurry!**

—a tale with a moral

THERE was a shop—a most excellent shop—you will have guessed it was a radio shop. A gentleman enters; an intelligent looking gentleman—but he is in a hurry.

He wants a high-tension battery.

"As before?"

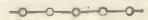
"Eight Shillings?"

"Yes, that will do. You might test it! By the way, I bought one of those batteries here about a month ago, and it has already 'conked out' on my two-valve set!"

The assistant, with considerable acumen, registers great surprise—and gathers in the price of the new battery. Upon which the gentleman departs with the optimistic remark—

"I hope this one lasts longer!"

He is in a hurry.



Now assuming that the second battery also lasts a month, he will have paid 16/- for two month's service. And yet, at the price of a few seconds' thought and a few shillings more, he could have bought a COLUMBIA 60-volt Battery (22/6) that would have given him 8 to 12 months' sterling service.

**DO YOU PURCHASE YOUR H.T. BATTERIES IN A HURRY?**

COLUMBIA Batteries are big batteries. They are built for long service. And because of this they will outlast a whole series of small batteries and show you an actual saving in cash.

**Columbia**  
**Radio Batteries**  
—They last longer

Ask your dealer for COLUMBIA High Capacity Radio Batteries—or write to us for further particulars.

**J. R. MORRIS**  
15, Kingsway, London W.C.2

Scotland:

J. T. Cartwright, 3 Cadogan St., Glasgow

## CHIEF EVENTS OF THE WEEK

- LONDON AND DAVENTRY (5XX)**  
 Oct. 2 Light Orchestral Concert.  
 " 3 Special International Chamber Music Concert.  
 " 4 Variety programme.  
 " 5 *Miss Hook of Holland*, a Dutch musical incident.  
 " 6 Military Band Concert.  
 " 7 National Concert, conducted by Sir Henry Wood.
- DAVENTRY (5GB)**  
 Oct. 2 *Samson*, an oratorio by Handel.  
 " 3 Military Band concert.  
 " 4 *Manon*, by Massenet, relayed from Glasgow.  
 " 7 Light music and vocal programme.  
 " 8 Roger Quilter programme.
- BOURNEMOUTH**  
 Oct. 2 Religious service relayed from the Punshon Memorial Church. Address by the Rev. J. Howell Rees.  
 " 4 Short Concert of Spanish Music.  
 " 6 *Romance*, an orchestral and vocal concert.
- CARDIFF**  
 Oct. 5 A Welsh Harvest programme.  
 " 6 *La Serva Padrona*, a short comic opera in two scenes. *Breaking the Spell*, a comic operetta in one act by Offenbach.
- MANCHESTER**  
 Oct. 8 *On with the Show of 1927*, relayed from the North Pier, Blackpool.
- NEWCASTLE**  
 Oct. 6 A popular orchestral and vocal programme in memory of Jenny Lind ("the Swedish Nightingale").
- ABERDEEN**  
 Oct. 3 A Goring Thomas programme.
- BELFAST**  
 Oct. 3 The Scottish National Theatre presents the Scottish National Players in two one-act plays.  
 " 8 The Ladies will Entertain.

### WIRELESS LECTURES

THAT popular lecturer and wireless expert, Capt. Jack Frost, late "Uncle Jack" of the B.B.C., will deliver a course of weekly lectures on wireless at the Streatham and Tooting Literary Institute (Bec School, Beechcroft Road, S.W.17), on Tuesdays, as from September 27, and at the Putney Literary Institute (County Secondary School, West Hill, S.W.15), on Wednesdays, as from September 28, at 7.15 p.m. The lectures are intended for the ordinary wireless enthusiast, with or without technical knowledge. They should make a strong appeal to residents in south-west London and a heavy enrolment is anticipated. A fee of 4s. only is charged for the winter session (September to Easter), while a payment of 6s. entitles a student to attend the full course, which ends in July.

### JACKSON CONDENSERS

IN our survey of the Exhibition stands last week we drew attention to Stand 85, occupied by Jackson Bros., 8 Poland Street, Oxford Street, W.1.

Owing to a typographical error, we referred to one of their condensers as a "neutralising" logarithmic condenser. The two new models of J.B. logarithmic condensers are the plain type and the slow-motion type, and these are supplied in the usual tuning capacities.

The neutralising condenser, which incorporates many notable features of design, is not, of course, a logarithmic condenser. A leaflet received gives full particulars of the J.B. neutralising condenser, which retails at the moderate price of 4s. 6d.

