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Vol. V. No. 131.

SATURDAY, DECEMBER 6, 1924

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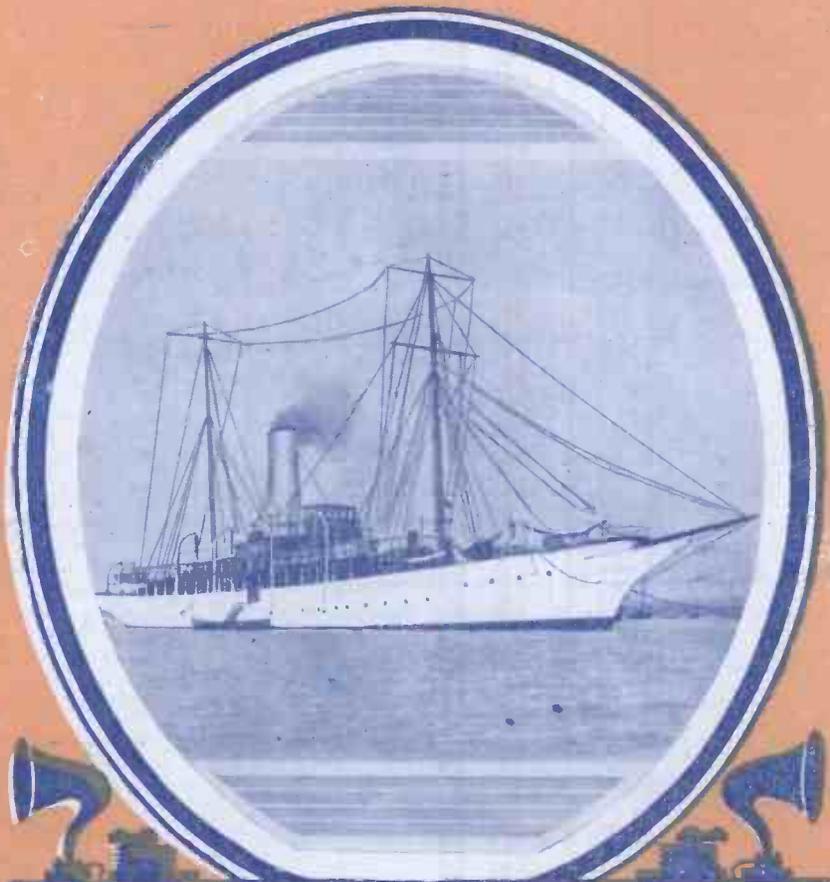
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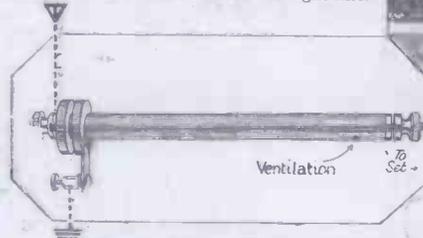
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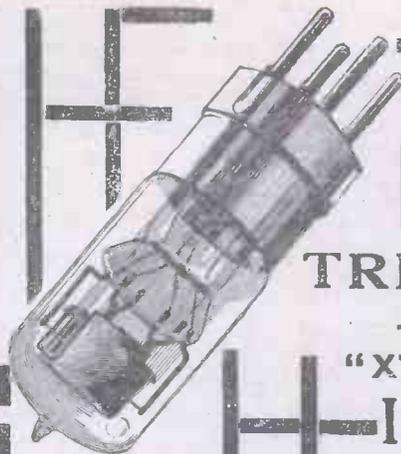
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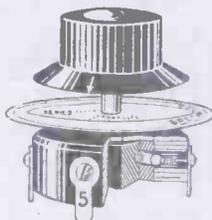
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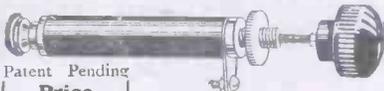
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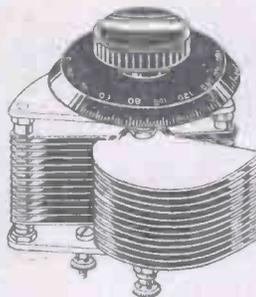
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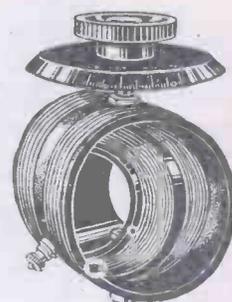


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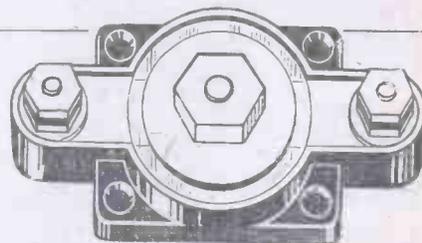
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Amateur Wireless

and Electricians

Vol. V. No. 131

December 6, 1924

WEATHER REPORTS AND HOW TO READ THEM

SOME OF THE WORLD'S METEOROLOGICAL WIRELESS STATIONS

THE collection and distribution of data relating to weather conditions is a most important work, which to a great extent is carried on by means of wireless.

Throughout the world there are numerous wireless stations which are continually engaged in sending out messages relating to meteorological conditions. If you are able to read morse and you should happen to tune in one of these stations, you would probably be unable to make any sense of the apparent jumble of figures, phrases and letters in which a modern weather message is sent unless you were in possession of the code.

Meteorological Codes

In many cases the information broadcast is so scientific and detailed that it would take many hours to transmit an average weather report. Therefore recourse is made to code, which enables a long message to be sent in a relatively short space of time. There are many codes used by the various meteorological wireless stations, but an attempt is being made to persuade all countries to adopt what is known as the New International Code. Besides the International Code, there is the Lindenburg Code, the American Code, and the French Meteorological Code, which is similar to the International Code with one or two exceptions.

It would take many pages of this journal to describe fully all these various codes, and the technicalities involved would be most difficult to understand unless the reader had had some training in meteorology. However, the writer proposes to give a few details concerning the International Code which may be of interest.

Understanding the Signals

A system of symbols has been devised, each with its separate meaning. These symbols range from A to Z, with various combinations, and denote various weather conditions. For instance, DD followed by a code figure means "the direction of the wind near the ground," L followed by a code figure means "amount of sky covered by cloud," and R with a code figure denotes "rainfall for the preceding twenty-four hours." These code figures range

from 0 to 100, and are used to denote types of weather, for example, "fair," "cloudy," "rain or drizzle," etc. Thus R2 would mean that the rainfall for the preceding twenty-four hours, reckoned from the timing of the report, was 0.2 to 2 millimetres, while R6 would mean a rainfall of 16 to 20 millimetres.

Altogether there are fourteen codes used for the specifications of types of weather alone. To give one or two instances, there is a code which denotes the weather at the actual time of observation together with the general character of the weather, the symbol for which is "ww," and then there is a code for horizontal visibility, symbols V and Vs, a code for the state of the sea and swell, symbol S, and so on.

How to Decode

Suppose we wanted to put into code form the following simple message:

"The sea is very rough and visibility is poor. It has been raining five or six hours before the time of this observation."

Looking up our list of symbols, we should see that S denotes the state of the sea and swell, therefore S is put down as part of the message. We then turn up our list of codes and look for the code which denotes "state of sea"; "very rough" is number 8 in this particular code, so we add 8 to S, making S8. The same process is carried out for the remainder of the message, and in the end we arrive at the following code message: "S8v5R6."

Although this may not be the order or the grouping in which a meteorological message is sent, the example will show how simple the above message appears when in code.

The above examples will show on what system the International Code is worked, but of course a complete message in the code is rather a complicated affair, containing as it does index and check figures, besides a quantity of other matter not mentioned here. A complete weather message looks more an algebraic sum than a statement of weather conditions. So thorough has been the make-up of the International Code that it is possible to send the most intricate observations con-

cerning humidity and barometric tendencies with absolute accuracy.

The Eiffel Tower

Perhaps the meteorological station best known to amateurs is the Eiffel Tower (FL) at Paris. This station is one of the most powerful in the world, and provides a fine meteorological service. Messages are sent at the following times: G.M.T. 02.20, 04.00, 08.20, 10.05, 14.20, 16.00, 19.20. The message at 10.05 is sent on a wavelength of 2,600 metres (spark) and can be picked up on a crystal set capable of tuning to the wavelength in this country. The other messages are sent out on a wavelength of 7,330 m. (C.W.), but in the case of a breakdown on the main transmitting plant a wavelength of 6,500 m. (C.W.) is used. The code chiefly used is the International Code.

The Eiffel Tower, besides the code messages, sends out some weather reports in French by telephony. These reports and forecasts are mainly intended for farmers, and are sent out on a wavelength of 2,600 metres at the following times: G.M.T. 06.40, 11.15, 19.00, 22.10. On Sundays the 19.00 message only is transmitted.

The Air Ministry

Another well-known meteorological station is the Air Ministry station in London, which sends most of its messages on a wavelength of 4,100 m. (C.W.). The station sends an International Collective Report at 08.50 and 14.50 G.M.T. in the International Code. The British and Icelandic Synoptic Report is also sent in code on 4,100 m. (C.W.) at the following times: 02.00, 06.00, 08.00, 14.00, 19.00, 19.40 G.M.T.

Other Foreign Stations

In the United States there are several stations, some of which can be picked up by amateurs in England. Annapolis (NSS) transmits each day to France a weather bulletin containing observations taken at a number of stations in the United States, Alaska, Canada, Nova Scotia, Newfoundland and Bermuda. This bulletin is sent out as the first message in the Annapolis Schedule with France, and commences at 05.30 G.M.T. on a wave-

(Concluded in third column of next page)

WHY SOME CRYSTALS GIVE BETTER RESULTS THAN OTHERS : IMPROVING RESULTS FROM 5XX

THERE are two classes into which detectors may be divided. In the first, to which belongs the crystal detector, the current set up in the aerial by the incoming waves is used directly to operate the phones. In the second, of which the valve is the typical example, the detecting device serves to release the energy of a local source of power (the H.T. battery) which provides the phone current, the actual detector merely controlling this current according to the voltage applied to it. The first class are known as "current-operated," the second as "potential-operated" detectors.

Detector and Aerial

It will be evident that the considerations governing the method of application of these two classes of detectors to the aerial will be different. Generally speaking, a current-operated detector should be placed in series with the aerial in order that the whole of the aerial currents may flow through it. A potential detector, on the other hand, should be in parallel and connected to the two points on the aerial between which the maximum differences of potential are set up.

But in practice we find that a crystal detector in series with the aerial is very inefficient and that, in the vast majority of cases, the connections for a valve or crystal are both made in parallel across a portion of the aerial circuit, usually the A.T.I. Sometimes only a part of the A.T.I. is used; sometimes, as in auto-transformer arrangements, an attempt is made to get a step up in voltage, but the effort is always to obtain voltage, even when the crystal is used.

Detector Resistance

Now the reason for the inefficiency of the series arrangement of the crystal is that the very high resistance of the detector, being added to that of the aerial, reduces the current to a very serious degree. But if the crystal is in parallel, the total impedance of the whole circuit is reduced, because the resultant of two parallel impedances is less than either of them separately. So the total current is increased, and by arranging our shunt efficiently we get better results from the portion we tap off than we could from the whole of the much feebler currents which can pass with the series arrangement.

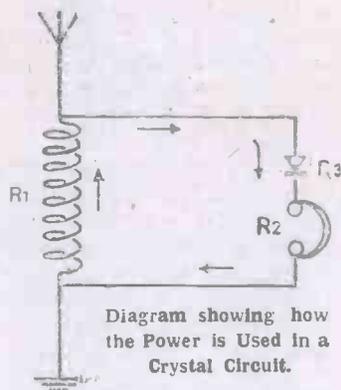
Valve and Crystal Contrasted

But whereas in a valve detector we can say at once that a high grid-filament impedance is desirable, since practically no current is required to pass, and the higher the total joint impedance of the A.T.I.

and grid-filament circuits the greater will be the potential difference across them, the crystal circuit requires more careful consideration. The crystal circuit is a power circuit and is therefore subject to the same conditions as those governing other power circuits.

Useful and Wasted Power

It is an elementary rule in electrical engineering that, when there is inevitable waste in the source of power, the maximum power is obtained in the outside



circuit when the impedance of that circuit is made equal to that causing the loss in the source.

In the diagram the power circuit consists of the A.T.I. (R_1), the phones (R_2) and the detector (R_3). The source of power is, of course, the A.T.I., across which the potential for driving the current is set up. The useful work is done in the detector and phones. R_1 should therefore be equal to R_2 plus R_3 .

R_1 is determined in practice by the size and efficiency of the tuning coil and the frequency of the incoming wave. For a given set, used on a given aerial, it is thus dependent on the wavelength and not readily controlled by the operator. R_2 similarly depends on the phones, phone leads, condenser, etc., and again is not usually under control. But R_3 , the resistance of the crystal detector, can be varied within fairly wide limits by the choice of crystal and crystal setting; it provides a means of adjusting our receiver not often understood by the average crystal user, though many do something in this direction (without knowing why) by resetting their crystals when they find signal strength unsatisfactory after a change of wavelength.

Have Several Crystals

The practical upshot of it all is that as the wavelength increases you should use a crystal of higher resistance. You should

provide yourself with an assortment of crystals and not expect the one which has served you admirably for 2 L O to perform equally well on 5 X X. Neither is the one which gives Brown satisfaction in his set, and on his aerial, necessarily suited to Robinson's receiver. The actual resistance of any given crystal depends not only on the point of contact but also on the cat-whisker pressure and the signal strength. Speaking generally, the galenas (the various "ites") are medium resistance crystals, most specimens of carborundum can be considered high, and most of the perikons rather low. Experiment is the only sure guide. H. W. S.

WEATHER REPORTS AND HOW TO READ THEM (continued from preceding page)

length of 17,145 metres (C.W.). This message is in the International Code and not in the American Code.

Germany has many stations regularly transmitting weather reports, chief among which may be mentioned Königswusterhausen (L.P.). This station transmits on 5,700 metres (C.W.) at the following times: 06.50, 08.40, 08.50, 14.50, 19.40, 19.50 G.M.T.

The reports are in the International code, and are of a synoptic and international collective nature. In this connection it may be mentioned that use is sometimes made by L.P. of the Lindenburg Code, but this is mostly for messages known as "aerological" reports.

Karlsborg (S.A.J.) is a Swedish meteorological station, which can be picked up by English amateurs with valve sets. The wavelength is 4,200 m. (C.W.), and the chief transmissions are at G.M.T. 07.40, 13.40, and 18.40 in code.

If there are any amateurs with a knowledge of the Morse code who would like an evening's practice at receiving meteorological messages, tuning-in the following stations is suggested:

G.M.T.	Station	Wave	Report
1900	Air Ministry G.F.A.	4100 C.W.	British and Iceland Synoptic.
1920	Paris F.L.	7300 C.W.	French National Synoptic.
1950	Königswuster- hausen L.P.	5700 C.W.	International Collective.
2030	Madrid E.G.C.	2000 Sp.	Synoptic.
2210	Moscow R.A.I.	5000 Sp.	do.

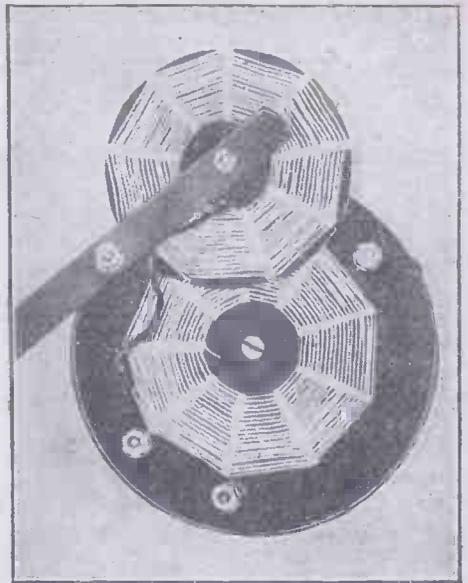
The picking up and decoding of meteorological messages is a fascinating study. S. W.



The Complete Receiver.

A UNIQUE CRYSTAL SET

leave space for the tuning coils beneath. Two of these legs are pieces of $\frac{1}{8}$ -in. ebonite rod (Fig. 2) tapped 4 B.A. at one end; the third, which acts as a pivot for the handle of the moving coil, is turned from $\frac{3}{8}$ -in. diameter brass rod to the dimensions shown in Fig. 3. The crystal detector can be purchased for a trifle, though that shown in the photograph was specially made. Details of the ebonite cap for this and the crystal cup are shown by Figs. 4 and 5.



Under Side of Panel.

UNDOUBTEDLY there is nothing like the crystal set for simplicity and cheapness; for those living within a few miles of a broadcasting station it is quite loud enough for use with phones.

The set about to be described is small and neat in appearance, but is as efficient as many large sets. The general arrangement can be gathered from the photographs.

Commence making this set by marking out the base on a piece of ebonite $\frac{1}{8}$ in. thick. The centre point should first be punched and a 4-in. diameter circle marked; all the holes can be marked out and drilled according to Fig. 1. The disc may be turned in a lathe or cut out with a fretsaw.

The base stands on three legs, which

The formers for the basket coils (Figs. 6 and 7) should be cut out from black fibre $\frac{1}{2}$ in. thick. Cardboard can, of course, be used, but the fibre is preferable. These coils should be wound in the usual manner with No. 24 d.c.c. wire, the small coil having 34 turns and the larger one 38 turns. It is necessary when connecting up that the current should flow in the same direction in both coils, so that if the coils are both wound in the same direction and are mounted face to face the two finishing ends should be connected together.

The tuning handle (Fig. 8) should be made from a piece of $\frac{1}{8}$ -in. sheet ebonite.

Before assembling all the brass fittings should preferably be lacquered.