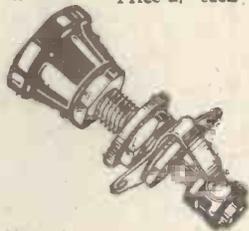


**BENJAMIN Clear-Tone Anti-Microphonic VALVE HOLDER**

Make sure that the anti-microphonic valve holders you buy are Benjamin, because in these alone you get these 5 essential features:—

- (1) Valve sockets and springs are made in one piece with no joints or rivets to work loose and cause faulty connections.
- (2) Valves are free to float in every direction.
- (3) Valves can be inserted and removed easily and safely.
- (4) Valve legs cannot possibly foul the base-board.
- (5) Both terminals and soldering tags are provided.

Price 2/- each



**BENJAMIN BATTERY SWITCH**

A sturdy positive action switch for high or low tension. It's OFF when it's IN, thus preventing the accidental turning on of current. Single contact. One-hole fixing.

Price 1/- each

There is a story told of a famous singer that he could sing a certain note into a wineglass and smash it into fragments by the vibration.

This is an extreme instance of the damage vibration can do. Nearer and dearer to you is the damage vibration does to the delicate filaments of your valves.

Every time a lorry rumbles past your house a wave of vibration travels to your radio set. Every time you walk across the floor another wave is sent.

The only way you can thoroughly stop vibration reaching the filaments is to fit Benjamin Anti-microphonic Valve Holders.

The smallest shock and vibration is quenched by the wonderful one-piece springs. Microphonic noises are entirely eliminated. The life of the valve is trebled at least.

# BENJAMIN

ANTI-MICROPHONIC VALVE HOLDER

PRICE 2/- EACH.

THE BENJAMIN ELECTRIC LTD.

Brantwood Works, Tariff Road, Tottenham, N.17.

See BENJAMIN Exhibits at Stand No. 79, National Radio Exhibition

# BROADCAST TELEPHONY



NOTE.—In the following list of transmissions these abbreviations are observed: con. for concert; lec. for lecture; orch. for orchestral concert; irr. for irregular; m. for metres; Kc. for kilocycles and sig. for signal. Unless otherwise stated all times are p.m. (B.S.T.).

## GREAT BRITAIN

London (2LO, 361.4 m. (830 Kc.). 12-2.0, con.; 3.15-4.0, transmission to schools; 3.30-5.45, con. (Sun.); 4.15, con.; 5.15-5.35, children; 6, dance music; 6.30, time sig., news, music, talk; 8.10, music; 9.0, time sig., news, talk, con. Dance music daily (exc. Sundays) from 10.30 until midnight.

Aberdeen (2BD), 500 m. (600 Kc.) Belfast (2BE), 306.1 m. (980 Kc.) Bournemouth (6BM), 326.1 m. (920 Kc.) Cardiff (5WA), 353 m. (850 Kc.) Glasgow (5SC), 405.4 m. (740 Kc.) Manchester (2ZY), 384.6 m. (780 Kc.) Newcastle (5NO), 312.5 m. (960 Kc.) Much the same as London times.

Bradford (2LS), 252.1 m. (1.190 Kc.) Dundee (2DE), 294.1 m. (1.020 Kc.) Edinburgh (2EH), 288.5 m. (1.040 Kc.) Hull (6KH), 294.1 m. (1.020 Kc.) Leeds (2LS), 277.8 m. (1.080 Kc.) Liverpool (6LV), 297 m. (1.010 Kc.) Nottingham (5NG), 275.2 m. (1090 Kc.) Plymouth (5PY) 400 m. (750 Kc.) Sheffield (6FL), 272.7 m. (1,100 Kc.) Stoke-on-Trent (6ST), 294 m. (1,020 Kc.) Swansea (5SX), 294

m. (1.020 Kc.) Daventry (25 kw.), high-power station, 1,604 m. (187 Kc.) Special weather report 10.30 a.m. and 10.25 p.m. (weekdays), 9.10 (Sun.); relays 2LO. Daventry Experimental, (5GB). 491.8 m. (610 Kc), 30 kw., from 3.0 onwards.

## IRISH FREE STATE

Dublin (2RN), 319.1 m. (940 Kc.) Daily 7.25; Sundays, 8.30 until 10.30 p.m. Relays Cork.

Cork (6CK), 400 m. (1 kw.). (750 Kc.) Relays Dublin (exc. Sundays).

## CONTINENT

### AUSTRIA

Vienna (Radio Wien), 517.2 m. (5 kw.) and 577 m. 7.30, con. Relays: Graz, 357.1 m. (750 w.); Klagenfurt, (750 w.) 272.7 m.; Innsbruck, 294.1 m. Linz (under construction).

### BELGIUM

Brussels, 508.5 m. (1.5 kw.). 5.0 orch. (not daily), 8.30, talk, 9.0 con., news.

### CZECHO-SLOVAKIA

Prague, 348.9 m. (5 kw.). Con., 8.0 (daily). \*Brunn, 441.2 m. (3 kw.). 7.0, con. (daily). \*Bratislava, 300 m. (500 w.). \*Kosice, 1,870 m. (5 kw.). 7.30 con., testing. \*Relays Prague.