There now only remains the assembling and wiring to complete the set. The wir-

ing is very simple, and is shown in Fig. 9. The two phone terminals should have their stems cut as short as possible so as not to foul the moving coil, but the stem of the aerial terminal-if left long will act as a stop and prevent the coil from being moved the wrong way. The fixed coil should have a 4 B.A. screw passed through the centre hole of its former and a thin 4 B.A. nut screwed on. If this screw is now passed through the centre hole of the base (a wire having been first put round it) the crystal cup when screwed on at the top of the base will secure its connecting wire and the coil. The moving coil should have two pieces of thin flexible wire soldered to its ends. These should be passed through the two small holes in the

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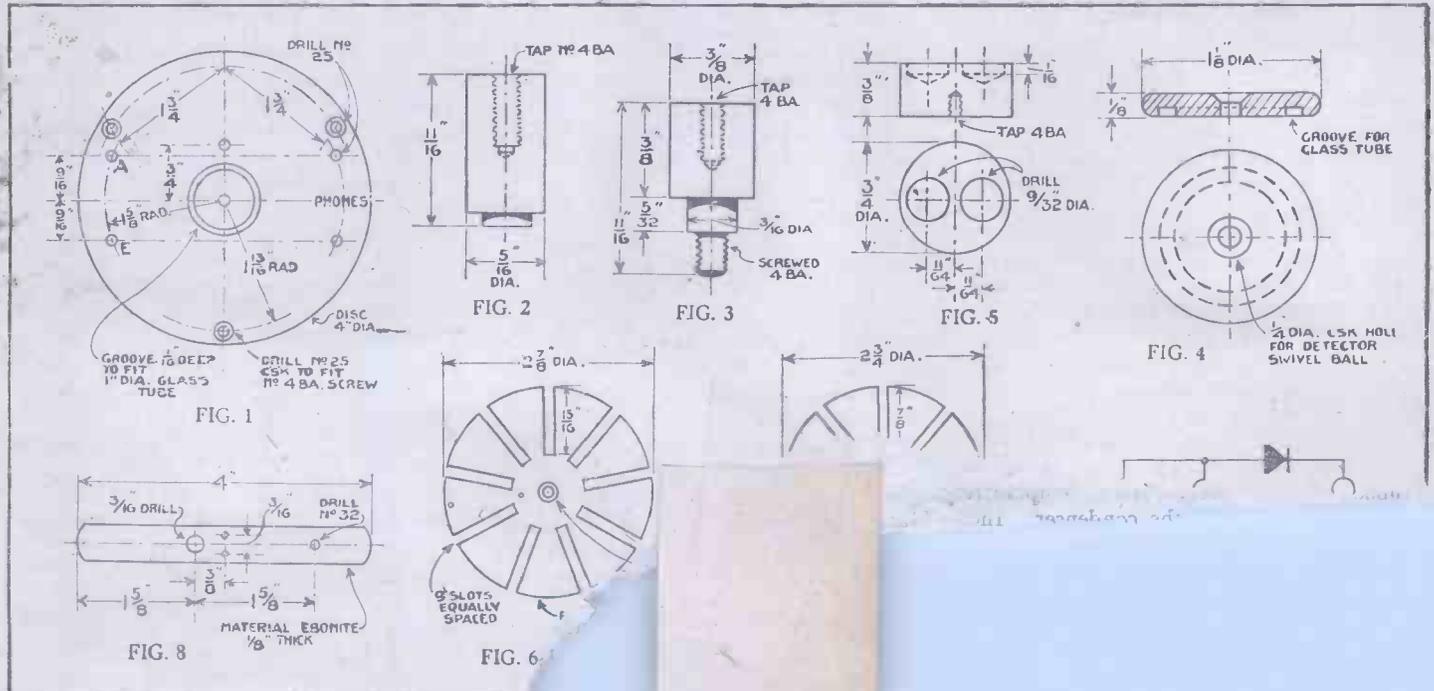


Fig. 1.—Layout of Panel. Fig. 2.—Foot for Base. Fig. 3.—Foot for Base. Fig. 4.—Groove for Glass Tube. Fig. 5.—Details of Ebonite Cap and Crystal Cup. Fig. 6.—Formers for Tuning Coils. Fig. 7.—Formers for Tuning Coils. Fig. 8.—Tuning Handle.

WELL-KNOWN AMATEUR STATIONS—5CF

5CF, the station shown by the photograph on this page, is owned by Mr. F. G. S. Wise, 12, Crouch End Hill, London, N. The completeness of the installation needs no comment, and the following brief particulars will suffice.

On the extreme left of the photograph is the short-wave (100 metres) power transmitter, wired to allow experimental changes of circuit. Modulation for telephony is obtained by the relay-control valve method. The power board carries the 240-volt mains, and this is supplemented by a bank of accumulators switched in series and giving a maximum pressure of 350 volts.

Next is the permanent low-power transmitter (130-200 metres) which uses the reversed feed-back system with the grid-control method of modulation. The instrument

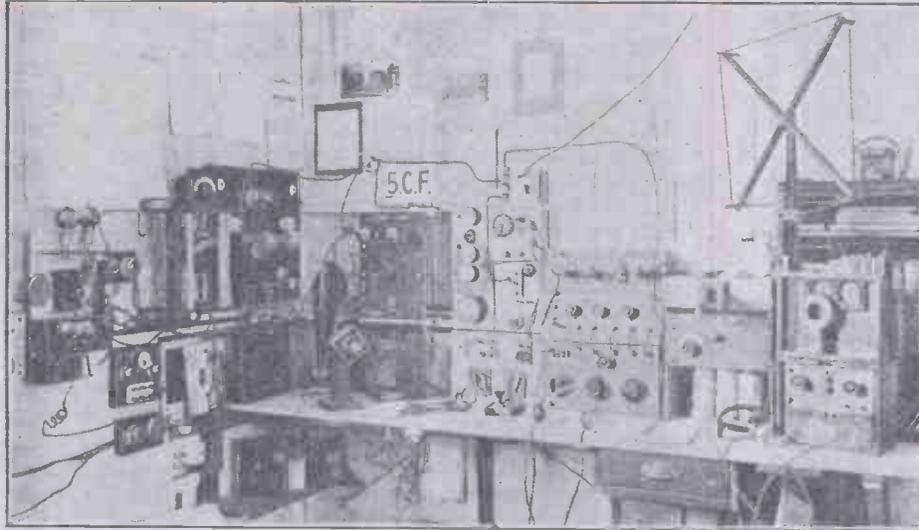
board carries the filament voltmeter, aerial ammeters, milliammeters, and switch for aerial change-over.

Switches are provided for the use of

out switch is also fitted for convenience. The three-valve (1-v-1) receiver for short waves (80-250 metres) is of the straight-circuit design and uses variometer tuning in the anode circuit of the H.F. valve. The two-valve (0-v-1) receiver on the left of the photograph is for broadcast work; plug-in coils are used. This receiver is operated by relay from various points for loud-speaker reception, a great convenience to the listener.

The portable receiver on the extreme right is self-contained, employing a reflex circuit (modified Voigt) and giving on a frame aerial a range of 150-400 metres.

The resistance lamps are used for accumulator charging, switching being provided to allow the use of a floating-charge battery system.



5CF—The Amateur Transmitting Station of Mr. F. G. S. Wise, Crouch End, London, N.

various microphones, a speech amplifier and remote control being provided for each transmitter. A master rheostat for filament-current variation and a power cut-

TWO GOOD PHONE TESTS

THE following are two simple yet reliable methods of testing either high- or low-resistance phones, the latter being used with a telephone transformer.

Obtain a good quality fixed condenser of about .002 microfarad capacity, tighten up the terminals, and holding the instrument in the hand proceed to give one of the terminals two or three smart rubs on the coat sleeve. On bringing the leads from the phone into contact with the condenser terminals a click will be heard in the earpieces if everything is in order.

A slightly more powerful effect can be obtained by allowing one of the condenser terminals to be in contact with the hand at the time the other terminal is being rubbed on the sleeve, thus temporarily

finger of the same hand. With the other hand—holding by the insulation—bring the tag of the remaining cord into contact with any portion of the same metallic object; if the phones are in good order a click will be audible on making contact.

A modification of the foregoing test, which is extremely useful for comparative tests with various phones, is to substitute the metal object with a pencil line drawn on paper. The line should be from $\frac{1}{8}$ in. to $\frac{3}{8}$ in. in width, and should be made with a soft pencil. A finger of the hand holding the phone tag should be pressed on one end and the tag of the other cord brought into contact with various parts of the pencil line.

A click will be heard on touching the blacklead line with the second tag, provided a distance does not

width, and drawn rather heavily with a BB pencil on ordinary writing paper, a click was audible in the phones throughout the length of line of just over $1\frac{3}{4}$ in., the headphones used being of 8,000 ohms resistance.

A. P.

"A UNIQUE CRYSTAL SET" (continued from preceding page)

tuning handle and the coil fixed thereto by means of a 6 B.A. countersunk screw and nut. The tuning handle should now be placed on its pivot with a 2 B.A. washer which has been cut through and opened to act as a thin spring washer. If a 4 B.A. nut is now screwed down to the shoulder the handle should work smoothly.

For a catwhisker a piece of No. 36 resistance wire which has been wound round a $\frac{3}{8}$ -in. drill shank is very suitable.

The tuning coils described here are designed to tune to 2 LO with sufficient variation to make up for any difference in aeri-als. For other stations more or less turns, determined by experiment according to wavelength, will be required on the fixed coil.

T. W. R.

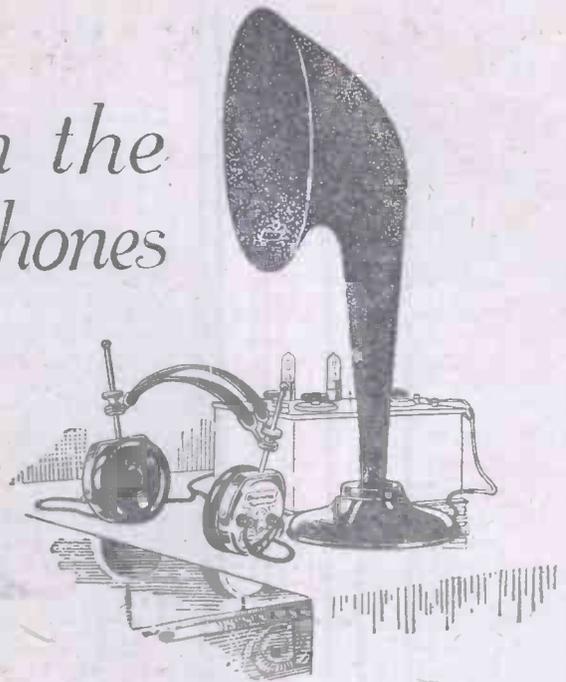
Tune the Table-Talker with the "Matched Tone" Headphones



The Brandes Family Series

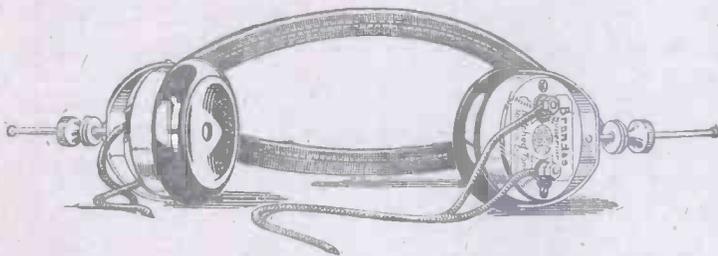
GRANDPA is well content with the comfortable companionship of the Brandes "Matched Tone" Headphones and their clear, full-blooded tone. He watches the joyful exuberance of the younger members of the Brandes family under the influence of the Savoy Orpheans in amusedly tolerant mood. The Table-Talker brings the rhythmical vigour of this famous dance band with intoxicating naturalness, and nothing loath, he will join in the frolic. They'll have a jolly time at Christmas. Amaryllis artfully defies him. Grandpa will then execute a gay *pas seul* with paper cap at rakish angle, to the intense amusement of all. He says he is as young as any of 'em.

Ask your Dealer for Brandes.



All Brandes products carry our official money-back guarantee, enabling you to return them within 10 days if dissatisfied. This practically constitutes a free trial.

The "Matched Tone" feature was embodied as the distinctive characteristic of Brandes Headphones in 1908, and means that both your ears hear exactly the same sound at the same instant—and you learn a new beauty of tone. They are tested and re-tested for just this one vital point, and in addition their strength, long-wearing comfort, and reliable efficiency make them undoubtedly superior. **25/-**



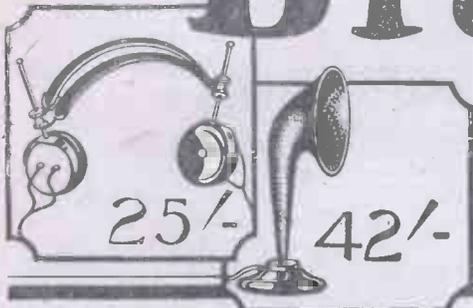
The Table-Talker is a Brandes quality product at a moderate price. The non-resonant, specially constructed horn is matched to the unit so that the air resistance produced will exactly balance the mechanical power of the diaphragm. This means beautiful sound-balance and remarkable tone qualities. It is twenty-one inches high, and is finished a shade of neutral brown. **42/-**

British Manufacture (B.B.C. stamped).

Brandes

Result of 16 Years Experience

The name to know in Radio



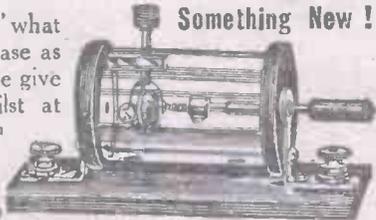
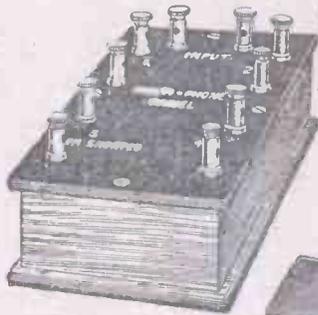
WIRELESS ON EASY TERMS

GAMAGES have now extended their easy payment system to Wireless, and you may now secure on payment of first deposit Wireless Sets and Apparatus from £5 upwards, balance being payable in monthly instalments. Write for details to Wireless Dept.

GAMAGES WIRELESS PARTS FOR XMAS GIFTS

For your fellow "Listeners-in," what Gift as practical—as sure to please as a Gamage Wireless Part? We give a few suggestions here, whilst at Holborn is a Great Array which you would do well to come and see

Something New!



SUPER CRYSTAL DETECTOR

The striking points about this new detector are the revolving crystal, the silver cat's whisker, all brass parts lacquered. New crystal easily fitted. Complete with Gamages famous "Permanite" Crystal. Post 4d. on each type.

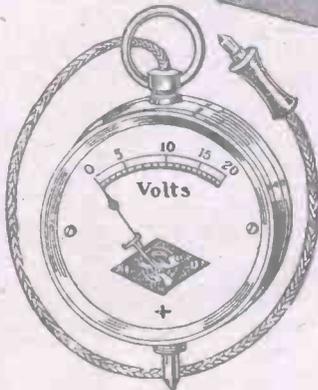
Price for Panel Mounting **4/6** Price for Table Panel Mounting **5/6**



THE MULTIPHONE PANEL

This is the perfect addition to any Wireless Set when it is required to use several pairs of 'phones. As an Xmas Present, it is ideal.

Post 6d. Price Order yours now — personally or by post. **7/6**



VOLTMETERS

Dead-beat Type. Very reliable. Readings, 0-3, 0-6, 0-12, 0-15, 0-20 volts. Price each **5/-** Post 6d.

Our Wireless Catalogue contains a host of novel suggestions for Christmas Gifting to your Wireless Friends. Write for a Copy NOW We will send you one postfree on request

MORSE SIGNALLING APPARATUS

Efficient and handy instruments fitted with Flashing Apparatus and High-note Buzz-r, with terminals for connecting wires for Line Telegraphy. Polished Mahogany Case, with hinged lid and slit in bottom to facilitate renewal of battery. Size 5 1/2 x 3 1/2 x 3 1/2 in. Complete with Battery, ready for work. Post 1/- Price Weight 1 lb. 3 oz. Extra Batteries 8d. each. Post 4d. **16/6**

WIRELESS SETS

The Famous "Brownie" CRYSTAL SET complete with Phones, Aerial Out-let, etc. Post free.

24/-

Solid moulded ebonite cap and highest grade nickel fittings. British throughout. Sold ready for use and will operate 4 pairs of phone. Set without phones and aerial 7/6 Post 6d.



A. W. GAMAGE, Ltd., Holborn, London, E.C.1. Also at Benetfinks, Cheapside, E.C.2.

An Enormous **U.S.** — improvement in reception.

MAGNIFICATION WITHOUT DISTORTION



WOUND by experts and packed with Stalloy iron, the British-made U.S. Transformer produces maximum magnification without trace of distortion. Ratio guaranteed 5 : 1. The large, accessible terminals, the absence of bolts through the core, the remarkable fullness and purity of tone produced have been highly spoken of by the technical press.

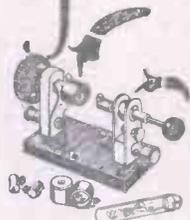
Remember—it's British! PRICE **18/6** EACH

U.S. RADIO CO., LTD., 155, High Street, Lewisham, S.E.13. Phone: Lee Green 2404.

THE **U.S. SUPER** Transformer

The KUPEE

Crystal Detector



Extremely sensitive adjustment of pressure to give extra loud reception by turning the large knob. Universal movement here—any degree of tension you wish on ball joint. Sensitive spots quickly found. Once set — stays set. No fiddling about. Very strongly, heavily built. Many other advantages. Write for free folder at once to:

What users say of the "KUPEE" Crystal Detector

T.M.A. Aberdeen, writes: "I am very pleased with same." D.R.H., Bethnal Green: "Received the detector safely... more than satisfied... speech distinguishable three yards from phons."

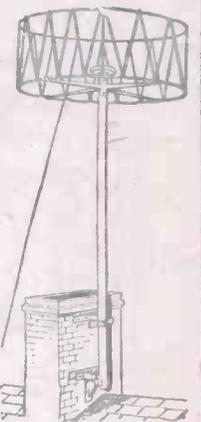
All Models enclosed by handsome Cases and dust cover, instantly detachable. This is omitted from illustration so that details of Detec or may be closely seen.

QUALITY PRODUCTS

29, WATER ST., **HYDE**

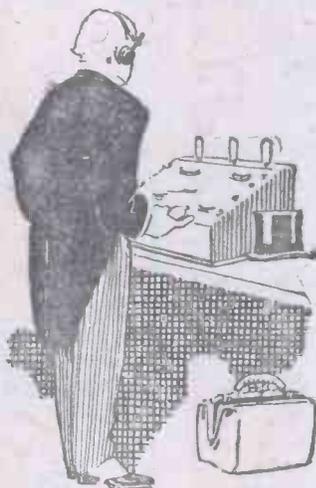
Richardson's VERTEX AERIAL

Hundreds of users say that the "VERTEX" is the most compact, attractive and efficient aerial on the market. Easily attached to chimney-stack or face of wall, as shown, it increases range, volume and purity. It has one mast only, and can be installed in the most confined space. The "VERTEX" obviates "interference." Complete with 50-ft. downlead, 4 insulated arms and central steel hub **£3 15 0** Steel wall brackets, with bolts, nuts, Rawlplugs and screws can be supplied.



"VERTEX" INDCOR AERIAL A most efficient long-range "VERTEX" Indoor Aerial is also made for use where outside aerial is not possible. Can be suspended in loft under roof or in a top room. With 35-foot down-lead, insulated cords and ring for suspension. **£3 15 0**

Trade Enquiries Invited **WIRELESS APPARATUS LTD., 36, Pantou Street, Haymarket, S.W.1.**



Has your set valvular disease?

GENERAL PURPOSE VALVES:

Type R ... 12/6 each

Filament Voltage.....4 volts
 Filament Current.....0.7 amp.
 Maximum plate voltage...100 volts
 Plate resistance.....27,000 ohms.

Type B 3 ... 21/- each

Filament voltage.....1.8 volts
 Filament current.....0.35 amp.
 Maximum plate voltage...80 volts
 Plate resistance.....27,000 ohms.

***Type B5 ... 25/- each**

Filament voltage.....2.8-3 volts
 Filament current...0.06 amp.(at 3 v.)
 Maximum plate voltage...80 volts
 Plate resistance.....17,000 ohms.