### DENMARK

\*Copenhagen, 337 m. (700 w.). Sundays, 10.0 a.m. sacred service; 8.0, con. Weekdays: 8. lec., con., news; dance to midnight (Thurs., Sat.).

\*Relayed by Kalundborg (7 kw.) 1,153 m.

### FRANCE

Eiffel Tower, 2,650 m. (8 kw.). 6.30 a.m., markets (exc. Sun. and Mon.); 10.15 a.m., time sig., weather; 6.0 talk; 7.0 weather, con.; 8.15 lec. Relay PTT, Paris, Sat., 9.10-11.0, and weekday afternoons.

Radio-Paris (CFR), 1,750 m. (about 5 kw.)

Sundays; 12.0 sacred service; 12.45, con.; news; con.; 8.15, news, dance, Weekdays; 10.30 a.m., news, con., 12.30, con., markets, weather, news; 4.30, markets, con.; 8.0 time sig., news, con.

L'Ecole Sup. des Postes et Telegraphes (PTT), Paris, 458 m. (5 kw.). 1.15-3.0 (relay of Sorbonne University); 9.0 con. (daily).

Le Petit Parisien, 340.9 m. (500 w.). 9.15, con. (Tues., Thurs., Sat., Sun.).

Radio L.L. (Paris), 370 m. (250 w.). Con. (Mon., Wed., Fri.), 9.30.

Biarritz (Côte d'Argent), 200 m. 7.0, con. (Irr.).

Radio Vitus (Paris), 322.6 m. 9.0, con. (Mon., Wed., Fri.).

Radio-Toulouse, 391 m. (3 kw.). 5.30 news (exc. Sun.); 8.45, con.

Radio-Lyon, 291 m. (1.5 kw.). 8.20, con. (daily); 4.0 (Sun.).

Strassburg (8 G.F.), 268 m. (0.1 kw.). Con., 9.0 (Tues., & Fri.). (Irr.).

Radio Agen, 297 m. (500 w.). 8.30, con. (Tues., Fri.).

Mont de Marsan, 400 m. (300 w.), con., 8.30 (Irr.).

\*Lyon-la-Doua, 476 m. (1 kw.). Own con. 8.0 (Mon., Wed., Sat.). Relays Paris & Marseilles.

\*Lille, 283 m. (500 w.). Own con. (Tues., Fri.)

\*Marseilles, 309 m. (500 w.).

\*Grenoble, 278 m. (500 w.). (Wed. and Sats.)

\*Toulouse, 260 m. (500 w.) (exc. Sun.).

\*Rennes, 320 m.

\*Limoges, 273 m.

\*Bourges, 500 m. (1 kw.). testing.

Montpellier, 252.1 m. (1 kw.). 8.45 (Wed., Fri.). For news, relays Marseilles.

Beziers, 158 m. (700 w.). 9.0 (weekdays only).

Juan-les-Pins, 230 m. Temp. closed down.

Bordeaux (Radio-Sud-ouest), 238 m. (1 kw.). 7.25 con. (Thurs.) also on 25 m. (Sun.).

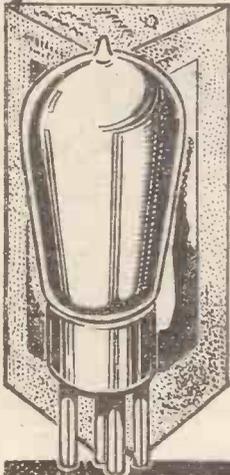
\*Relays of PTT, Paris.

(Continued on page 460)

**THE SAME RELIABLE VOLTRON WITH A WONDERFUL NEW FILAMENT**

Another year of exhaustive research places "Voltron" Valves in a position of leadership. The wonderful new Voltron T.T. filament means operating efficiency increased all round by 25 per cent.

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201. H.F., Det., L.F.	1.8	.1 7/6
P.2. Power	1.8	.2 9/-
401. H.F., Det., L.F.	3.7	.1 7/6
P.4. Power	3.7	.15 10/9
601. H.F., Det., L.F.	5.5	.1 12/-
P.6. Power	5.5	.1 12/-

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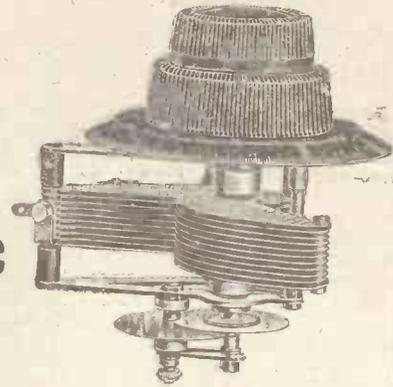
Nearly 50 splendid features in the October



## Wireless Magazine

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## The New J.B. Logarithmic Models



J.B. Log. Slow Motion.