POWER AMPLIFYING VALVES :

Type B4 ... 35/- each

Filament voltage 5-6 volts
 Filament current...0.25 amp.(at 6 v.)
 Maximum plate voltage...120 volts
 Plate resistance 6,000 ohms.

***Type B6 ... 35/- each**

Filament voltage.....3 volts
 Filament current.....0.12 amp.
 Maximum plate voltage...120 volts
 Plate resistance 9,000 ohms.

***Type B 7 ... 37/6 each**

Filament voltage.....6 volts
 Filament current.....0.06 amp.
 Maximum plate voltage...120 volts
 Plate resistance 9,000 ohms.

*For use with Dry Cells



The heart of your set is the valve, and in wireless a hard heart is better than a soft one. "Soft" is a euphemism for bad vacuum. A valve with a little air in it is liable to oxidation of the filament, and soon loses its efficiency. B.T.H. Valves are very highly exhausted by a special patented process. This ensures long life and maintained efficiency. They last longer and give infinitely better results than "soft" foreign (or English) valves.

FIT B.T.H. VALVES AND GIVE YOUR SET A GOOD HEART

From all Electricians and Radio Dealers.

**B.T.H.
 RADIO
 VALVES**



Let the Cobbler stick to his last

THE Railway Engineer requires his instruments to be of the greatest precision.

When he chooses a theodolite, he goes not to an upholsterer, nor to a maker of gramophones, but to a firm whose speciality is the manufacture of surveying instruments.

He knows that instruments if defective may cost him thousands of pounds, so he is careful to buy them only from a firm whose long specialised knowledge is a guarantee of good results.

The small fixed condensers in your wireless set are perhaps not so delicate as surveying instruments, nor is a faulty choice likely to cost you thousands of pounds. But the manufacture of good condensers most emphatically is the work of specialists, and a poor condenser will certainly ruin your reception of broadcasting and cost you many disappointing evenings.

Many thousands of constructors have found that in spite of appearance condensers are specialised instruments, and that best results can only be expected if they buy condensers backed by long specialised experience.

That explains why 60,000 Dubilier Condensers are sold each day throughout the world.

YOU should specify Dubilier.

DUBILIER
CONDENSER CO LTD

On Your Wavelength!

America

I OUGHT really to be able to tell you that during the International Radio week I have been obtaining perfectly wonderful reception of America. To do so would be easy. I could speak glibly of the main items rendered and received—for has not the daily press been packed with detailed reports? But, reader, I will be frank, free and honest with you. My direct reception of U.S.A. stations this week has been so poor that it is hardly worth talking about.

WGY and KDKA I have had, certainly, but neither would come in with its usual strength or clearness. Probably there is some small thing amiss with the set, or it may be that my skill in fine tuning is temporarily—I hope that it is only temporarily—in abeyance. This kind of thing *would* happen, would it not, in just the one week when one most wanted to hear the American stations. Last week everything was working beautifully. I had no difficulty at all in picking up these far-away voices; next week it will probably be the same. But at present, if I get hold of a Transatlantic carrier wave, I cannot resolve it in most cases, and if I do resolve it I get nothing but woolly, mushy sounds that are far from pleasing. It is all very sad.

A Tragedy

Last night I received what Shakespeare called the most unkindest cut of all. I had decided to make a night of it, and this I duly did, not seeking my couch until 5.30 a.m. Until 11.30 p.m. I amused myself by listening to 2LO's "Lucky Dip" programme, and later to his "Consolation" items. I went round a good many of the Continental stations, all of which came in well.

Signal strength was not phenomenal, but there were no atmospherics worth talking about, and when they are absent, or nearly so, it is usually worth while to sit up. Then I did a little work until about one in the morning, which finished, I sat down with a book and a pipe to while away the next couple of hours. At 3 o'clock, with notebook and pencil beside me, I started to tune-in. Before long I had distinct sounds of speech from a station which the wavemeter showed to be WGY. When I say "distinct" I mean that they were undoubtedly speech. That was as far as I could get.

A little later there was music. It was an orchestral piece, I know, but more I cannot tell you.

I went higher up the wavelength scale. "Hallo! There's something quite hefty." Yes, this was the real stuff at last. A

military band playing the "Star Spangled Banner." And then came a voice speaking in *German*. It was Hamburg, who was apparently conducting a little Transatlantic trial all on his own between 3 o'clock and 4 o'clock, instead of in the following hour.

And so it went on until just before 4 o'clock my finger rested accidentally on the voltmeter press-button, and the needle shot round, not to four good volts but to a miserable three!

How It Happened

In a flash I realised how it had come about. Normally I use nothing but dull-emitters, and the current consumed by the united valve filaments of the multi-valves is just under one ampere. At the end of the previous week I thought I would test out bright-emitters against dull to see whether any difference could be detected between their respective performances. I mounted a quintet of these current-devouring eye-dazzling things, and let them batten upon my accumulator for two days. Four amperes they took between them, according to the ammeter, and it was their horrid gluttony that did in my accumulator. I had forgotten the drain to which it had been subjected, forgotten that it would have to go to be charged long before it would have been due to do so in the ordinary way.

By cutting down the valves first to three and later to two, and using "06's," I nursed the set for a further hour and listened to several of the Continental stations hailing America. If any of their transmissions were picked up on the other side of the water I am willing to wager that Radio-Iberica was amongst them. He was coming in very much more strongly than any of the others, on the medium wave, at any rate, for I did not try Radio-Paris, having by that time reached a stage produced by a mingling of disappointment and sleepiness at which even the simple task of changing coils seemed a labour too great to be contemplated. And so ended a tragic night of listening, when everything that could go wrong did go wrong. I am not in the least consoled by the knowledge that it was all my own fault for not remembering about the accumulator!

The Foreign Ramp

The "dumping" of foreign goods on our wireless market continues, in spite of the fact that such components are taboo in broadcast receivers. I have before me an extremely funny pamphlet which came over with a foreign crystal detector.

Apart from glowing claims for the detector, the wording of the pamphlet is

full of quaint blunders. For instance, I am informed that "an unobjectionable earth is absolutely necessary" to get the results claimed—and I quite believe it! Further on it is stated that "At the beginning the tuning demands some patience, but a surprising and fine result does not fail to be the reward!" Oh, ye shades of Hertz, what on earth has the crystal detector to do with the tuning?

Under a paragraph headed "Its Advantages" the following tips are given.

"Most simple attendance, even easy for a child or a blind." The last three words may mean more than appears at first glance.

"Using an outdoor aerial it will be possible to receive without amplifier not only local stations but also Continental stations, besides distant English stations. Naturally it is supposed that a good receiving set is used as well as an unobjectionable aerial!"

"The intercepted energy is naturally weak, so that it must thoroughly be used. Evidently the reception of distant stations is soft *but sometimes clear*."

I quote the leaflet word for word, and leave it to my readers to guess whence came this gem.

"Dud" Components

But, speaking seriously, many of these foreign goods are not worth the money expended on their transport to this country. There are exceptions, of course, but some few months back I saw a German H.T. battery, and in a rash moment I purchased it. Thirty-six volts for 4s. 6d. was a temptation not to be lightly put aside, and I fell! Within two months that battery refused to yield more than a dozen volts, although its use had been limited to the heterodyne wavemeter—about ten hours' run in all!

Similarly an L.F. transformer, when disembowelled, disclosed that its interior was wound with resistance wire! Readers therefore should beware of cheap foreign component parts.

In a Foundry?

2LO unknowingly provided me with a real thrill on the first night they attempted to relay KDKA this season. Have you ever been in an iron foundry or shipyard? Have you ever tried to keep calm and collected when huge sheets of steel plate are being thrown about by giant cranes? When the announcer said that they were going to attempt to relay KDKA, I thought that a mistake had been made and that we had got switched through to some shipbuilding yard. Eventually things calmed down a little, but that continual

On Your Wavelength! (continued)

crashing and jangling, interrupted by a nasal voice and short periods of silence, was more of a thriller than Congo night! It was a huge success. Anyway, I had to switch off the loud-speaker for the sake of the sleeping humanity round about me!

Loud-speakers: High or Low Resistance?

Several correspondents have asked me whether the high- or low-resistance loud-speaker is to be preferred. This is an interesting question, but it is not possible to give an answer one way or the other which will cover every case. The advantages of the low-resistance instrument are that its windings do not have to carry the steady current flowing in the plate circuit of the last valve and that it is not nearly so likely to be damaged by the effects of powerful atmospheric. Against this we must set the drawback that its use makes it necessary to introduce another iron-cored audio-frequency transformer. The more iron cores you have in a set, the greater are the chances that distortion will be present for a variety of reasons. Telephone transformers, too, are just as liable to the effects of interaction as intervalve transformers.

Had It a Good Flavour?

Although you may not believe it, I can vouch for the truth of the following story.

* * * * *

Scene: Busy period at a recent exhibition. Young Hopeful goes to the stall of a certain phone manufacturer and engages a salesman in conversation.

Young Hopeful: "... I've a two-valve and crystal reflex set. But, do you know, I can't hear a sound with your phones unless I take the insulating washer off one terminal."

Salesman (a little uncertain whether to laugh or cry): "Really? Would you mind telling me a little more about your set?"

Young Hopeful does so at length, and they discuss reflex circuits in detail.

Young Hopeful: "Oh! yes, my set is very powerful. Why, all the time I am wearing the phones I can taste the sounds in my mouth."

Total collapse of salesman, who decides to cry after all.

* * * * *

Do you know why he could taste the H.T.? No? Well, he had a frame fault in the phones and was getting a current through his body.

Fading

Fading during the last ten days or so has been very marked where I live and move and turn my knobs. It has affected not only British stations, but also many of the Continental ones on whose transmissions I have never before known it occur.

I can't help thinking that a good deal of it may be due to the action of receivers that, though oscillating, are not actually howling. If no howls and shrieks occur when the knobs are twiddled many users of wireless sets believe fondly that all must be well and that the set cannot be oscillating. It can, though, and if it is allowed to do so it will affect other people's reception over a big area.

Trouble Nights

I have a confession to make. It concerns my receiver. It's a very nice receiver and has given me excellent service, at least the panel and terminals which were part of the main construction three years ago have; other parts have come and gone with time, amongst them being many L.F. transformers. And that is a part of the confession. I cannot keep a moderately-priced L.F. transformer in the set for longer than a year but bang goes the primary winding.

Disembowelling the Set

The first time it happened I was led a sorry dance. In my ignorance I took that receiver to pieces and reassembled it half a dozen times at least. The symptoms were crackling, periodic cessation of oscillations, a weakness in signal strength, and a rise in my personal temperature. The H.T. battery was first of all blamed (as is usually the case), and although it showed a good percentage of its normal voltage, it was consigned to the dustbin and a fresh one substituted. Still the symptoms persisted, and the condensers (fixed and variable), grid leak, earth lead and everything else came under suspicion in turn, with disastrous results for them. Strange faults were suspected and remedied by the substitution of fresh components, but it was of no use.

Transformer Trouble

The L.F. transformer also was not above suspicion. It was tested for continuity of both windings, and although the ratio of resistance seemed inclined to be high, the continuity was there. The tests were made with a high-resistance voltmeter. The transformer went back. Still those cracklings. On some nights I imagined that statics were the cause, because on other nights the set was silent. At last I could bear it no longer. Once again the transformer came out and a new one went in—and all was well. I made a note in the log book: "Next time statics are bad, suspect the transformer."

And what was the trouble? The primary was actually broken, but the wire was making intermittent contact so soon as it got warmed up by the one and a half milliamps dissipated on the plate of the valve. The voltmeter always refused to

show up this intermittent current, probably because it was not sensitive enough.

After this you would have thought that my experience would have led me to the seat of the trouble if it occurred again, but not a bit of it. The same symptoms appeared in due course, but the new transformer was a costly affair and beyond suspicion. The same old heart-breaking search took place and the same result was obtained—nothing doing. In desperation that transformer came out and another one went in—and all was well. I am now wondering what to do next time.

The Organ in Wireless

I am a great admirer of the organ, but it does not broadcast well except in the hands of players who understand the needs of the microphone. Frankly, I have not heard this instrument properly played since Mr. Stanton Jefferies was heard relayed to 2 L O from the National Institute for the Blind. Last Sunday, however, another clever organist in Leonard A. Marsh evidently grasped the same point that the reed and gamba stops are the ones to use when broadcasting. Consequently I enjoyed one part of the Sunday programme. This is not of frequent occurrence, for every week the sermons grow longer and the propaganda stronger.

Local Talent

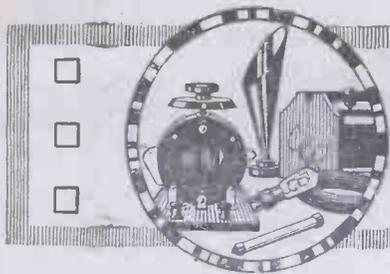
I believe in utilising local talent where possible, don't you? Think of the joy of being able to meet your next-door neighbour the next day and tell her that your valve was half a tone flat, and what a shame the pianist could not get her top notes. It adds local colour sometimes. However, Nottingham did well with the prize choir known as William Turner's Ladies' Prize Choir, consisting of 140 of Nottingham's feminine singers. As it has won over forty prizes, including the first prize from the National Eisteddfod of Wales, it is worth the hearing.

Dancing Decadence

There's no pleasing everybody, I know, but taking into consideration that the majority of the listeners are, to quote Barrie, "young enough to know everything," as well as to enjoy, I can't agree with that pessimist who grumbled at the broadcasting of dance music. I'm no lover of jazz, though neither do I see the practical use of Sarabandes, giges and other "back numbers," but I'll back that Wireless Trio at 2 L O to play "What'll I do" better than any jazz band in the country.

Now, if that grumbler had struck at some of those talks, especially the Japanese schoolgirl variety—well, I'd join issue with him. Come to that, why can't I develop a thirst for information on Hottentots and Afridis?

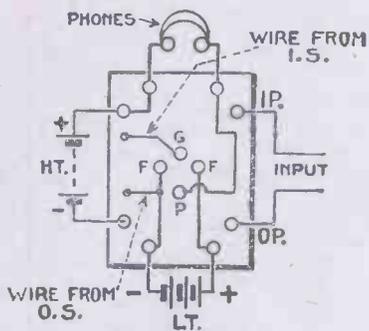
THERMION.



PRACTICAL ODDS AND ENDS

Compact Amplifier

A COMPACT L.F. amplifier can be made by fixing over the four terminals of an intervalve L.F. transformer a piece of ebonite on which is mounted a valve holder. The ebonite is drilled to slip over the transformer terminals, a



Wiring of Compact Amplifier.

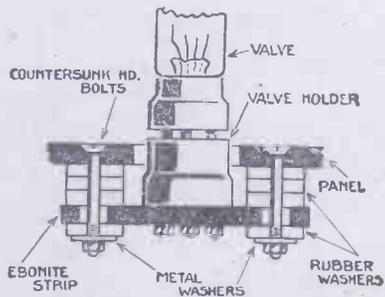
valve holder is mounted in the centre and two extra terminals are provided at each end.

Connections are made as shown in the diagram. It should be noticed that no filament resistance is included, but that for the detector valve can be used. E. O. W.

Valve Mounting

A NOVEL method of valve mounting, very suitable for use in portable sets or in places where vibration is likely to effect the proper working of the valves, is shown by the illustration.

A clearance hole is provided in the panel for the valve socket, which is mounted on an ebonite strip, this in turn being secured

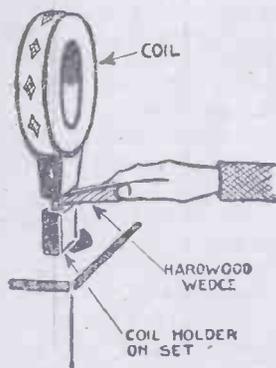


Shock-absorber Valve Mounting.

to the panel proper by means of two or four countersunk head bolts. Rubber washers should be interposed between the panel and holder strip for the purpose of taking up shocks or vibration. R. N. W.

Removing Coils

WHEN removing or changing plug-in coils in a set that has dull-emitter or other valves with delicate filaments, the use of a small hard-wood wedge for prising the coil out of the holder (as shown in



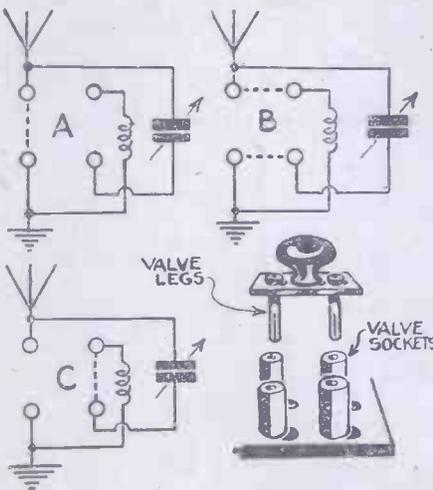
Method of Removing Coil.

the illustration) will prevent undue vibration and obviate risk of filament fracture. Microphonic noises are also obviated.

R. W.

Using "Dud" Valves

BURNT-OUT valves should never be thrown away, for the legs, when fixed to small strips of ebonite (as shown in the diagram), can be put to many uses. The



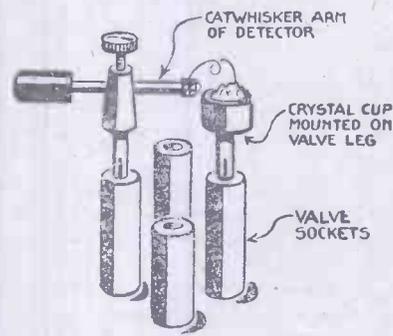
Uses for Valve Legs.

arrangement shown comprises a simple aerial-earthing and series-parallel switch.

At A the aerial is put straight to earth; B shows the condenser and coil in parallel; while C shows them in series. W. H. A.

Improvised Detector

WHEN you have the misfortune to burn out a valve in a multi-valve set and have no spare at hand, there is no need to stop listening-in. Simply substitute the detector valve by a crystal, as shown in the diagram.



Arrangement of Improvised Detector.

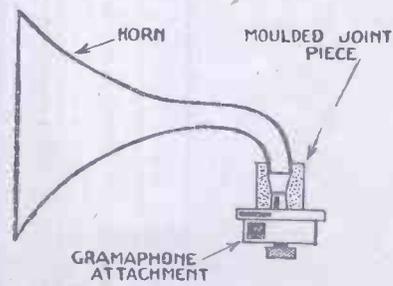
The detector parts are plugged into the grid and anode sockets, the grid condenser and leak being temporarily taken out of circuit.

R. E. D.

Fixing Loud-speaker Horns

DIFFICULTY is sometimes experienced in adapting a gramophone loud-speaker attachment to a horn purchased separately. A good method of temporarily overcoming the trouble is to obtain a quantity of modelling Plasticine and mould a small tube to the dimensions required.

Providing care is taken when adjusting the magnets of the loud-speaker attachment, the temporary fitting will be found to keep its shape quite satisfactorily. To



Method of Fixing Horn.

make a more permanent job the horn and the attachment should be securely fixed down to a wood base so as to prevent movement between the two parts. The wood may then be varnished. L.