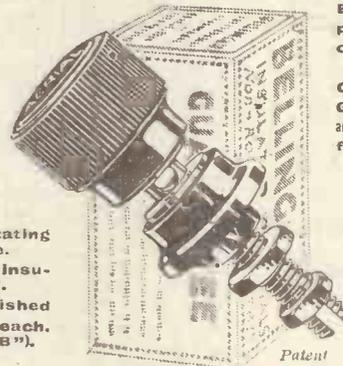
Our new Logarithmic Models are proving one of the features of the Exhibition. Stand 85 is the great attraction. These Log. models are fitted with nickel-plated brass skeleton end plates, ball-bearing centre spindle, pig-tail connection, and brass vanes. Rotor vanes tied at tips. The plain model is fitted with a Variable Tuning Tension. J.B. Condensers make radio the real pleasure it is meant to be.

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**BELLING & LEE, Ltd., Queensway Works, PONDERS END, MIDDLESEX.**

**"BROADCAST TELEPHONY"**

(Continued from page 458)

Bordeaux (Lafayette) 273 m. (1½ kw.).  
 Con. 5.0, 9.0 (weekdays), 2.30 (Sun.). Relays  
 PTT, Paris, 8.30 (Sat.). No transm. on Mon.

**GERMANY**

Berlin, on 483.9 and 566 m. Throughout  
 day. Relayed by Stettin (236.2 m.).

Königswusterhausen (LP), 1,250 m. (8 kw.)  
 11.30-12.50 a.m., con. (Sun.); 3.0, lec. (daily).  
 8.30, relay of Berlin (Vox haus) con., or from  
 other German Stations (daily).

Breslau, 322.6 m. (4 kw.). 7.0 lec.; 8.30  
 con. Relay, Gleiwitz, 250 m.

Dortmund, 283 m. (1½ kw.). See Langenberg.

Frankfort-on-Main, 428.6 m. (4 kw.). 6.45.  
 a.m. (exc. Sun.), physical exercises; 8.30  
 a.m., sacred con. (Sun.); 4.30, con.; 8.0, lec.,  
 con., weather. Relay: Cassel, 272.7 m.

Hamburg, 394.7 m. (4 kw.). Relayed by  
 Bremen (252.1 m.) Hanover (297 m.). Kiel  
 (254.2 m.). Sundays: 6.50, relays Berlin;  
 9.15 a.m., sacred con.; 6.0 con.; 7.0 con.,  
 Weekdays: 5.45 a.m., then from 9.0 a.m.  
 throughout day.

Königsberg, 329.7 m. (4 kw.). 8.0, con.  
 Relay: Danzig, 272.7 m.

Langenberg, (Rhineland), 468.8 m. (25 kw.).  
 Relays Muenster, Dortmund, Cologne or  
 Dusseldorf (daily). Throughout day.

Leipzig, 365.8 m. (4 kw.). Relayed by  
 Dresden (275.2 m.). 8.15 con. or opera;  
 weather, news, dance music.

Munich, 535.7 m. (4 kw.). Relayed by  
 Nuremberg, 303 m. (4 kw.) and Augsburg  
 566 m. 11.30 a.m., lec., con. (Sun.); 6.30.  
 con. (weekdays).

Muenster, 241.9 m. (1.5 kw.). See Langenberg.

Norddeich (KAV), 1780 m. 11.15 a.m., 10.30.  
 Stuttgart, 379.7 m. (4 kw.). 11.30 a.m., con.  
 (Sun.); 6.30, time sig., news, lec., con. (daily);  
 Relay: Freiburg, 577 m. (1½ kw.).

**GRAND DUCHY OF LUXEMBURG**

Radio Luxemburg, 217.4 (250 w.). Con.

2.0 (Sun.), 9.0 (Tues.). (Irr.)

**HOLLAND**

Hilversum (ANRO) 1,060 m. (5 kw.). Sun-  
 days: 9.40 a.m., sacred service; 12.40 and  
 2.10, con.; 6.25, church service; 7.40, weather,  
 news, con. Weekdays: 4.40, con.; 7.50, con.

Scheveningen-Haven, 1,950 m. (2½ kw.).  
 Throughout day. Markets, Stock Ex.

Eindhoven (PCJJ), 30.2 m. (Tues., Thur.)  
 6 p. —midnight.

Huizen, 1875 m. (5 kw.). Testing.

**HUNGARY**

Budapest, 556 m. (3 kw.). 8.0 con.

**ITALY**

Rome, (IRO), 450 m. (3 kw.). 8.30, news,  
 weather, con.; 10.15, late news.

Milan, 315.8 m. (4 kw.). 8.15-11.0, con.

Naples, 333.3 m. (1½ kw.). 8.30-11.0, con.

Como, 500 m. (5 kw.) 8.0-11.0 (temp.).

**NORWAY**

Oslo, 461.5 m. (1.5 kw.). 7.15, con.

Bergen, 370.4 m. (1 kw.). 7.30, news, con.

\*Fredriksstad, 434.8 m.

\*Porsgrund, 502 m. (1½ kw.).

\*Tromsø, 500 m.

\*Relays Oslo.

**POLAND**

Warsaw 111.1 m. (4 kw.) 6.0 onwards (daily).

Cracow, 422 m. (2 kw.). 6.30 onwards (daily).

Posen, 280.4 m. (1.5 kw.). 8.30 con. (daily).

**RUSSIA**

Moscow (RDW), 1,450 m. (15 kw.). 5.30  
 p.m. con. News. 11.0 chimes from Kremlin.

Moscow Popoff, 675 m. (5 kw.). 5.30 daily.

Leningrad, 233.9 m. (10 kw.). 6.0 and on  
 1000 m.

Kharkov, 477 m. (4 kw.). 7.0 daily.

**SPAIN**

Madrid (EAJ7), 375 m. (1.5 kw.). Con.,  
 daily. 9 or 10 con.

Madrid (Radio Espana), 400 m. (2 kw.). Irr.

Barcelona (EAJ1), 344.8 m. (1½ kw.).  
 6.0-11.0 (daily).

Barcelona (Radio-Catalana) (EAJ13), 462 m.  
 (1 kw.). 7.0-11.0, con., weather, news.

Bilbao (EAJ9), 438 m. (500 w.). 7.0 con.

Bilbao (Radio-Vizcaya) (EAJ11), 418 m.  
 (500 w.). 8.0-12.0, con. (daily).

Cadiz (EAJ3), 400 m. (550 w.). 7.0-9.0, con.,  
 news. Tests daily (exc. Sun.), midnight.

Cartagena (EAJ16), 335 m. (500 w.). 8.30-  
 10.0, con. (daily).

Seville (EAJ5), 357 m. (500 w.). 9.0, con.,  
 news, weather. Close down 11.0.

Seville (EAJ17), 400 m. (500 w.). 7.0-10.0  
 con. (daily).

San Sebastian (EAJ8), 297 m. (1.5 kw.).  
 Relays Madrid (EAJ7).

Salamanca (EAJ22), 405 m. (1 kw.). 5.0  
 and 9.0 con. (daily). Closes down 11.0.

Almeira (EAJ18) (1 kw.), testing 300-400 m,  
 Saragossa, 566 m. (500 w.), 9.0 p.m.

**SWEDEN**

Stockholm (SASA), 454.5 m. (1½ kw.).  
 11.0 a.m., sacred service (Sun.); 6.0, sacred  
 service; 7.0, lec.; 9.15, news, con., weather,  
 Dance (Sat., Sun.), 9.45. Relayed by Motala.

1,320 m. (40 kw.).

**SWITZERLAND**

Lausanne, (HB2), 680 m. (600 w.). 8.0  
 Zurich, 588 m. (600 w.). 11.0 a.m., con.  
 (Sun.); 6.15, lec., con., dance (Fri.).

Geneva (HB1), 760 m. (750 w.). 8.15, con.

Berne, (411 m. (1.5 kw.). 8.30, con.

Basle, 1,100 m. (250 w.). Relays Berne.

**TURKEY**

Constantinople (Radio Stamboul), 1,220 m.  
 (7 kw.). Con., 8.0 p.m.

Angora (15 kw.), testing shortly.

NOTE:—Readers should bear in mind that  
 Great Britain reverts to G.M.T. on October 2,  
 when the transmission times of Central  
 European Stations must be reduced by one  
 hour. This change does not affect Belgium  
 and France.

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One-valve All-wave Reinartz ..	A.W.2	1 0
All-in-all One Valver ..	A.W.13	1 0
Hartley DX One-valver ..	A.W.27	1 0
Alpha One* ..	W.M.26	1 3
<b>TWO-VALVE SETS</b>		
All-broadcast Two* ..	W.M.5	1 3
Safeguard Two ..	A.W.3	1 0
Two-valver embodying K.L.1 Valves ..	A.W.5	1 0
One-control Two ..	A.W.6	1 0
Wide World Short-wave Two ..	A.W.11	1 0
All-wave Two Valver ..	A.W.15	1 0
Loftin-White Two* ..	W.M.20	1 3
Reinartz Two ..	A.W.21	1 0
Remote-control Two ..	A.W.23	1 0
One-dial Two ..	W.M.23	1 0
Empire Short-wave Two ..	A.W.28	1 0
Screened-trap Two ..	A.W.31	1 0
"Next-step" Receiver ..	A.W.34	1 0
Girdle Two* ..	W.M.30	1 3
Centre-tap Two ..	A.W.42	1 0
<b>THREE-VALVE SETS</b>		
One-knob Three ..	W.M.3	1 0
Continental Three ..	W.M.7	1 0
Shielded Searcher ..	W.M.8	1 0
Victory Three ..	A.W.9	1 0
Regulator Three ..	A.W.12	1 0
M.C. Three, with copy of "Amateur Wireless," giving full instructions	A.W.1	0 7