AN EXPERIMENTAL FIVE-VALVER

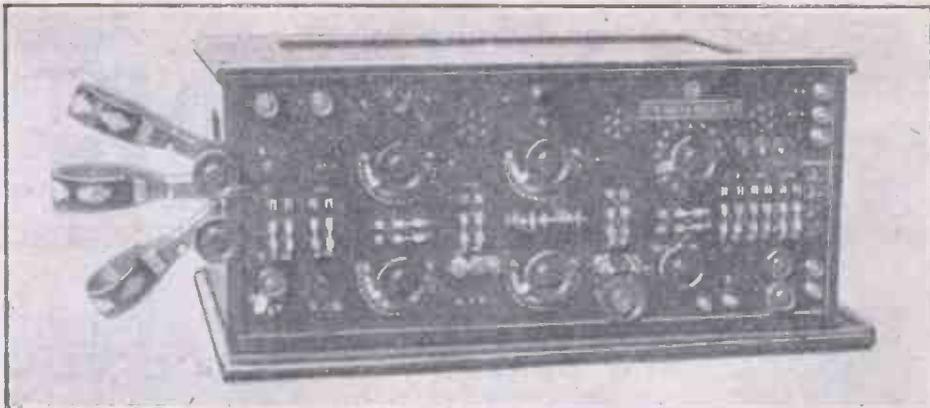


Fig. 1.—The Five-valve Multi-circuit Receiver.

THE photograph, Fig. 1, shows a wireless receiver, measuring 20 in. by 8 in., equipped with double-pole switches arranged to cut out any or all of the five valves. Fig. 2 is the circuit diagram. The switches, starting from the left, are: Tune-stand-by, first high-frequency valve, series parallel, second high-frequency

valve, reaction reverse, valve or crystal detector.

The aerial and earth terminals are seen at the top left-hand corner, while the two small ebonite buttons to the right of them are the dead-end switches for the two anode-tuning coils. Both of the latter are inside the set and, being identical, are

venient as the flashlamp batteries are inside this part of the cabinet. The aerial and earth terminals are seen at the top left-hand corner, while the two small ebonite buttons to the right of them are the dead-end switches for the two anode-tuning coils. Both of the latter are inside the set and, being identical, are

of the panel; the topmost terminal is used for extra high plate voltages for power amplifying with the last two valves. The low-frequency portion of the set can be used as a separate two-valve amplifier, and any set can be attached to the two "input" terminals at the bottom of the panel near the right-hand end. The output is arranged for telephone jacks.

Crystal rectification can be used with any combination of amplifying and magnifying valves, a choice of three types of detector being possible by means of the three-stud switch, including, in addition to the usual catwhisker type, carborundum and perikon.

The two upper knobs and scales belong to the primary and secondary tuning circuits, while the pair below control the two anode-coil condensers.

All the valves are arranged inside the polished mahogany cabinet on a separate panel, the H.F. and detector being of the V24 pattern.

The wiring diagram should make the switching arrangements quite clear. The filament circuits have been omitted in order to avoid confusion.

The filament circuits of the H.F. and L.F. valves are completed only when these valves are switched into circuit in order to effect a saving in current. Obvious fixed condensers have likewise been left out, as they only occur in the usual place, across transformers and phones, etc. H. R.

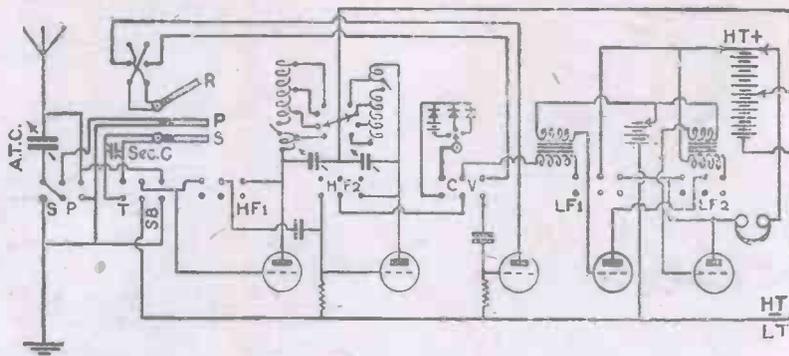


Fig. 2.—Circuit Diagram of Five-valve Multi-circuit Receiver.

valve, reaction reverse, valve or crystal detector.

Either or both of the low-frequency valves can be added at will by means of the two switches nearest the right-hand end of the panel. Variable grid bias can be applied to these valves (LS2 type) to give power amplification. The three-stud switch for this purpose is situated at the left-hand bottom corner, this being con-

simultaneously tapped by the double-armed switch just under the engraved name. These dead-end switches break the coils (which tune up to 4,000 metres) after the 500-metre point to give greater efficiency on broadcast wavelengths.

The three small knobs to the right of the anode-tap switch control the supply of low- and high-tension current, which is applied at the five terminals at the right

Our Christmas Number

next week will contain special topical and authentic articles that will appeal alike to the broadcast listener, the home-constructor and the experimenter. There will be constructional and topical articles, pages of photographs and—
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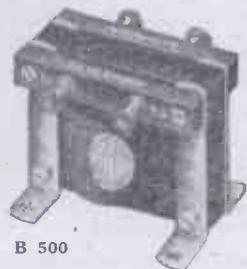
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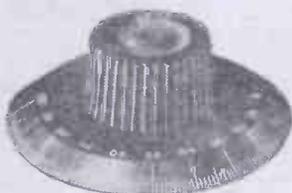


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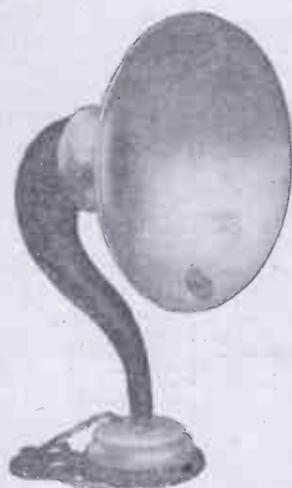
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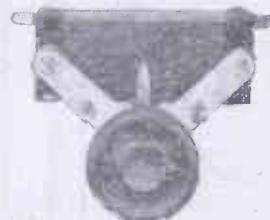
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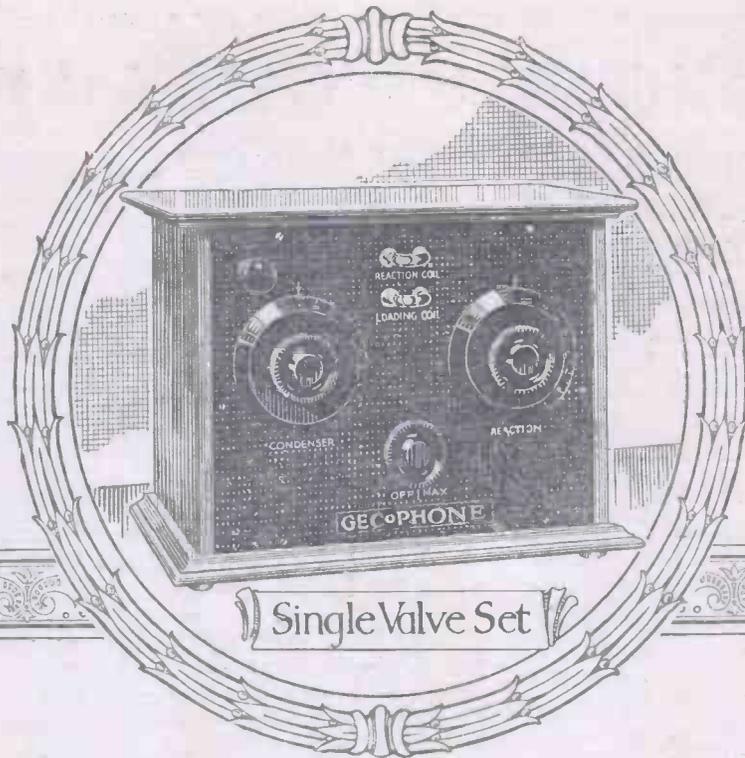
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COMPONENTS YOU CAN RELY UPON

SMALL POWER VALVES.—II

OBVIOUSLY the effect of raising the voltage applied to the plate is to throw the whole curve bodily over towards the left. With 100 volts on the plate of a power amplifier we have a curve with a very long straight portion, a great part of which lies entirely to the left of the vertical line. It now becomes possible to adjust the working point of the valve so that the grid is very considerably negative. This is done by means of the grid-biasing battery, the wiring of which is shown in Fig. 3. As the current flowing from this

using a very high plate potential, and in adjusting the grid so that it is considerably negative; it must be so much negative that the tops of oscillations of large amplitude cannot set up any flow of grid current. Grid bias has also another very beneficial effect: it cuts down the amount of steady current passed by the valve and therefore lengthens the life of the high-tension battery.

Properly adjusted, the small power valve will give a tremendous volume of sound whilst drawing only 4 or 5 milliamperes from the high-tension supply. On my own five-valve set, fitted with two DEQ's as high-frequency amplifiers, a DEV as rectifier and two small power valves for note-magnification purposes, the total plate current is only about 10 milliamperes, which should be well within the capacity of any high-tension battery of respectable size.

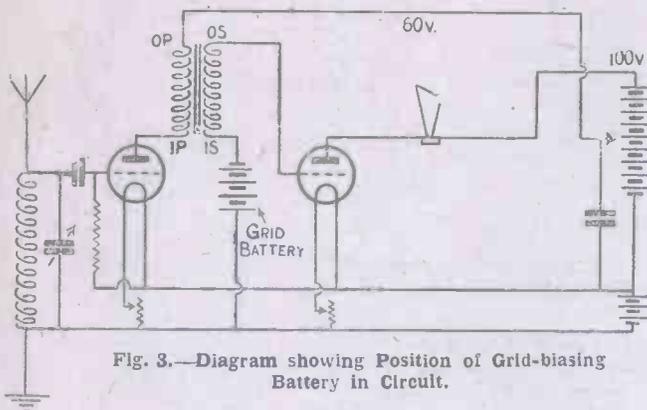


Fig. 3.—Diagram showing Position of Grid-biasing Battery in Circuit.

battery is of minute proportion very small cells will suffice. These should be placed in series between L.T. — and IS of the intervalve transformer, the negative end of the grid battery being connected to IS. Fig. 3 also shows how the extra anode potential required for power-amplifying valves is provided by means of a second high-tension plus lead.

Grid Amplification

Returning to Fig. 2 (page 822), let us suppose that we have adjusted the grid so that its potential is 6 volts negative; the normal working point will then be at X. An oscillation with the same crest and trough values as before—that is, with variations between 1 volt positive and 1 volt negative—will carry the working point up to A with the upper half of each wave and down to B with the lower half. Even at A the grid is still 5 volts negative and no grid current will flow. Neither A nor B are upon the bent portion of the curve. Hence there will be no distortion either through grid current or through bends in the grid-volts anode-current curve. Thus the plate will deliver oscillations of precisely the same form as those which reach the grid of the valve, the only difference being that they are very much amplified.

From what has been said it will be seen that the whole secret of obtaining successful reception with a power valve lies in

with which the designer of power amplifiers found himself faced was that a vast majority of wireless enthusiasts use high-resistance telephones or loud-speakers. This meant that such people could not use a valve working with a plate potential of 300 or 400 volts, which would be far more than the delicate windings of the magnets could stand. It was essential, therefore, to produce a valve which should have all the desirable characteristics when working with a plate voltage of 100 or less. This has been most successfully carried out in a great number of cases, and it is now possible to obtain power valves which can be used perfectly well with high-resistance instruments.

To be on the safe side when working with voltages up to 100 it is perhaps as well to use a 1 to 1 transformer in the way shown in Fig. 4. When this is done the steady current from the battery does not pass through the windings of the loud-speaker, only the modulation at audio-frequency reaching them. Transformers of this kind are quite easily made or they can be purchased very cheaply.

The Mullard Valves

There are both bright- and dull-emitter power valves, and their prices range from about £1 5s. to £2 15s. A good example of the bright-emitter power valve is the

Mullard PA3, which has been designed in such a way that it can be substituted for existing general-purpose valves in the note-magnifying part of the set. The PA3 has a filament consumption of .67 ampere at a potential of 4 volts. The anode voltage may be from 70 to 150, excellent results being obtained with 100 volts and a suitable grid bias. It will be seen that this valve makes very little more drain upon the low-tension battery than does an ordinary general-purpose valve, the filament wattage being 2.68, as against 2.28 for the Ora valve. It will be found to give a larger volume of sound than a general-purpose valve, with complete freedom from distortion. It is intended to deal with a moderate volume of sound, and will be found quite suitable for working drawing-room loud-speakers.

If greater strength is required there is a larger bright-emitter available in the PA2, which will pass a much greater amount of current. This valve consumes .85 ampere at 5.5 volts on the filament, and the anode voltage should be from 100 to 200 volts. A transformer should certainly be used with a PA2.

A still more powerful valve is the PA1, which is suitable for filling a large hall with sound or even for open-air work. The filament of this valve requires 1.5 amperes at 6 volts and the plate voltage

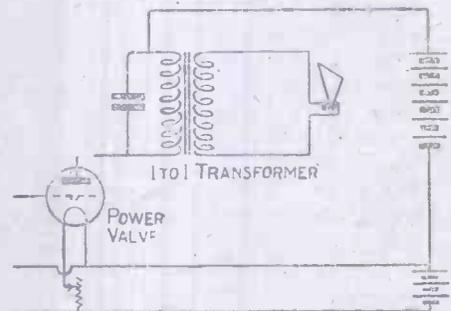


Fig. 4.—Diagram showing Position of Transformer in Power-valve Circuit.

should be a high one, about 200 to 400 volts being required for the best results. A transformer is, of course, essential with a power valve of this type. J. H. R.

(To be continued)

There is a probability that the wavelength of Vienna (Radio-Wien) may shortly be altered, as Austrian and South German listeners complain that it is difficult to tune out Berlin. It is suggested that Vienna's wavelength should be reduced to 300-320 metres.

LISTENING TO THE TRANSATLANTIC TESTS

IT is, of course, too early to be able to say definitely what results have been gained either in this country or others during the Transatlantic tests. But the time is sufficiently advanced for us to form some conclusions regarding the general principles which have governed the tests and the results which have been achieved so far. General atmospheric conditions have not been good, the organisation might, perhaps, have been bettered, and the results have not fulfilled expectations.

2 L O has "got over" and a few Continental stations have been heard more or less faintly in the United States. K D K A has been re-broadcast by the experts at London with more success than has attended any previous effort, and an amateur has done two-way work with Australia. But there the tale of achievements ends.

Bad Reception

It is undoubtedly true that up to the moment of writing, this reception of American stations has been not one degree better during the tests than at any time during the past month or so. In my own personal opinion it has been a good deal worse.

So much for a general review of the situation. Now let me discuss something on which I can speak with more certainty—my own experiences of these tests up to date.

Everybody knows, I think, that recently, after a prolonged spell during which reception was almost perfect, K D K A became almost impossible to get. This unpleasant state of affairs lasted about a fortnight, but for a considerable time prior to the commencement of these tests conditions were almost normal again. The three standard American broadcasting stations, K D K A, W G Y and W B Z, had been coming in sufficiently well to be audible when switched through to a loud-speaker.

Stations Received?

Yet the beginning of the tests coincided with a notable decrease in strength again. The three stations named have been coming in as usual, but only just loud enough to identify. Other stations have come in as well, but it has been impossible to ascertain what and where they were. I have received between 3 a.m. and 4 a.m. K D K A, W B Z, W G Y, W F Y and W H A Z at fair strength, along with some dozen other American stations which I have not been able to log. But with the sole exception of K D K A not one of these has been good enough to relay over a telephone line.

Static has undoubtedly been worse than

usual, as also has fading. The best reception during the whole of the test period occurred between 3 p.m. and 4 p.m. on November 26, when I tuned-in a station, operating on the wavelength of K D K A,

The writer of this article, Mr. E. C. Davies, has a great reputation for Transatlantic work. His account, therefore, of conditions during the International Radio Week will be of special interest.

which I was able to pass over the line sufficiently well to be fairly clear at the other end. Whether this station was K D K A I am not prepared to guarantee.

Possibly K D K A

There was, however, no doubt that the station was working at a great distance, and in consideration of the position on the dials and the general characteristics of the transmission I have little doubt that it was K D K A.

One noteworthy thing about this experience is the fact that static was heavy, an unusual occurrence at that time of the day. But undoubtedly the greatest force operating to the detriment of decent reception during these tests has been the terrible overloading of the ether. The atmosphere has been filled with morse, static and "mush."

The effect is as though every wireless station in the world had been crammed into the narrow limits of the broadcast band and all were working at double their normal power. The few stations which come through are heterodyned out of existence by the "backwash" of those which do not.

Increased Power

Listeners to the Continental stations last Wednesday week must have realised that additional power does not always mean an increase in reception quality. Between 4 a.m. and 5 a.m. it was almost an impossibility to keep the phones on one's head while searching anywhere between 300 and 500 metres, and yet there is no possible doubt that not one of those stations working on greatly increased power but can be received with much more ease under normal conditions. So bad was the general distortion that a violin solo sounded more like a trombone.

It would seem that a better plan would be to detail a certain station to represent each country and dedicate to that station the work of crossing the Atlantic, all other stations keeping silent during the attempt. I think that were this plan adopted no difficulty would be found in spanning the two or three thousand miles which separate the Continent of Europe from that of America, even without greatly in-

creasing the power of the stations operating.

I have on more than one occasion received direct from Los Angeles under quite normal conditions, and have gained the impression that only the trouble experienced through static prevents us at the present time from obtaining perfectly good stuff from any decent station within a radius of some three or four thousand miles. K D K A, for instance, may be received with regularity on a fairly sensitive set as early as 7.45 p.m. almost any evening. A slight increase in the sharpness of the tuning of this transmission would in all probability render it clearly audible to most English enthusiasts at this hour.

In conclusion it may perhaps be permissible to mention that the three greatest and most important lines upon which experiments are needed are: The elimination or filtration of static interference; reception of American telephony during the hours of daylight; and distant reception in general.

Reception Problems

If every amateur would only concentrate upon either of the two first mentioned it would be but a very short time before two-way work was being done between the United States and England with perfect regularity and purity. The number of wireless enthusiasts, professional and amateur, who are concentrating their attention upon problems concerning reception is only too small. E. C. D.

DO TRANSFORMERS BURN OUT?

SOME people think that low-frequency transformers never really burn out at all, but that their sudden failure is due to quite different causes. When a transformer is under load its windings are likely to vibrate, especially if their fundamental frequency is anything near that of the signals being received.

In some power amplifiers, for example, the transformer usually placed in the plate circuit of the last valve buzzes quite loudly.

This vibration seems to have two effects. It either causes an actual mechanical fracture of the wire or else produces crystallisation. In the latter case the wire becomes brittle and is liable to break at any minute.

To make the windings more elastic some manufacturers wind their transformers with silk threads between the turns of wire.

R.