	Price, post free.	
	No.	s. d.
A.W. Ballot Three, with copy of "A.W.," giving full instructions	A.W.4	0 7
Hi-mu R.C. Three* ..	W.M.9	1 3
M.C.3 Star ..	A.W.16	1 0
Wave-catcher Three ..	W.M.19	1 0
Excelsior Three ..	A.W.20	1 0
Reinartz R.C. Three for the Family* ..	W.M.15	1 3
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Lighthouse Three ..	A.W.29	1 0
Purity Three-valver ..	A.W.33	1 0
A Modern Tuned Anode Three ..	A.W.35	1 0
Tetrode-three for Shielded Valves ..	A.W.36	1 0
Alternative-programme Three ..	A.W.38	1 0
A "Mains" Three Valver ..	W.M.34	1 0
Screened-grid Three ..	W.M.21	1 0
Simple Wireless "All-from-the- Mains" Receiver ..	A.W.41	1 0
<b>FOUR-VALVE SETS</b>		
Paradyne Four ..	W.M.2	1 6
M.C. Four ..	A.W.8	1 6
Distance Getter ..	A.W.10	1 6
Household Four ..	A.W.17	1 6
DX Four ..	A.W.18	1 6
Revelation Four ..	W.M.24	1 6
Auto-selector Four ..	W.M.35	1 6
"A.W." Gramo Radio ..	A.W.40	1 6
<b>FIVE-VALVE SETS</b>		
1927 Five ..	W.M.6	1 6
Two-volter's Five ..	W.M.11	1 6
Individual Five ..	A.W.25	1 6
Exhibition Five ..	W.M.33	1 6

	Price, post free.	
	No.	s. d.
<b>SIX-VALVE SETS</b>		
Nomad Six ..	W.M.31	1 6
<b>SEVEN-VALVE SETS</b>		
Simpladyne Seven (Super-het) ..	W.M.22	1 6
<b>AMPLIFIERS</b>		
All-broadcast Amplifier ..	W.M.10	1 0
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<b>PORTABLE SETS</b>		
Springtime Portable Two-valver ..	W.M.12	1 0
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M.C. Three Portable ..	A.W.22	1 0
Handy Three ..	W.M.27	1 0
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Fonotrol Crystal Set ..	W.M.14	0 6
Hi-lo Crystal Set ..	W.M.18	0 6
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The  
"Simpler Wireless Three-Valver"  
Some Notes on the Operation of the Special Mains Set Described in Last Week's Issue.

THE first published description of a set built on the "Simpler Wireless" principle appeared in last week's AMATEUR WIRELESS and employed a valve detector followed by two L.F. stages.

As this set is the first of a series of "Simpler Wireless" sets to be described in this periodical, and as it therefore serves, in a sense, to introduce readers to the practical side of "Simpler Wireless" it was considered advisable to push its construction to the extreme limit of simplicity.

For this reason various small refinements which would have increased the sensitivity and flexibility of the set, and which will be incorporated in future sets were omitted, so that no more apparatus or controls need be used than are absolutely necessary.

Modifications

When the slightly more advanced receivers are described, however, readers will find that the parts specified for last week's set can be used in building them or alternatively, such refinements as separate grid bias to each of the valves, reaction, provision for an earth connection, etc., can be incorporated in the original set with very little trouble.

As regards one point, at least, the present set is in no way inferior to the slightly more elaborate ones which will follow it, and this is the excellency of its reproduction.

Employing neither H.F. amplification nor reaction it is, as explained last week, only intended for local-station loud-speaker work, but up to the normal range of similar sets employing ordinary circuits it may be relied upon to give at least equal volume together with really excellent quality.

Valves

As no means of adjusting the grid potential of the detector valve is provided (the latter being fixed at zero) it is, of course, necessary to use a detector valve which will function as an anode-bend rectifier with 40 volts on the plate and none on the grid. As pointed out last week, the Marconi and the Osram D.E.H. valves fulfil these conditions and were used during the testing of the original set.

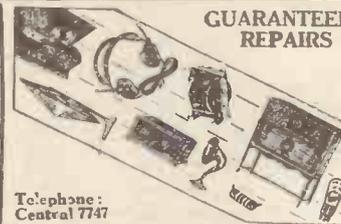
A high-mu (R.C. type) valve is, of course, required for the first L.F. stage and the various well-known makes of this type of valve all appear to function almost equally well here. The actual voltage applied to the grid of the second valve may, if desired, be ascertained in the following manner:—

First find the resistance of the L.F. choke coil. To do this connect up the coil in series with a small battery and a milliammeter and note the current that flows. Then the voltage of the battery divided by the current will give the resistance of the coil in ohms. Suppose that the battery is a 4-volt

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Valve:—

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accumulator and the current that flows is 8 milliamps (.008 amps). Then the choke has a resistance of 500-ohms.