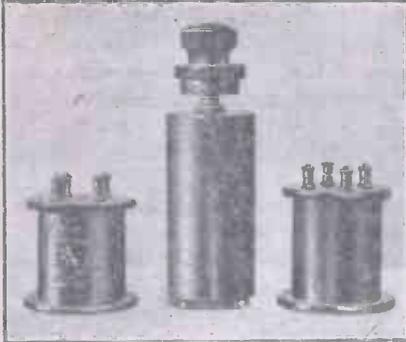
Ask "A.W." for List of Technical Books

AROUND THE SHOWROOMS

Success Components

WELL-FINISHED apparatus always looks as if it ought to be efficient and in practice it usually is. This applies particularly to the range of Success components made by Beard and Fitch, Ltd., of 34-36, Aylesbury Street, E.C.1.

In the photograph are shown two low-frequency transformers and a reactance-capacity coupling unit. The transformers are enclosed in neat lacquered brass cases,



Success Components.

with ebonite tops and bottoms. I have found that the standard ratio model (which sells at 16s.) gives excellent results.

For the Constructor

ANY constructional work is facilitated, and therefore made more pleasurable, by the use of the right tools for the job. There-

fore two Aeronomic devices should find a place on every amateur's bench. The first is a valve-socket marker that takes the form of a metal disc with four raised points, attached to a wooden handle; its utility needs no emphasis.

The second tool is a special pair of pliers for making sharp right-angle bends in wire when connecting up a set. Having decided where you want the wire to bend, place the pliers there, grip tight, and a neat bend is the result. Both these devices are made by A. F. Bulgin and Co., of 9-10, Cursitor Street, Chancery Lane, E.C.4.

Uralium Crystal

IT will always be a debatable point, I suppose, whether natural or synthetic crystals make the most efficient rectifiers. I have had crystals of both kinds that are equally good to use.

An excellent example of a good natural crystal is Uralium. I have tested this and found it to give remarkably good signals. It is supplied in a neat box with a silver catwhisker for 1s. 6d. by Bower Electric, Ltd., of 15, Grape Street, Shaftesbury Avenue, W.C.

Quality Components

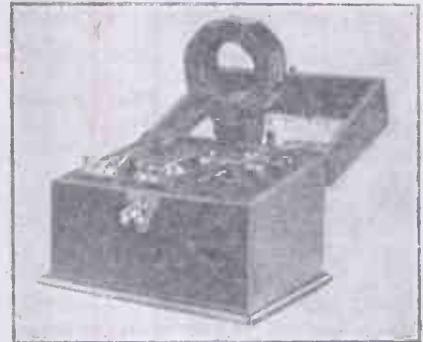
A GREAT disadvantage of many plug-in coil holders is that they take up a considerable amount of space when mounted on a panel. For this reason the Goswell

Engineering Co., Ltd., of 12A, Pentonville Road, N.1, have produced a neat and cheap panel-mounting holder.

Connections are made to the fixing nuts and bolts at the back of the panel, thus doing away with flexible leads.

Belling-lee Set

Now that wireless apparatus generally is so much cheaper than it was a year ago it seems that a crystal set would in many



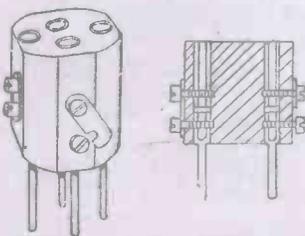
Belling-lee Set.

cases make an ideal Christmas present. A neat Belling-lee set, that gives excellent results, I find, is shown by the photograph. This has a special glass-covered detector, a socket for a loading coil and terminals for using several phones. The makers are Belling and Lec, Ltd., of Ponders End, Middlesex. VANGUARD.

PROGRESS AND INVENTION

Valve Holder

ONCE a set has been constructed and housed in a cabinet it is usually a matter of difficulty to alter the circuit to any considerable extent, but a special type



Valve Holder (223,337/24).

of adaptor described in Patent No. 223,337/24 (W. E. H. Humphrys, of Hendon) overcomes this trouble.

As can be seen by the diagrams, the adaptor is similar to an ordinary valve holder except that the sockets are broken

into two, each half being provided with a terminal.

By plugging one of these adaptors in position it is possible to make almost any desired alteration to the circuit. For instance, an extra inductance can be placed in an anode circuit or grid bias applied to an amplifier.

Valve Electrodes

THAT the valve manufacturer must also be an expert metallurgist is proved by Patent No. 223,306/24 (H. J. Osborn, of Salford, and W. L. Turner, of Purley Caldy).

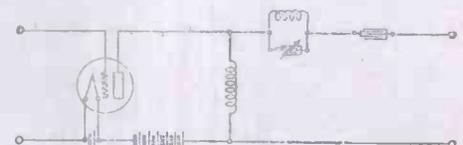
In the specification it is stated that nickel, tantalum, tungsten and molybdenum, while used for making valve electrodes, occlude relatively large quantities of gas which, unless carefully removed during the manufacture of the valve, make the valve soften.

A special chrome-iron alloy is found to occlude less gas than most metals.

Amplifier Coupling

INCREASED selectivity is the object of a new method of high-frequency coupling that is similar to the tuned-anode system.

A tuned circuit comprising a condenser in parallel with a coil is placed in the anode circuit in series with a fixed condenser. Thus the parallel coil and condenser, with the fixed condenser in series,



Amplifier Coupling (222,331/24).

form an acceptor circuit, while the parallel circuit forms a rejector.

The arrangement is more fully described in Patent No. 222,331/24 (Western Electric Co., Ltd., of London, and G. H. Nash, of Sidcup).

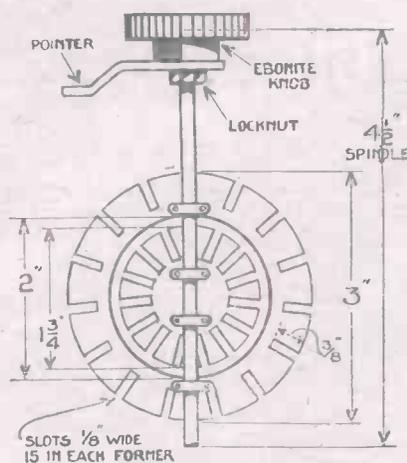


Fig. 1.—Variometer Former and Spindle.

IN No. 120, on page 343, there appeared an article entitled "A Compact Crystal Set that Gives Results." Several inquiries have been received asking for further particulars of this receiver. The layout of the panel can easily be seen in the photograph published with the original article.

The basket-coil variometers can be made in the following manner: Cut the formers

THE COMPACT CRYSTAL SET

SOME INQUIRIES ANSWERED

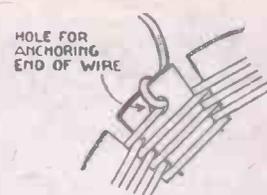


Fig. 2.—Method of Winding.

(as shown in the diagram Fig. 1) out of stout cardboard (two of each kind will be required) and give each a thick coat of shellac varnish. When thoroughly dry wind No. 34 enamelled wire on one of the inner formers. After forty-eight turns have been wound on, cut the wire, leaving a length of about 6 in. for connection. Make a small hole in the edge of the former (see Fig. 2) and pass the loose end through once or twice in order to make it secure.

Next wind the outer former. When twenty-four turns have been wound on, cut the wire and secure it in the same manner as before.

Now proceed to wind the two remaining basket coils, winding fifty-eight turns on the inner and thirty turns on the outer former.

The two inner coils are to be permanently fastened to each other, and the outer coil of the secondary is hinged in order to vary the coupling (see Fig. 1, page 343).

The outside end of the winding of one of the inner coils is connected to the inside end of the fixed outer coil. This forms the primary variometer. The outside of the remaining inner coil is connected to the inside of the hinged outer coil. This completes the secondary variometer. For the remaining connections see Fig. 4 on page 343.

If these instructions are carefully followed no difficulty should be experienced in making the set, which, when completed, will well repay the time spent in its construction. When properly adjusted it will give excellent results.

G. O. R.

USING THE FLEWELLING RECEIVER

A Short Article upon the Operation of the Set Described in the last issue

WHEN attempting to adjust the set to secure super-regeneration results the coils must be closely coupled—that is, almost tight up—and the anode voltage fixed at about 30 volts. After adjustments and whilst receiving signals the anode voltage may be increased up to 60 or 100 volts, but remember that one valve is doing all the work.

As a Portable Receiver

If it is intended to use the set as a portable receiver the leads from the batteries should always be kept as nearly as possible the same length, otherwise readjustments may be necessary if the length of wire becomes excessive. It may also be found that after adjusting the set in the house and on a wooden floor or table and then placing it outdoors on damp earth that the sensitivity is affected so far as super-regeneration is concerned, thus entailing further adjustment.

It should be noted that the circuit Fig. 1 (p. 840) is not suitable for the frame aerial and is perhaps the most easily managed and reliable of the two circuits.

Using the Frame-aerial Circuit

The same general remarks as to operations apply to this circuit and aerial as to the former arrangement, except that tuning is possibly more critical and the

frame aerial has to be oriented in the direction of the station from which it is desired to receive signals. Clear strong signals are received when using the set as a plain regenerator and great sensitivity is displayed by the super-regenerative arrangement.

In this case, however, it appears unnecessary to vary the size of the reaction coil; for either purpose Nos. 75 and 100 honeycomb or Nos. 3 and 4 Burndept coils were found suitable for the arrangement. It will not function with an ordinary single wire as did the circuit shown first. Taken all round, the set is an ideal one-valver.

The Functions of the Condensers

It will be noted from Fig. 2 (p. 840) that three fixed condensers of a value of .006 microfarad are specified and two variable resistances. The receiver depends for its regenerative action upon the action of these resistances and condensers in blocking and freeing the valve. The desired signals are received on the grid of the valve, by which they are rectified in the usual manner, and in the meantime the reaction coil and the aerial acts on the feed-back principle—the signals again and again being fed to the grid and built up to maximum intensity.

Another function is performed, however, whereby the received and built-up impulses of high- and low-frequency are fed back to the grid of the valve via the resistance and .006 condenser C3 and R2 and the grid leak and condenser C4 and R1. This action and the regenerative action causes an audible howl or whistle in the telephones, which may be verified by the fact that variation of the grid leak R1 varies the pitch until it becomes almost inaudible.

The Cause of the Howl

The howl is caused by the blocking and freeing of the grid of the valve, which in a properly adjusted set can be varied from a series of clicks or thumps easily countable to the high-pitched whistle referred to, which is explained by the fact that the accumulated charge is being freed from the grid at a very high rate. In practice it will be found that the resistance R2 may be set at a value of about 2 megohms and left so whilst adjustments are made on the resistance R1.

It will be seen that whilst the grid of the valve is being blocked and freed at a very high rate, the .006 condenser is being also charged and discharged, the discharge being into the grid circuit; this gives regeneration with the added discharge of the .006 condenser.

A. T. C.

EXPERIMENTS WITH DOUBLE-GRID VALVES

VALVES with two or more grids have for some years been more in favour among amateurs on the Continent, particularly in France and Germany, than in this country. Recently they have been used here to some extent in certain circuits in which the main object has been to dis-

The merit of this particular arrangement is that it combines the work of two valves in one, namely, an H.F. amplifier plus a detector. The input signals from the aerial A are applied directly across the first grid G1 and the filament. Owing to the high voltage existing on the grid G2

half-cycle of the high-frequency oscillations in the coil L. The value of this current fluctuates according to the average amplitude of the positive half-cycles.

In other words, a process of rectification takes place between the grid G2 and the plate P, and the resultant current is de-

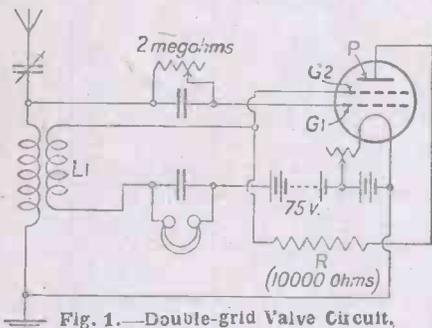


Fig. 1.—Double-grid Valve Circuit.

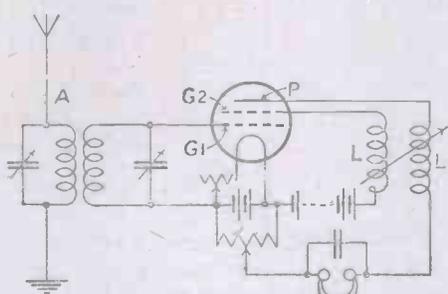


Fig. 2.—A Double-grid Valve Circuit Due to Capt. Round.

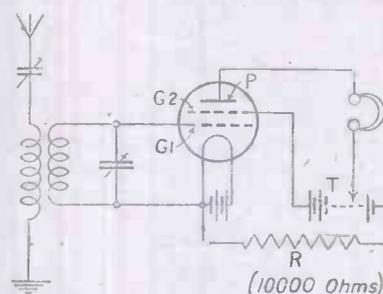


Fig. 4.—Double-grid Valve Circuit with Resistance in Place of Transformer.

pense with the plate battery. Whatever may be the merits of abolishing high-tension, it is certain that the four-electrode valve is not being employed to the best possible advantage in such arrangements.

Fig. 1, for example, shows a receiving circuit comprising only one four-electrode valve by means of which a well-known French amateur has succeeded in reproducing 2 LO on a loud-speaker at Strasburg and in hearing American broadcast with good audibility on the headphones. This is an achievement which demonstrates the interesting possibilities of long-range work with such valves, provided the standard H.T. battery is retained.

It will be noticed that the plate P and second grid G2 are joined through a resistance R of 10,000 ohms and that both are connected to the positive pole of a high-tension battery of 75 volts in series with a coil L1 back-coupled to the aerial tuning coil L. The latter is connected across the filament and first grid G1 through a grid condenser and variable leak. The grid condenser has a somewhat higher value than usual, namely, .05 microfarad, and is shunted by a variable resistance of at least 2 megohms.

Fig. 2 shows another four-electrode circuit, due to Capt. Round, in which the second grid G2 is connected to the positive high-tension, the plate lead being brought round to a potentiometer across the filament battery. In this arrangement the grid G2 acts in much the same way as the plate of an ordinary valve so far as the attraction of the electron stream is concerned, the space between G2 and P being used to produce a rectifying effect.

it attracts the electrons just as does the plate of an ordinary valve, so that an amplified current is set up in the coil L1 in the second grid circuit.

The initial or adjusted potential of the plate P is the same as that of the filament—that is, it is negative with respect to G2, so that any electrons that shoot past the open spaces of that grid are pushed back from the plate and do not flow through the outer circuit P L1.

It will be noticed, however, that the coil L is closely coupled to the coil L1 in the plate circuit. Accordingly, the amplified high-frequency currents flowing in the coil L will transfer corresponding voltages to the coil L1, and these will have the effect of throwing the plate P alternatively positive and negative with respect to the filament.

The negative pulses simply decrease the

detected by the phones in the ordinary way. The applied signals have, however, undergone a double process of amplification (1) by the ordinary valve action between the high-potential grid G2 and the filament, and (2) by the step-up effect between the high-frequency transformer coils L L1. In addition they have been rectified in the manner just described.

Fig. 3 shows a further development of a double-grid valve circuit. In this instance a single valve is used to amplify on the high-frequency side, then to rectify, and finally to re-amplify the resultant low-frequency currents.

As before the input currents applied to the first grid G1 are amplified in the second grid circuit G2 L, and are then transformed into corresponding voltages across the H.F. transformer L L1. The negative pulses are eliminated and the positive pulses are rectified into a low-frequency current flowing in the external plate circuit.

Instead, however, of inserting the telephones in this circuit they are replaced by the primary of a low-frequency transformer L3, the secondary of which is inserted in the circuit of the first grid or input G1. The rectified currents are therefore re-applied as low-frequency voltages and are again amplified across the grid and filament, just as in G2 the well-known reflex circuits used with ordinary valves.

A condenser C1 shunts the secondary of the low-frequency transformer in order to short-circuit this coil for radio-frequency currents; otherwise these would be choked back and would exercise no effect in the first instance. A second condenser C2 provides a similar short circuit for the ampli-

(Concluded on page 890)

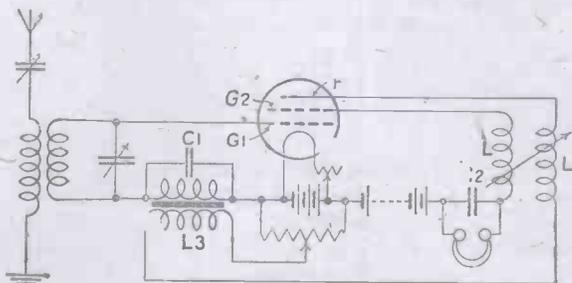


Fig. 3.—Another Double-grid Valve Circuit.

existing potential of the plate and have no other effect. The positive pulses, on the other hand, cause the plate P to attract (instead of repel) some of the crowd of electrons that are drawn up to and through the spaces of the grid G2. This accordingly gives rise to a current in the outer circuit P L1 corresponding to each positive

FLEX SET

frequency amplifier),
switching allows

behaviour between these two circuits, and these differences are worthy of note. The circuit of Fig. 2 is admirable for short-range work, but fails to make the most of distant signals for two reasons: Firstly, it is very difficult to use reaction really effectively, as a deafening buzz at low-frequency generally marks the beginning of incipient oscillation; secondly, faint signals are not stepped up by the transformer, but are lost altogether. This, of course, is not a new discovery; it is known, though not so widely as it should be, that a note-magnifier should be coupled *without* a transformer to a crystal set if the signals are very weak, and that only if they are strong does the transformer add appreciably to their power.

In view of these two

shortcomings of circuits of the type shown by Fig. 2, that shown in Fig. 3 was adopted for the second valve in spite of the fact that the power on short range is considerably less than that of the circuit of Fig. 2. Here, and indeed all through the design, attempt has been made to get the highest possible efficiency on the high-frequency side, combining this with as much efficiency on the low-frequency side as could conveniently be obtained. Fig. 3, then, shorn

of its dotted aerial and earth, represents the circuit of the second valve of the set at this stage of its development, while the first valve remained as shown in Fig. 1.

This alteration to the set, of course, resulted in a gratifying increase in volume; signals from all British stations could now be received at fair telephone strength on a tiny indoor aerial with a gas-pipe as earth. But still the writer felt that the first valve might be made to do a little more work, and so this also was called upon to perform a stage of note magnification.

The question arose at once as to whether the first H.F. valve should be the second note magnifier, which would involve only trifling changes in the wiring, or whether the currents should be fed from the crystal to the first valve and then on to the second. The points for and against each

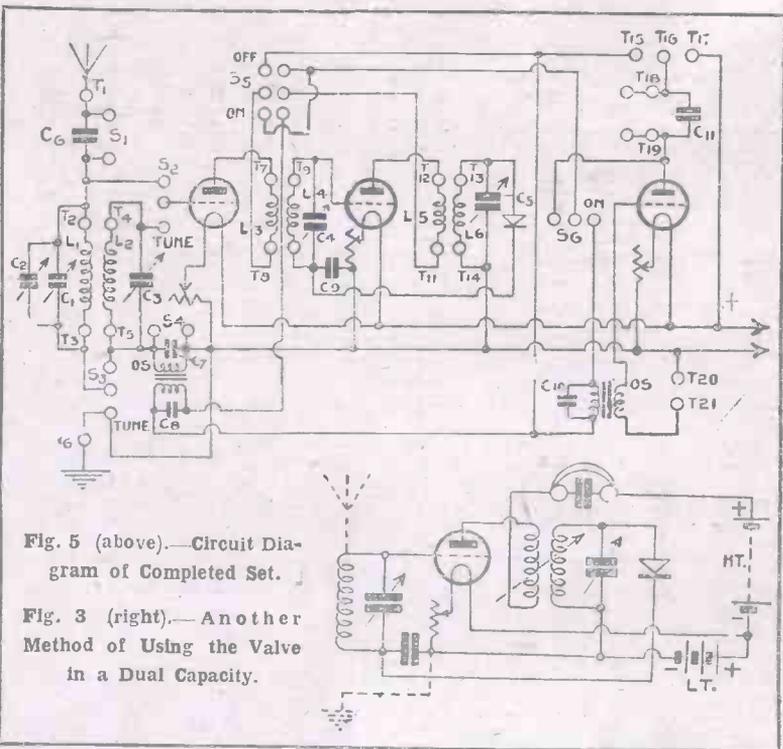


Fig. 5 (above).—Circuit Diagram of Completed Set.

Fig. 3 (right).—Another Method of Using the Valve in a Dual Capacity.

of the two arrangements were carefully considered; both have their advantages, both their difficulties. In a "straight double-dual," in which both high- and low-frequency currents pass through the valves in the same order, the last valve has very heavy work to do, in that it has to carry both the biggest H.F. and the biggest L.F. currents, and this may lead to distortion. Also any "earth-hum" due to electric light or other causes is magnified in such a set by *two* valves, while in an "inverse-dual" by one only.

The Inverse-dual

The only drawback to an inverse-dual (where the second H.F. valve is the *first* L.F. valve and signals are more evenly

divided between the valves) is that if any L.F. impulse at all can stray by way of the H.F. coupling from the first valve to the second, it is magnified and handed back to the first valve by the normal working of the circuit, and so a chain of low-frequency reaction is set up, resulting in an uncontrollable L.F. howl. It was, however, considered that the type of H.F. coupling employed, the two coils being but loosely coupled, would pass no L.F. impulses at all, and so the inverse type of dual circuit was chosen.

There being now no need to consider weak signals, a transformer was naturally used to convey the currents from the plate circuit of the second valve to the grid of the first, and so its secondary was connected in the grid circuit as indicated in Fig. 2, so that the accumulator was earthed. The telephones were shifted to the plate circuit of the first valve, the primary of the transformer taking their place.

The circuit was then as shown in Fig. 4, and proved both amply powerful for telephones and capable of receiving over long distances with the most inadequate aerials. Indeed, an American broadcasting station (W G Y, Schenectady, New York) was heard on four successive nights in April using this circuit on the tiny indoor aerial already mentioned (just bell wire across a very small upstairs room). The set at this stage was perfectly satisfactory for reception on telephones, but would not work a loud-speaker except at quite short ranges; moreover, it was an untidy "hook-up" and not at all suitable for use outside a wireless shop. Finally the decision was made to rebuild it, using a large panel, incorporating a third valve as simple note magnifier and adding an aerial secondary circuit to help to get rid of morse and other interruptions that trouble the listener-in when receiving over long ranges.

The photographs show the result; it is fairly tidy and extremely effective. Practically every station in Europe can be heard on the loud-speaker, using an extremely poor outside aerial; the "Ello" of the Frenchman and the "Achtung" of the German are common sounds in the house, while occasionally we go still farther afield and indulge in torrents of rapid Spanish from Radio Iberica.

The Three-valve Circuit

Fig. 5 shows the circuit diagram of the completed three-valve set, including all the switching arrangements, and corresponds exactly to the wiring shown in the photograph. It looks much more complicated than it really is on account of the six switches that have been introduced for various purposes. The first of these, marked in the figure S1, merely short-circuits the small fixed condenser C6, which has a capacity of .0002 microfarad. This condenser is very useful on occasion, for the arrangement shown, in which the tuning condenser is always in parallel with the tuning coil (while a small series con-

denser can be added as required) takes the place of the more usual arrangement embodying a series-parallel switch.

When the aerial used has a high capacity, either through being unusually large or from being unduly close to earthed objects, this small condenser enables a reasonable size of coil to be used in the aerial circuit, and permits of tuning down to lower wavelengths than would

otherwise be possible. Also its use increases selectivity very considerably, and by minimising the damping effect of a heavy aerial allows of a greater degree of reaction in the first valve. All this is on short waves; for long waves the condenser offers rather a large resistance to the incoming impulses and should be cut out by means of the switch. A. L. M. S.

(To be continued)

WIRE FOR INDUCTANCES

MANY experimenters are at a loss to know what gauge of wire to use for their inductances. Possibly they use No. 20 and are surprised to find that a friend seems to get equally good results with No. 26 (probably due to some minor advantage in the aerial). The table given on this page will be helpful to those who are seeking efficiency and economy.

The figures are all calculated for a hypothetical tuning coil wound on a 2-in. tube, without shellac or wax, to tune to 375 metres wavelength as an A.T.I. on a standard aerial without a condenser; they are, of course, comparable for the whole of the band of broadcast wavelengths.

On distant stations the low-resistance coils will give loud signals when the high-resistance coils render the signal barely audible.

Working with crystal circuits it is important to avoid all losses, and a marked advantage may be found in keeping the resistance as low as possible.

The variometer is a convenient form of tuner, but it is not sufficiently selective for those who live near the coast; a fixed series condenser will improve the tuning, but the use of low-resistance wire is an even greater help towards obtaining freedom from jamming, especially if the resistance is further diminished by restricting the maximum wavelength of the coils and thus avoiding an unnecessary length of wire.

Some readers may be trying the fascinating task of coaxing a crystal set to run a loud-speaker without further amplification. For this it is, of course, necessary to keep the capacity down to the lowest possible figure, but it is also important to keep the resistance down to get a sharp peak on the tuning curve.

The cost of the special stranded wire is a considerable item when designing a new set of coils. The 9/36 wire costs between 3s. and 4s. per 100 ft. and the twenty-one-strand wire is about three times the price. It is quite possible to make up satisfactory wire from the secondaries of old ignition coils. These are frequently wound with 40-gauge single-silk-covered wire, though some, however, are wound with bare wire and it is not worth while to pay much for an old coil on chance.

There is sufficient wire on an old 1/2-in. ignition coil to make about 300 ft. of twenty-one-strand wire. It is worth noting that a "burnt out" coil is generally found to be defective in the condenser or in the primary; the damage, if any, to the secondary is usually very slight.

It is important to avoid any broken strands of wire and to see that all the strands are soldered together at the ends.

H.F. Resistances of Inductances for Broadcast Wavelengths.

30 microhenries, 80,000 cycles per second. Solenoid winding on formers 5 cm. diameter.

S.W.G. and Insulation	Number of turns per cm.	Length of coil in cm.	Total number of turns	Length of wire in metres	D.C. Resistance in ohms.	H.F. coefficient	Total resistance in D.C. H.F.
20 D.C.C.	8.3	9.3	77	12.1	.312	3.55	1.11
22 D.C.C.	10	6.9	69	10.9	.465	2.75	1.28
24 D.C.C.	11.6	5.5	64	10	.691	2.35	1.62
26 D.C.C.	13.3	4.5	59	9.3	.96	1.85	1.775
28 D.C.C.	14.7	3.8	56	8.8	1.34	1.6	2.15
30 D.C.C.	16.3	3.35	53	8.3	1.8	1.37	2.46
9/36 S.S.C.	10	6.9	69	10.9	.7	1.07	.75
9/40 S.S.C.	14.7	3.8	56	8.8	1.41	1.009	1.41
21/40 S.C.	8.3	9.3	77	12.1	.835	1.009	.835
30/40 S.C.	6.5	14.	91	14.3	.69	1.009	.69

Worked from formulae in Spon's "Electrical Pocket Book" and "The Radio Experimenter's Handbook."

L. H. F.

"EXPERIMENTS WITH DOUBLE-GRID VALVES"
(Continued from page 8:7)

fied high-frequencies across the telephones.

Fig. 4 shows a final circuit in which the high-frequency transformer used in Figs. 2 and 3 is replaced by a high resistance R of 10,000 ohms inserted in the plate filament and second grid-filament circuit somewhat similar to the arrangement of Fig. 1.

Currents flowing in the circuit G2 R will give rise to differences of potential across the ends of the resistance R. These voltage fluctuations, combining with the potential of that part of the high-tension battery included in the plate circuit, increase or diminish the normal plate potential and so give rise to a rectification effect between P and G2 in precisely the same manner as previously described. Care must be taken to adjust the tapping point T from the plate to the H.T. battery to the correct position in the first instance.

M. A. L.



It is proposed to broadcast news of the prevailing weather conditions in London in foggy weather, so that listeners living some distance from the City might start for their offices earlier in the morning (*sic*).

A loud-speaker has been installed at Lloyd's to assist the crier in his duty of calling out the names of the brokers and underwriters.

This Christmas we are to have carols by wireless, but, unlike the usual outdoor variety, they will be tuneful. On December 20 a carol concert held at the Royal Albert Hall, under the conductorship of Sir Hugh Allen, will be relayed.

Serious damage has been done to L.N.E.R. property by people breaking open battery boxes and stealing dry cells and accumulators suitable for wireless sets.

The first of the new concerts from Chelmsford will be on December 15, when

it is intended to transmit a performance of the opera *Prince Igor*, played at the Brussels Opera House.

Worcester guardians are providing wireless sets for the workhouse.

Officials at the Edinburgh broadcasting station are busy with the technical difficulties to be overcome in order to broadcast the cries of the animals at the Corporation Zoo Gardens.

It is stated that 80 per cent. of the people in Great Britain can receive broadcasting of some sort on sets which cost less than £3.

Sir George Newman, chief medical officer of the Ministry of Health, will talk on "Public Health" from 2 LO on December 5.

The B.B.C. now has 1,000,000 subscribers, and receives in revenue £375,000 a year.

Comparison between the Greenwich time signal and Big Ben has revealed the fact

that the latter's chime was only one second in error in 293 days.

On December 9 the Roosters' Concert Party will give a programme in the form of a musical extravaganza.

A well-known firm of wireless manufacturers is producing phonés at the rate of 12,000 a week.

Complaints have been received by the B.B.C. of interference between Glasgow on 420 metres and Belfast on 435 metres.

A Dublin schoolboy, only 16 years old, has listened for two hours to WBZ (Springfield, Mass.) on a home-made two-valve receiver.

Nearly 600 convicts at Parkhurst were entertained recently by a wireless concert.

An enterprising scheme has been adopted in Belfast whereby wireless receivers will be installed in all the hospitals. £800 to £1,000 will be necessary to carry out completely this extensive scheme.

It is rumoured in Kettering that the B.B.C. have inspected a site near the Council's housing estate as a possible position for the new high-power station.

Speaking at Glasgow, Captain Eckersley disclosed that the B.B.C. was taking into account the claims of nationality, and that the establishment of Scotland as a separate district, with headquarters at Glasgow, was in contemplation.

(Continued on next page)

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RADIOGRAMS (continued from previous page)

The London Board of Trade has given instructions that special wireless sets are to be installed in one motor lifeboat on every liner with fifteen boats or more.

Mr. Hall, of Matlock, is reported to be able to hear music and broadcast speech when wearing phones, although he has been stone deaf for 40 years.

The question as to whether the Swansea station is to relay programmes from Cardiff or London still continues to agitate listeners in the Swansea district.

Daventry Rural Council has decided to install a wireless set at the Isolation Hospital.

Over 250 firms are taking part in the Berlin Wireless Exhibition, which is taking place on December 4. According to German estimates, this will constitute a record, inasmuch as up to the present no other country has built a special hall for the purpose.

Reception of broadcasting with loud-speakers in a Glasgow park was heard well for a distance of 200 yd., despite the noise of passing traffic.

Those parts of the British broadcasting programmes that include time signals from Big Ben have the chief interest for American listeners. Everybody wants to hear the historic national timepiece.

Complaints have been received by the

broadcasting authorities of morse interference in the Wolverhampton district.

Reports have been received of the operations of a bogus wireless inspector in the Twickenham district who is collecting "extra" fees for himself.

Mr. G. K. Chesterton, who broadcast from Edinburgh recently, said that if he grossly insulted his listeners he would feel a horrible and almost diabolical sense of security. They could not storm the platform or tear him to pieces!

A wireless message to the King was received on the night of November 24 from an Australian amateur station.

A Dublin experimenter has received Radio-Iberica (Madrid) on a simple one-valve set, using an indoor aerial only 25 ft. long.

A proposal has been made in France by the Herriot Government to transform wireless telephony into a State monopoly.

A cable from Montreal foreshadows the reorganisation of the Canadian Marconi Wireless Company.

Over four hundred American vessels have been fitted with wireless apparatus in order to intercept communication between "bootleg" rum smugglers and the shore.

A wireless telephony service is being carried out between Belgrade (Jugoslavia) and Beirut (Asia Minor) by the French Radio-Orient Company.

More signals from M. Louis (8BF, of Orleans) have been picked up by M. Perroux (8BV, of Nimes). A three-valve set without an aerial was used for reception.

At 7.30 p.m. on December 12 half an hour's cheery entertainment will be given by the Novelty Trio at 2LO.

At present 535 broadcasting stations are operating in the United States.

A harpsichord performance will be given by Mrs. Violet Gordon Woodhouse on December 12.

The band of the Royal Air Force will give a programme of bright music on December 13.

Every relay station wants London, states a broadcasting official, and refuses to recognise any merit in its nearest main broadcasting station.

A "Whiff of Devonshire" will be given on December 5 by Harry Rice from 2LO.

December 6 will be a popular night, and the programme will include items by the Wireless Orchestra and the Savoy bands.

The 2LO Military Band, under Mr. Dan Godfrey, jun., will broadcast from 2LO on December 7.

It is reported that up to October 4 this year 15,000 people have subscribed to the Vienna broadcasting service.

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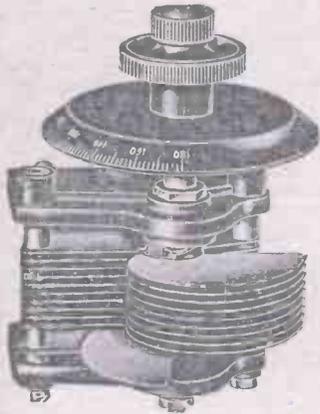


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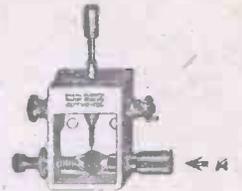
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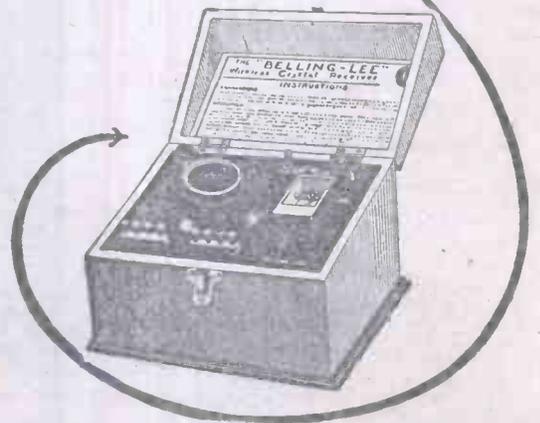
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The times given are according to Greenwich Mean Time.

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

Aberdeen (2BD), 495 m. Belfast (2BE), 435 m. Birmingham (511), 475 m. Bournemouth (6BM), 385 m. Cardiff (5WA), 351 m. Glasgow (5SC), 420 m. Manchester (2ZY), 375 m. Newcastle (5NO), 400 m. Much the same as London times.

Bradford (2LS), 310 m. Dundee (2DE), 331 m. Edinburgh (2EH), 328 m. Hull (6KH), 335 m. Leeds (2LS), 346 m. Liverpool (6LV), 315 m. Nottingham (5NG), 322 m. Plymouth (5PY), 335 m. Sheffield (6FL), 301 m. Stoke-on-Trent (6ST), 306 m. Programmes relayed.

CONTINENT

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

AUSTRIA.

Vienna (Ravag), 530 m. (1 kw.). 08.00, markets; 10.00, con.; 12.00, time sig.; 12.20, weather; 14.30, Stock Ex.; 15.00, news, con.; 15.15, children (Wed.); 17.15, lec. (Mon., Tues., Fri.); 18.30, news, weather; 19.00, time sig., con., news; 20.00, dance.

BELGIUM.

Brussels (SBR), 265 m. (1½ kw.). 17.00, orch., children (Wed. and Thurs.); dance (Tues. and Sat.); 18.00, news; 20.00, lec., con., news (opera, Mon. and Wed.).

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

CZECHO-SLOVAKIA.

Kbely (OKP), 1,150 m. (1 kw.). Weekdays: 09.00, 10.30, 12.30, 16.00 and 17.00, Stock Ex.; 18.15, lec., news, weather, con. (time sig., 19.00), daily; 10.00, con. (Sun.).

Komarov (OKB), 1,800 m. (1 kw.). Weekdays: 13.00, Stock Ex., weather, news; 09.00, con. (Sun.).

DENMARK.

Copenhagen (Kjobenhavns Radiofonistation), 470 m. 19.00, con. (Sun., Wed., Thurs.); also tests on 750 m. other days.

Lyngby (JXE), 2,400 m. Week-days: 18.20, news and Stock Ex.; 20.00 and 21.00, news, weather and time sig.

Ryvang, 1,025 m. 18.30, Eng. lesson (Wed.); 19.00, con. (Tues. and Fri.).

FRANCE.

Eiffel Tower, 2,650 m. (5 kw.). 06.40, weather (exc. Sun.); 11.00, markets (exc. Sun. and Mon.); 11.15, time sig., weather; 14.45, 15.35, 16.30,* Stock Ex. (exc. Sun. and Mon.); 18.00, con.; 19.00, weather; 22.10, weather (exc. Sun.).

* On 1st and 15th of each month at 16.45.
Radio-Paris (SFR), 1,780 m. (10 kw.). Sunday: 12.45, orch.; 13.45, news; 16.45, con.; 20.30, news, con.; 22.00, dance. 12.30, news,

Stock Ex., orch.; 16.30, markets, Stock Ex., con.; 17.45, Stock Ex., news, women's hour; 20.30, lec., news, con.; 22.00, dance (not daily). Special con. by *Le Matin*, Paris, every 2nd and 4th Sat. in month at 22.00.

L'Ecole Sup. des Postes et Télégraphes (PTT), 449 m. (500 w.). 16.00, lec. (Tues. and Thurs.); 20.30, Eng. conv. and con. (Tues.); 20.30, lec. or con. On 3rd Sun. of each month, organ recital, 20.45.

"Le Petit Parisien," 340 m. (500 w.). 21.30, con. (Sun., Tues., Thurs.).