Now wire up the choke in the set and put the milliammeter in series with it, noting the anode current of the detector valve under working conditions. Then multiply the resistance of the choke by the anode current and the result will give the number of volts, negative bias being applied to the grid of the second valve. If the resistance of the choke is 500 ohms, as above, and the anode current of the detector valve, under working conditions, is 4 m.a. (.004 amps), the grid of the second valve will be 2 volts negative with respect to the filament of this valve. The above figures have, of course, been chosen arbitrarily merely for the purposes of illustration.

It is by no means essential to check the amount of grid bias applied to the second valve in this way, as the grid of this valve will always be slightly negative with respect to its filament. The simple method of doing so outlined above is given here merely as a matter of interest.

A power valve should be used in the last stage of the set and the grid potential of this is controlled by moving the arm of the potentiometer which, in the circuit diagram, is connected immediately next to the last valve, on the positive side. This is the potentiometer mounted at the right hand side of the panel, looking at the front of the finished set. Should it be found that the grid of the last valve cannot be made sufficiently negative by means of this potentiometer the valve of the anode

resistance in the plate circuit of the second valve may be increased.

**Filament Current**

If a milliammeter is used to find the correct setting of the filament current control (the potentiometer mounted on the left-hand side of the panel) it should be remembered that it is by no means always essential to pass the full 100 milliamps through valves rated at .1 amp. in order that they may work efficiently. Many of these valves will work just as well with filament currents of only 80 or 90 milliamps, and, of course, the less the filament current the better it is for the valves.

J. F. JOHNSTON.

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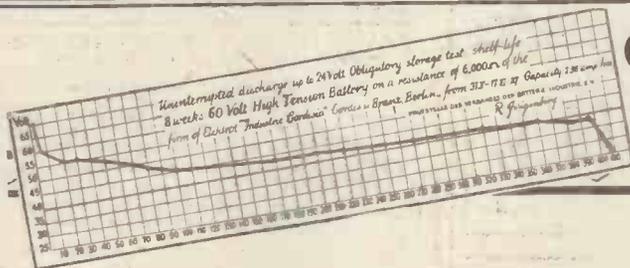
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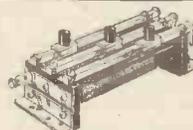


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## INTERNATIONAL RADIO CONFERENCE AT WASHINGTON

**SENATORE Marconi** and the Rt. Hon. **S. F. G. Kellaway, P.C.**, managing director of Marconi's Wireless Telegraph Co., Ltd., will represent the Marconi Companies' interests at the world Radio Telegraph Conference, which will open at Washington on October 4, to consider amendments to the international regulations that have become necessary by the development of wireless since the International Radio Telegraph Convention was signed in London in 1912.

Mr. Kellaway sailed for New York on the White Star liner *Homeric*, on September 21, and Senatore Marconi sailed from Italy to the United States on September 27.

Mr. C. E. Rickard, O.B.E., Deputy Engineer-in-Chief, will also represent the interests of Marconi's Wireless Telegraph Company, and Mr. Frederick S. Hayburn (General Manager) and Commander John A. Slee, C.B.E., R.N. (ret.) those of the International Marine Communication Co., Ltd.

### TRADE BREVITIES

Will readers note, **S. S. Bird & Sons** (Cyldon) of Sarnesfield Road, Enfield Town, Middlesex, have changed their telegraphic address from "Bird Enfield 0672" to "Capacity Enfield."

**Trelleborg Ebonite Works, Ltd.**, are now removed to Union Place, Wells Street, W.1. They have reduced the price of their ebonite panels of standard glossy finish to 1/2d. per sq. in. and 1/16 in. thickness.

We have had sent us by **The London Electric Wire Co. and Smith's Ltd.**, Playhouse Yard, Golden Lane, E.C.1, a copy of their new catalogue, which contains particulars of the new lines they are producing this season.

## PREPAID ADVERTISEMENTS.

Advertisements under this head are charged **THREEPENCE PER WORD**, minimum charge **THREE SHILLINGS**.

### DEPOSIT SYSTEM.

As the Publishers cannot accept responsibility for the bona fides of advertisers in this publication they have introduced a system of deposit which it is recommended should be adopted by readers when dealing with persons with whom they are unacquainted. It is here explained. Intending purchasers should forward to the Publishers the amount of the purchase money of the article advertised. This will be acknowledged to both the Depositor and the Vendor, whose names and addresses must necessarily be given. The Deposit is retained until advice is received of the completion of the purchase, or of the article having been returned to and accepted by the Vendor. In addition to the amount of the Deposit, a Fee of 6d. for sums of £1 and under, and 1s. for amounts in excess of £1, to cover postage, etc., must be remitted at the same time. In cases of persons not resident within the United Kingdom, double fees are charged.