Lyons-la-Doua, 550 m. 10.30, news and con.; 11.30-11.45-12.15, 16.15, Stock Ex.; 20.00, news and con.

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

Pic-du-Midi, 350 m. (300 w.). Testing.
Issy-lez-Moulineaux, 1,600 m. Tests.

GERMANY.

Berlin (2), 505 m. (1½ kw.): 08.00, sacred con., educational lec. (Sun.), markets, news; 10.00, gramophone con. on 430 m. (weekdays); 10.35, 11.15, Stock Ex.; 12.00, time sig., news, weather; 13.15, 14.00, Stock Ex.; 13.45, sacred con. (irr., Sun.); 14.30, children (Sun. and Wed.); 15.15, Stock Ex., orch.; 17.20, women, lec.; 18.00, French lesson (Mon.), lec. (other days); 19.30, con. or opera, weather, news, time sig. All daily except where otherwise stated.

Berlin (Telefunken Co.), 750 m. (1 kw.). 10.30, con. (almost daily); 19.00, con., tests (irr.).

Eberswalde, 280 m. 22.15, con. (Mon.).
Königswusterhausen (LP), 2,450 m. (5 kw.). 09.40, con. (Sun.). 2,550 m. (5 kw.): Wolff's Buro. Press Service: 06.00, 19.40, 2.800 m. (5 kw.): 10.50, con. (Sun.). 3,150 m., Telegraphen Union: 06.00-20.00, news (weekdays). 4,000 m. (10 kw.): Express News Service, 06.00-20.00 (daily).

(Continued on page 896)

The verdict of the Radio World-



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THIS NEW AMAZING CRYSTAL will stand the test of time. It is a natural product, with every facet sensitive. It is tested under actual working conditions. The strongest guarantee of perfect service. One trial will convince you of the superiority of this wonderful Crystal.

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 Resistances : £15 15 0

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And so with the **BROWN** Loud Speaker which, incidentally, was the very first Loud Speaker ever made in this country for Wireless use. This lengthy experience has undoubtedly resulted in the production of a Loud Speaker immeasurably superior in volume and tone. Remember that the **BROWN** Loud Speaker makes use of an entirely different principle. Instead of the usual flat iron diaphragm which is merely based on that used in the ordinary telephone, the **BROWN** utilises a cone-shaped aluminium diaphragm anchored to a tuned reed.

As a result the **BROWN** is entirely free from distortion and because the movement is so sensitive it is a Loud Speaker capable of giving immense volume.

But after all the only convincing test is to hear a **BROWN** actually in use. We are confident that if you will get your Dealer to demonstrate one you will be charmed with its exceptional volume and above all its wonderful purity of tone.

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The first Loud Speaker for Wireless was a **Brown**

Gilbert Ad. 1857

BROADCAST TELEPHONY (continued from page 894)

Bremen, 330 m. (1 kw.). Relays con. from Hamburg.

Breslau, 418 m. (1 1/2 kw.). 10.15, Stock Ex., weather; 11.00, sacred con. (Sun.); 11.55, time sig., weather (Sun.); 12.25, time sig., weather, Stock Ex.; 14.00, Berlin news; 15.00, children (Sat. and Sun.); 16.30, orch., lec. (Sun.); 18.30, Esperanto (Mon.); 19.30, con. (Sun.); Eng. conv. (Thurs.); con., lec. (other days).

Frankfort-on-Main, 470 m. (1 1/2 kw.). 07.00, sacred con. (Sun.); 10.10, news; 10.55, time sig. and news; 15.00, con. (Sun.); 15.10, markets; 15.30, orch.; 16.00, children (Sun.); 17.00, lec.; 18.30, lec.; Esperanto (Fri.); 19.00, lec., Eng. conv. (Mon. and Wed.); 19.30, con., opera; 20.30, news, weather; 20.50, tech. lec., women's hour; 21.00, time sig., con. (irr.).

Hamburg, 395 m. (1 1/2 kw.). Weekdays: 06.25, time sig., news; 11.45, markets; 12.00, time sig.; 13.30, markets; 14.00, news, women, markets; 17.00, con.; 18.00, lec.; 19.00, con. or opera; 21.00, weather, markets, sport; 21.50, news (in English), dance (not daily). Sundays: 07.55, time sig., weather, news, lec., women; 10.15, sacred con.; 11.15, chess; 12.15, con.; 14.30, photo talk; 15.30, children; 16.30, con.; 17.45, English conv.; 19.00, con. or opera; 21.00, con. as weekdays.

Königsberg, 463 m. (1 1/2 kw.). 07.10, markets (Wed., Sat.); 08.00, sacred con. (Sun.); 10.15, markets; 10.30, con. (Sun.); 11.55, time sig.; 13.15, news, Stock Ex.; 15.00, markets; 15.30, orch., children (Wed., Fri.); 18.00, lec.; 19.00, con., weather, news; 20.10, dance or con. (irr.).

Leipzig, 454 m. (1 1/2 kw.). 08.00, sacred con. (Sun.); 10.55, markets; 11.58, time sig.; 12.00* and 15.00*, Stock Ex. news; 15.30, con., children (Wed.); 17.00*, markets (exc. Sat.); 18.00, lec., Esperanto (Mon.); 18.30, lec., chess (Wed.); 18.45, Eng. lec. (Tues.); 19.15, lec., con. or opera; 20.30, news; 21.00, dance (Sun.). * Except Sunday.

Munich, 485 m. (1 1/2 kw.). 09.30, sacred con. (Sun.); 13.00, time sig., news, weather; 15.30, con.; 16.00, children (Wed.); 16.30, Eng. conv. (Mon.); Esperanto (Thurs.); 17.00, markets, news, women's hour (Tues. and Fri.); 17.30 and 18.30, con., lec.; 19.30, con., news, weather, time sig.; 20.00, dance, news, weather, time sig. (Sat.).

Munster, 410 m. (1 1/2 kw.). 06.55, time sig., news; 10.00, sacred con. (Sun.); 11.30, Stock Ex.; 12.00, time sig.; 14.30, markets, news; 15.00, orch.; 18.40, children (Wed. and Sat.), weather, news; 19.15, con. dance (Sat.); 20.15, news. Sun.: 19.00, con., news, dance.

Nuremberg (relay), 340 m. Programme relayed from Munich (q.v.).

Stuttgart, 443 m. (1 1/2 kw.). 10.30, con. (Sun.); 11.00, markets; 15.00, con., time sig., news (Sun.); 15.30, news; 16.30, markets, con., weather, time sig., children (Wed., Sat.), women (Fri.); 17.00, news, time sig. (Sun.); 17.30, weather, time sig.; 18.30, lec. (Mon. and Tues.); Eng. lec. (Fri.); 19.00, lec., con., weather, time sig., news.

HOLLAND.

Amsterdam (PA5), 1,050 m. (200 w.). 19.40, con. (Wed); 20.40, news; 21.10, con. (irr.). (PCFF), 2,125 m.: News and Stock Ex. almost hourly from 07.55 to 16.10.

Ymuiden (PCMM), 1,050 m. 20.10, con. (Sat.).

Hilversum (NSF), 1,050 m. (500 w.). 19.40, con. (Sun.); 20.40, lec. (Fri., irr.); 19.45, children (Mon.).

HUNGARY.

Buda-Pesth (MT1), 950 m. Half-hourly from 06.45, news, Stock Ex.; 10.00, con.; 11.30, news (daily).

ITALY.

Rome (IRO), 425 m. (1 1/2 kw.). 19.40 to 21.40, con.

JUGO-SLAVIA.

Belgrade, 1,650 m. (2 k.w.). 17.45, con. (Tues., Thurs., Sat.).

PORTUGAL.

Lisbon (Aero-Lisboa), 375-410 m. 20.30, tests, music, speech (irr.).

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

RUSSIA.

Moscow, 3,200 m. 13.30, speech or lec. (Esperanto) on last day of each month.

SPAIN.

Madrid (EAJ2), Radio-España, 335 m. 18.00, con.

Madrid (Radio-Iberica), 392 m. 21.00, weather, Stock Ex., time sig., con., news.

Barcelona (EAJ1), 325 m. 17.00 and 21.00, con.

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

SWEDEN.

Stockholm (TV), 440 m. 10.00, service, relayed (Sun.); 11.45, weather, time sig.; 18.10, con., news (exc. Mon.).

Gothenburg, 460 m. 18.10, con. (Tues., Fri. and Sat.). 680 m.: 18.10 (Mon., Wed. and Thurs.).

Boden, 2,500 m. 17.40, con. (Tues. and Fri.); 16.40, con., news (Sun.).

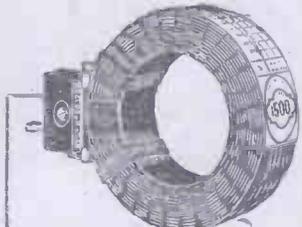
SWITZERLAND.

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

Lausanne (HB2), 780 m. (500 w.). 07.05, weather; 12.30, weather, markets, time sig., news; 16.00, children (Wed.); 17.55, weather, news; 20.15, con. (exc. Wed.), dance (Thurs. and Sat.).

Zurich (Höngg), 650 m. (500 w.). Tests are also being made on 515 m. 08.00, con., news; 12.00, weather, news, Stock Ex.; 15.00, con.; 17.15, children (Mon., Wed., Fri.); 18.00, weather, news; 19.15, lec., con., news, weather, dance (Sat.). Sundays: 15.00 and 19.15, con., news, weather.

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IGRANIC Honeycomb Coil
Low self-capacity—Small absorption factor—Minimum I.F. Resistance—No dead end losses—High self-induction—these qualities of ideal inductance are found to perfection in IGRANIC Honeycomb Duolateral Coils—20 sizes to cover wavelength ranges of 100 to 23,000 metres. Prices 5/- to 15/-.



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Built especially for accommodating Igranic plug type Honeycomb Coils—one fixed and two movable. Operating handles, obviate hand-capacity. Fitted with scale for rapid adjustment. With stand, 21/-.
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Time's short now if you want your set to "listen-in" to the coming Christmas broadcast programmes—but if you build with Igranic components there still is time, for you can rest assured that your set will be a real success as soon as you've completed the "wiring." Don't risk failure—see that you build a better set with

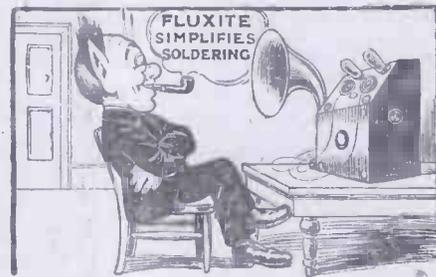


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It is perfectly simple to use, and will last for years in constant use. It contains a special "small-space" Soldering Iron with non-heating metal handle, a Pocket Blow-lamp, FLUXITE, Solder, etc., and full instructions. Price 7/6. Write to us should you be unable to obtain it.

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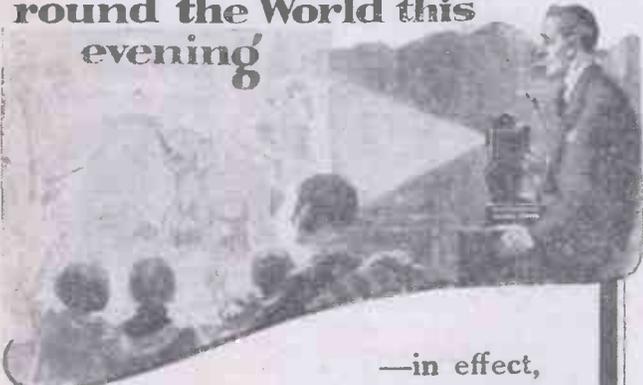
All Hardware and Ironmongery Stores sell FLUXITE in tins, price 8d., 1/4, and 2/8.

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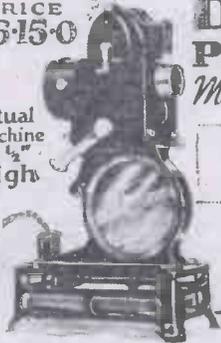
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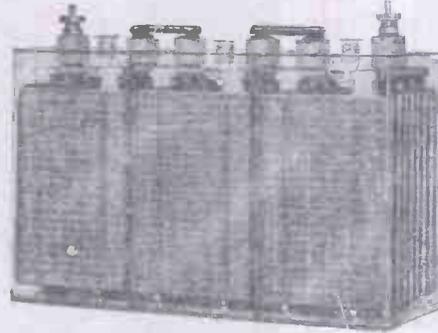
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20A	40A	60A	80A	100A	IGNITION CAPACITY.
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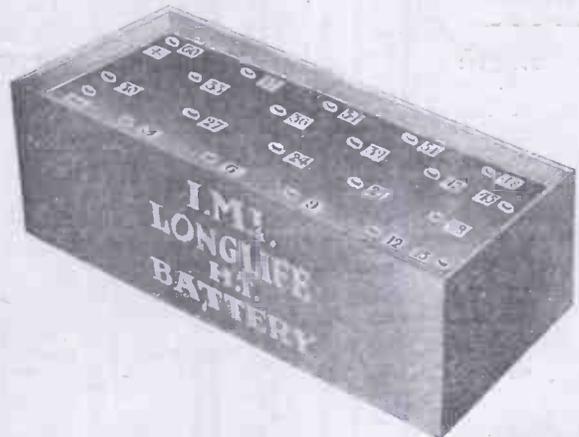
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The Newest of Loud-speakers

SIR,—May I be allowed to point out that the loud-speaker shown by the photographs on page 767, No. 129, is not of German origin, but was made by the author.

The original idea is German, but not the actual article shown by the photographs.—A. J. C. (London).

A Good Circuit

SIR,—As a champion of 5 Y M's circuit (see page 791, No. 129), which I have used for two years and find unbeatable, I should like to give readers of "A.W." who use this circuit two good tips. First use a 1-2 L.F. transformer, the best and biggest possible, and, secondly, use an aerial composed of 7/18 wire, rubber and cotton covered.—C. J. C. (Darlington).

5 Y M's Single-valve Circuit

SIR,—May I be permitted to testify to the efficiency of the above circuit (see

page 791, No. 129). I have not yet found any circuit to equal it. 5 I T comes in at great strength at a distance of seven miles, and is much too loud for headphone strength unless damped down, and distant stations come in wonderfully clear. This set works my Ethovox loud-speaker at good strength in an ordinary room, and with the addition of a note magnifier gives loud and clear reception which can be heard all over the house. Recently I dismantled the set for overhaul, and after rewiring was surprised to find the volume had greatly decreased. However, upon reversing the reaction leads reception was as good as ever. I also get better results with a small variable condenser across the reaction coil.—"ONE VALVE" (Birmingham).

Wireless and the Fair Sex

IR,—I think that there is a tendency to deprecate the idea of we of the "other" sex having any progressive interest in wireless. Perhaps the following will be

of interest to many of the male "fans" and D.X. enthusiasts.

Having no facilities for an outside aerial, I have had to erect one inside, which consists of two strands of No. 18 d.c.c. copper wire stretched across my bedroom, which is 18 ft. long. Connected to this "magnificent" aerial I have a simple two-valve autodyne receiver (direct reaction) consisting of 1 det. and 1 L.F. The first week I tried it out I logged 2 L O, 6 B M, 2 Z Y, 5 N O, 2 B D, 5 W A (?), 5 I T, but not, for some reason, Glasgow. In addition the following stations were received at very good strength: Breslau, Frankfurt, Munich (?) and Ecole Supérieure Frankfurt came in as strong as 5 I T.

In view of the poor conditions and absence of H.F. valve, I think that this reception can be, at least, classified as "good."—(Miss) W. K. T. (London, N.W.).

Other Correspondence Summarised

C. J. G. (Kent), referring to the tip on soldering earth plates in No. 128, states that washing the spirit off with strong soda-water, instead of cold water, prevents the article so soldered from rusting.

F. P. (Birmingham) has received all B.B.C. stations and sixteen Continental stations on his one-valve set.

S. J. E. (Wandsworth) states that soldering of connections can be eliminated by using No. 18 gauge wire and flattening and tightly clamping the ends between two
(Continued on page 900)

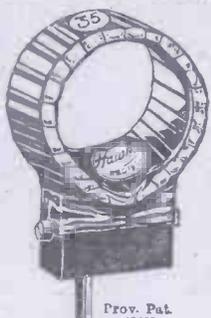
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MAXIMUM

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Coil No.	Wave Length, using .001 Variable Condenser in Parallel		Price
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30	435	240	2/4
35	515	360	2/6
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50	835	485	3/-
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100	1820	815	3/10
150	2300	960	4/8
200	3100	1870	5/4
250	3750	2200	5/8
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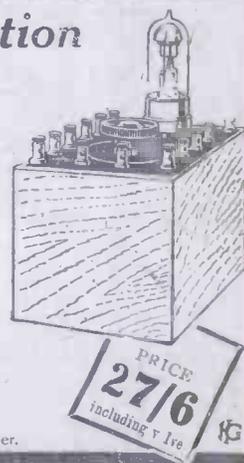
Enjoy Valve Reception on your crystal set

By adding the "MURAD" Amplifying Unit. Specially designed for addition to your existing Crystal Set. Increases the volume four to five times, without distortion.

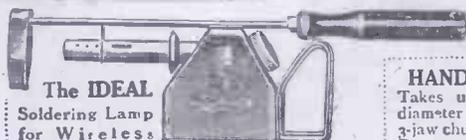
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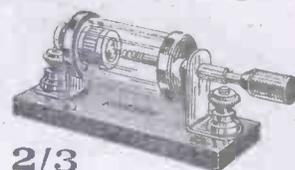
KINGSWAY VARIABLE CONDENSER

Universally popular owing to their smooth and pleasing movement, for which dead accurate assembly under modern production methods is responsible. The plates are of best aluminium sheet, whilst ebonite end pieces and handsome "Troilite" knob and 3 in. graduated dial are standard. .001 8/-; .00075 7/-; .0005 6/-; .0003 5/6; .0002 4/6; .0001 4/- AND 3 plate vernier 3/9.

"KINGSWAY"

DETECTOR

An enclosed Crystal Detector of finest quality, supplied with tested Shaw's Hertzite. Moulded unbreakable, base and nickelled parts.

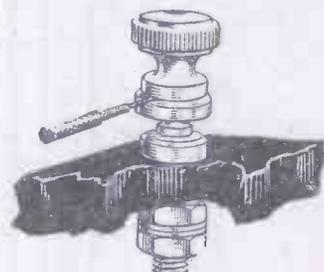


2/3

BRASS PARTS, TERMINALS, ETC.

Our brass parts are of the highest quality and finish throughout, at keen prices only made possible by modern production methods. They are exact and reliable.

	per doz.
Valve Sockets	8d.
Valve Pin with Collar	8d.
Terminals, Heavy Pattern	
2 B.A.	2/2
Terminals, W.O., 4 B.A.	1/-
Telephone Terminals, 4 B.A.	1/-
Small Barrel Terminals, 4 B.A.	1/-
Fancy Terminals, 4 B.A.	10d.
3-Part Terminals, 4 B.A.	10d.
Wander Plugs, complete red and black	4 1/2d.
Spade Terminals	1/-
Contact Studs, 5 B.A.	4d.
"SETAW" Terminals (illustrated)	4 1/2d. each



Factors and Dealers! Write now for our Special Trade Terms and Conditions.