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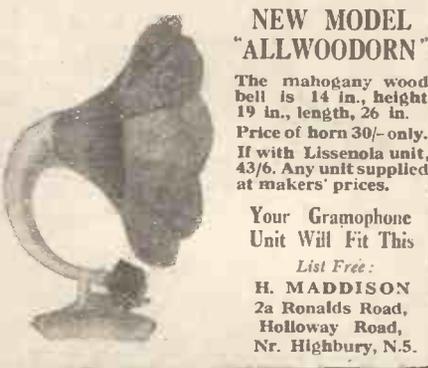
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## Amateur Wireless

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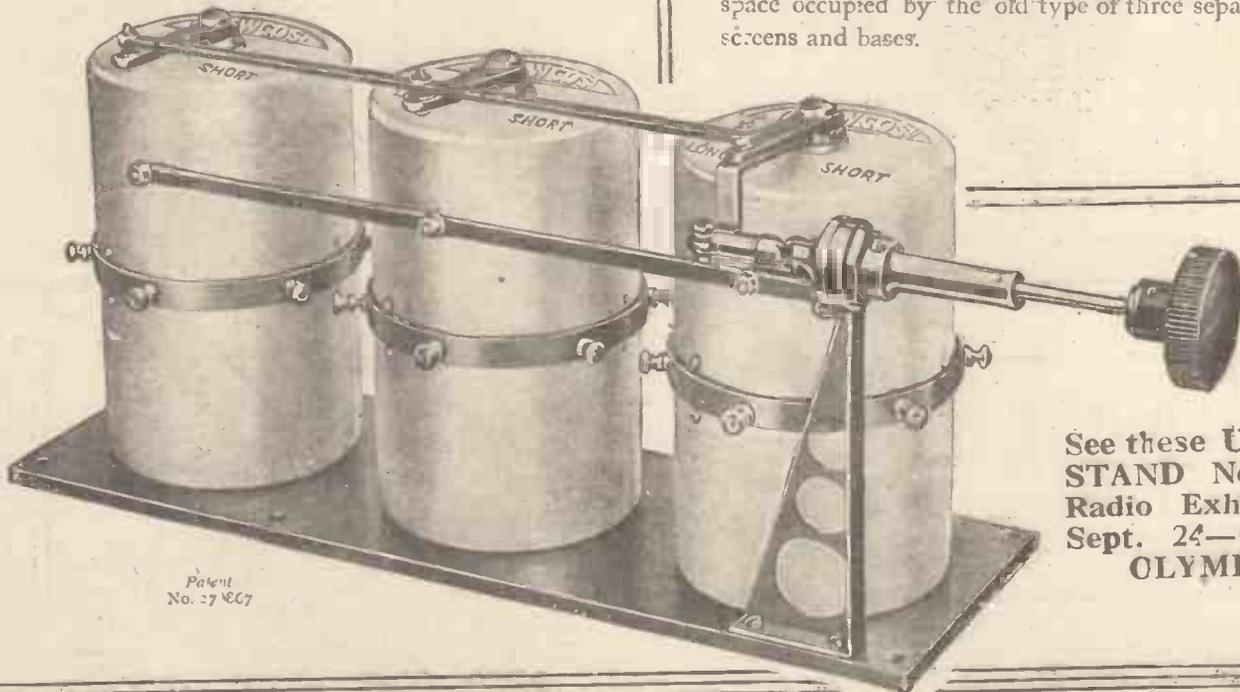
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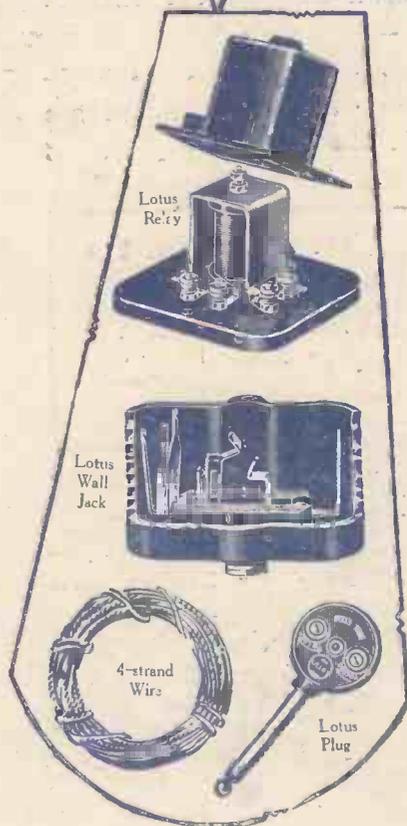
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