WATES BROS., LTD.,

Head Office: 12, 13, 14, GT. QUEEN STREET, KINGSWAY, W.C.2

Phone: Gerrard 575-6.

Works: LONDON, BIRMINGHAM, and WESTCLIFF.

Grams: Zywateseng, Westcent.

16

**THE
CRYSTAL SUPREME!**

Experimenting with crystals is a thing of the past—for why seek to improve on perfection?—if you buy the

VALPO

(Valve Power) CRYSTAL

Trade Enquiries Welcomed.

Super-sensitive all over—no dodging around the crystal during the "star" item! Use a "VALPO" Crystal and your catwhisker becomes a fixture. Each "VALPO" Crystal tested and GUARANTEED. Loud reception on crystal alone; beautiful pure tone for an attraction by one, two, or more valves. Price 1/6 complete with silver catwhisker. Of all reliable Wireless Stores, or post free direct from.

MERTON DAVIS, PARNELL & CO. 359 STRAND, LONDON, W.C.2. Regent 4232

WINDSOR HIGH GRADE

Coi' Holders and Fittings

<p>Best Quality Verniers. Very accurate adjustment. Special Gearless, 6/6 each. G.ared Pattern, 7/6 each.</p>	<p>Coil Plugs. Plain 8d. each. Curved 9d. each. Basket 11holders 1/3 each.</p>	<p>All ebonite Matt finish 2-Way 3/11 each. 3-Way 6/- each.</p>
--	---	--

Trade enquiries invited—

WINDSOR WIRELESS WORKS,

413a, Brighton Road, S. CROYDON.

A REAL EQUIVALENT NEW VALVES FOR OLD

The burnt-out Valves renewed by the G.W.I. latest process are improved beyond recognition and are GUARANTEED to function equal to new Valves. This is amply proved by the regularly increasing demand, and we are catering for this by considerable extension of our producing plant. The additional equipment is the most up-to-date, enabling us to utilise the very latest process and accommodate the renewal of practically every type of Valve.

G. W. I. VALVE RENEWALS

Standard types	Bright emitter	from 6/6 each.
Dull emitter	25 amp. type	10/6 " delivery 7-14 days.
"	06 " "	12/6 " delivery shortly.

Myers and Wecovalues. Prices and delivery shortly.
We have a special Express service of exchange with great economy.
Particulars on Application.

G.W.I. Ltd., 43 GRAFTON ST., TOTTENHAM CT. RD. W.1.
and IMPERIAL WORKS, LONDON, N.W.1.

The original and largest repairers of Valves.
Agents Wanted throughout the Country. Guaranteed deliveries.

YOURS FOR 20/-

Send 20/- to-day, together with your order for the "Tonyphone," and this wonderful set, which receives all B.B.C. stations, will be delivered complete, including all accessories. You pay a further £1 each month afterwards. The total cost is only £15 9s., or, if you prefer, £14 5s. cash.

'TONYPHONE' SUPER TWO VALVES

Complete with Accumulator, H.T. Battery, Aerial, 1 pair 4,000 ohms Headphones, and two Valves—one High Frequency and one Detector. All Royalties paid.

Send to-day and enjoy broadcasting NOW

BRITISH ENGINEERING PRODUCTS CO.

(Tonyphone Dept.), Windsor House, Victoria Street, London, S.W.1

S.S.A.

CHIEF EVENTS OF THE WEEK

SUNDAY, December 7.		
London	3.0	Military Band Programme.
	8.30	Rt. Rev. Bishop Taylor Smith.
Birmingham	8.30	Rev. Thomas Towers.
Cardiff	3.0	Band of H.M. Grenadier Guards.
Manchester	3.0	Beethoven and Mendelssohn Programme.
MONDAY		
ALL STATIONS	7.30	Rosemary, That's for Remembrance, and two other plays.
<i>(Except Bournemouth and Belfast.)</i>		
Bournemouth	7.30	Winter Gardens Night.
TUESDAY		
London	7.30	A Day in the Country.
Birmingham	7.30	Symphony Programme.
Bournemouth	7.30	Old Pantomime Favourites.
Manchester	7.30	Light Music, Songs, and Stories.
Newcastle	7.30	"John Henry" and "Blossom."
Glasgow	7.30	Watteau Night.
WEDNESDAY		
ALL STATIONS	8.0	International Symphony Concert relayed from The Royal Opera House, Covent Garden.
<i>(Except Belfast.)</i>		
THURSDAY		
Manchester	7.35	Hallé Concert.
Newcastle	7.35	Selections from Wagner's Operas.
Aberdeen	7.35	When Greek Meets Greek. "John Henry" and "Blossom."
FRIDAY		
London	9.0	Opening of the Swansea Relay Station—Speech by Mayor of Swansea.
Birmingham	8.0	A Mystery Programme and Competition.
Manchester	7.30	2ZY Gala Night—Opening of the New Studio.
SATURDAY		
London	7.30	Royal Air Force Band.
Bournemouth	7.30	Lucky-dip Night.

CORRESPONDENCE (continued from page 898)
nuts on a terminal shank behind the panel.

T. G. L. (West Croydon) writes that he found that phone terminals could be used instead of crystals and detectors when operating the multi-phone crystal set described in No. 124.

G. T. M. (Surrey) objects to the use of a crystal in multi-valve circuits as he finds that extra controls are necessary, as the anode of the last H.F. valve has to be tuned; a damping effect is introduced, with consequent lack of selectivity; the crystal easily becomes overloaded with amplified H.F. current and a sensitive spot has to be found.

J. R. L. (Finchley, N.3) has received KDKA on his one-valve reaction circuit.

J. McL. (Inverness) has received WKAQ (West Indies) and nine American stations on his three-valve and crystal set.

H. N. S. (Whitley, nr. Coventry) has received all the main B.B.C. stations, Radio-Paris, *Le Petit Parisien*, and Radio Iberica on his crystal set.

S. MACS. (Ireland) receives WGY, WOR and WBZ as easily as 2LO on his three-valve set.

G. W. F. (Walthamstow) would like to get into touch with an enthusiast in his district with whom he could practise Morse.

WONDERFUL ENTERTAINMENT for CHRISTMAS

is given in this week's issue of "*The Amateur Mechanic & Work*," which is a special Christmas issue published at the usual price of 3d. Here are some of the contents:

"A Packing-case Problem."

"Some Novel Home-made Tops and Spinning Toys."

"A Coil and Bobbin Winder."

"Home-made Basket-coils."

"Fake Juggling and How to Make the Apparatus."

"A Christmas Revel."

"Two Novel Sand Toys."

"A Four-roomed Doll's House."

"Home Cinema Shows for Christmas."

"Amateur Theatrical Properties and How to Make them Cheaply and Simply."

"Operating Marionettes from a Keyboard."

"New Magic for Amateur Conjurers."

"Hints for Motorists."

ORDER YOUR COPY at ONCE

For WIRELESS APPARATUS and COMPONENT PARTS, consult a firm that SPECIALISES
IN RADIO GOODS and nothing else.

PAYNE & HORNSBY, LTD.

THE LARGEST SOLELY WIRELESS FIRM IN ALL ENGLAND, under the Personal Supervision of "UNCLE TOM" PAYNE, 1st Station Director of Newcastle-on-Tyne B.B.C. Station, and the ONLY FIRM in England with ACTUAL Broadcasting experience.

SHOP BY POST with security. WE GUARANTEE you the same satisfaction and courtesy through the post as would be given you by a personal Visit.

Catalogues post free on request. WHOLESALE and RETAIL.

Note the Addresses:

PAYNE & HORNSBY, LTD.

6, St. Andrew's Buildings, Gallowgate, NEWCASTLE.

Gibson's Buildings, Castle Street, BELFAST.

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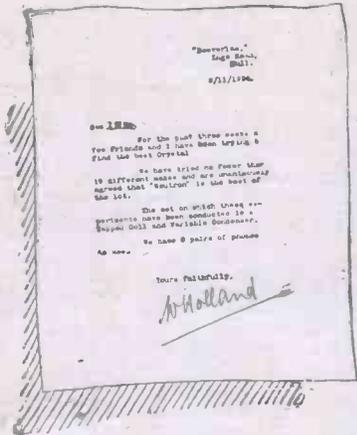
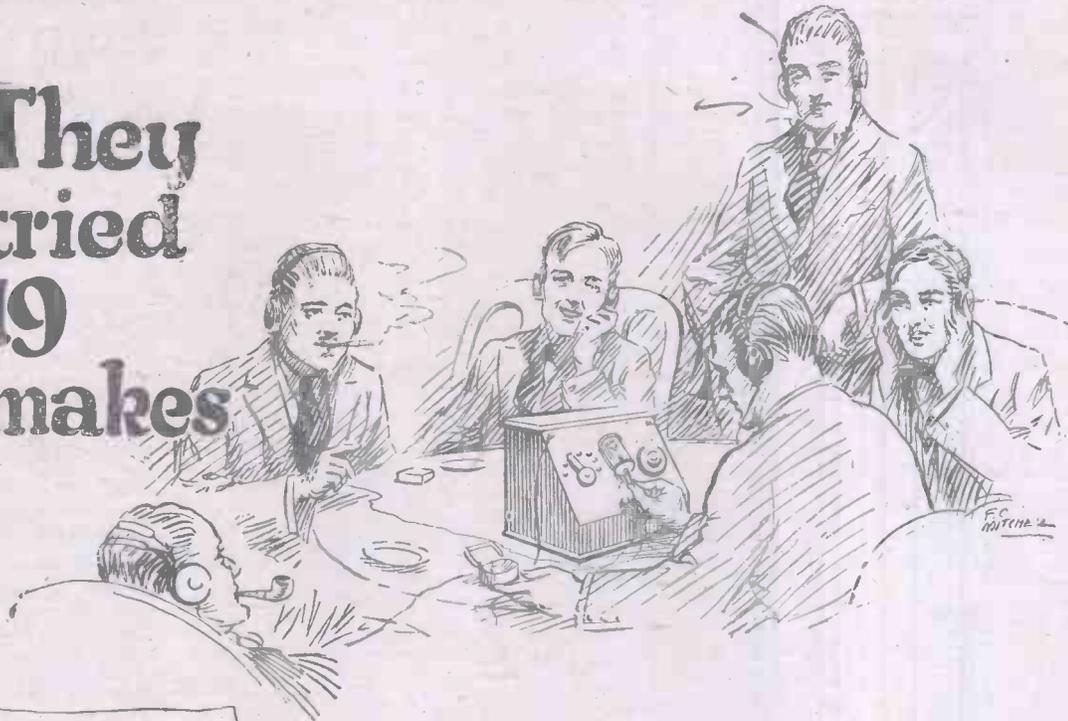
66 Camden Street, NORTH SHIELDS.

4 Stoney Street, NOTTINGHAM.

10 Queen Victoria Street, LEEDS.

Ocean Road; Russell Street, SOUTH SHIELDS.

They tried 19 makes



Here is another remarkable letter of testimony, one of several received in the same mail. It is photographically reproduced on the left, and reads :—

"For the past three weeks a few friends and I have been trying to find the best crystal. We have tried no fewer than 19 different makes, and are unanimously agreed that 'Neutron' is the best of the lot. The set on which these experiments have been conducted is a Tapped Coil and Variable Condenser. We have 6 pairs of phones in use."...

"We have Six Pairs of Phones in Use."

Sooner or later, you will use Neutron, and then stop searching for better results. You may secure a good crystal by just asking for "a crystal"; but you may also try twenty or thirty first. On the other hand, if you ask for Neutron, in the black-and-yellow tin, you will inevitably secure optimum re-

sults at once—and save the expense of further tests. The reason why you can depend on Neutron is that each Neutron is carefully tested and selected, and before ever it reaches your crystal-cup it has been proved at maximum efficiency, for loudness, clearness and complete sensitiveness.

and **NEUTRON** was the best of the lot"

Stocked by the Best Radio Dealers. Packed in tin, with silver cats-whisker. Insist on Neutron, in the Black and Yellow Tin, **1/6**

Long-distance Circuit Diagram FREE

Ask your Dealer for Free Diagram (given on request to every purchaser of a Neutron) of the circuit used by 5 B T in receiving Brussels from Chiswick on a Neutron. We send one direct with sample Neutron if you enclose stamped envelope and 1/6 with Dealer's name.

Sole Distributors:—V. Zeilin & Sons, 144, Theobald's Rd., London, W.C.1. Phones: Museum 3795 & 6841.

Produced by:—Neutron Ltd., Sicilian House, Southampton Row, London, W.C.1. Phone: Museum 2677.

District Agents;

Scotland: R. F. Miller & Co., 22, York Place, Edinburgh.
Plymouth: Mumford & Sons, 68, Mutley Plain, Plymouth.
B'gham: Cooke & Whitfield Wireless Ltd., St. Paul's Buildings, 24, St. Paul's Square, Birmingham.

North-East Yorks: Smith & Jordan, The Arcade, Redcar, Yorks.
Manchester: Garnett's, Islington Grove Works, Salford, Manchester.
Ireland: Pettigrew & Merriman Ltd., 8, Corporation Street, Belfast.
N. Staffs: H. W. Teeton, Foundry St., Hanley.

The Concert-Tested and Guaranteed Radio Crystal

SIEMENS

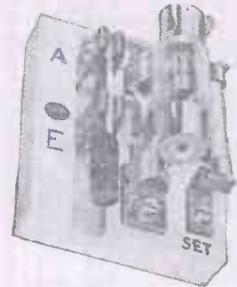
High grade Headphones in presentation box.



PRICES: 120 ohms £2 10 0
 2,000 .. £2 12 6
 4,000 .. £2 15 0



PRICES: 120 ohms £1 2 6
 2,000 .. £1 4 0
 4,000 .. £1 5 0



Combined Lightning Arrester and Earthing Switch.
 PRICE 12/-

Siemens' Headphones and Loud Speakers have gained great reputation for their purity of tone, due to the use of the highest grade materials and long experience in this class of work. The Headphones are renowned for their extreme sensitivity, and are exceptionally suitable for use with crystal sets, and for tuning-in distant stations.

Obtainable from all leading dealers.

SIEMENS BROTHERS & CO., LTD., WOOLWICH, LONDON, S.E.18.

And at: Belfast, Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Sheffield and Southampton.

Aids to Home Constructors

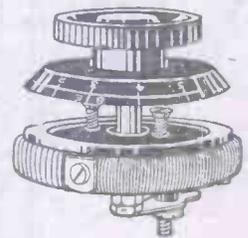


HIGH GRADE COMPONENTS ARE WORLD FAMOUS.

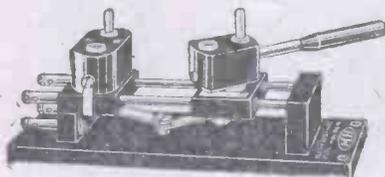
Our Standard receiving apparatus is used in every quarter of the globe, and our components are in demand everywhere. We have a set or component for every requirement. We also have imitators; for efficiency insist on having M.H. Products.

FILAMENT RESISTANCE-DOUBLE

The M.H. double Filament Resistance has been designed for both Dull emitter and Bright emitter, valves enabling either type to be used with safety. The spool is a separate unit solidly constructed. The resistance unit is supported on its circumference. Fixing is the simplest possible; three clear holes in the panel being all that is required; two fixing screws are supplied with each resistance. The contact arm makes a smooth and regular contact with the resistance unit, the latter being wound on a former and is replaceable. An off position is provided for. A rubbing spring contact makes the second connection. The dial is engraved and polished, the engraving being RED on the Bright emitter side and WHITE on the Dull emitter side, a safety device of the utmost utility. The dial together with the polished knob locks in any designed position.



PRICE in cartons, 7/6 each.



REVERSINE COIL HOLDER

A beautifully made, perfect action coil holder. It is made of polished ebonite with lacquered brass mountings. The contacts with the moving coil are by rubbing spring brushes; terminals at one end provide for the circuit connections of both the fixed and movable coils. Standard plugs and sockets take the ordinary type dualateral coils.

This M.H. coil holder enables the moving coil to be completely reversed in both its physical and electrical relationship with the fixed coil. It is a perfect variometer as well as a loose coupler and means of applying reaction. If you need to reverse reaction there is no need to reverse the movement of the moving coil. PRICE in carton. 2 coil, 21/-; 3 coil, 39/-.

L.F. TRANSFORMER

A high-grade and efficient transformer of pleasing design for all intervalve purposes, possessing the best possible electrical characteristics. A fixed condenser is nearly always used with an intervalve transformer; provision is made in the M.H. Model by the clips at the top to take our standard flat type of condenser of suitable value. A point to observe in the design is that the fixing-down lugs can easily be got at. The screwdriver when screwing in the holding-down screws is not fouled by any portion of the transformer. Transformer is tested to 1,000 volts.

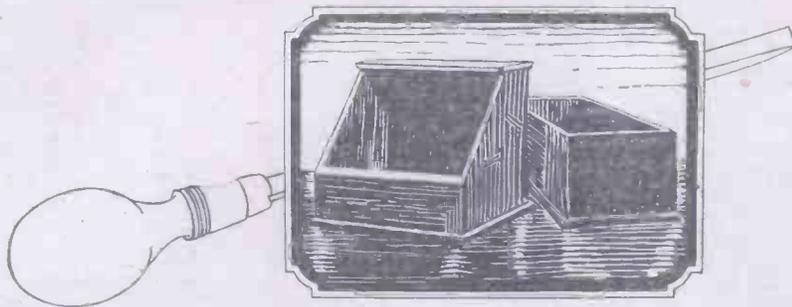
PRICES IN CARTONS, 21/- each.



L.M. MICHAEL LTD

IN CONJUNCTION WITH B. HESKETH LTD

Radio Corner, 179, Strand, London, W.C.2



Build Beautiful Cabinets yourself

They come to you like this



Satisfaction Guaranteed or Money Back.

Your dealer can hand you a parcel like this, but if you have any difficulty write to us, enclosing remittance, and we'll see that you are supplied. Please add 6d. towards postage.

Trade enquiries invited for this and other attractive lines in wireless sets and components.

MORTONE Cabinets are supplied ready jointed and french-polished but not assembled. This gives two advantages. It enables us to supply first-class oak or mahogany cabinets of high-grade finish, and at a price that compares favourably with the cheap and nasty cabinets of stained canary wood so many dealers are now offering. A good cabinet trebles the value of your set, so ask your dealer for "Mortone." If you have any difficulty we will supply you direct. In ordering, simply give the number of the cabinet you want, and state whether you want oak or mahogany.

Prices for Box Type, Oak or Mahogany.

No.	Panel Size	Depth	Price	Eb onite Panel
No. 2	4 1/2 x 5	3	3/10	1/-
No. 5	7 x 5	3	5/-	2/3
No. 8	10 x 7	3	7/-	3/9
No. 11	12 x 12	5	8/9	7/-

Panels are of best quality British made Post Office ebonite matt finish, 1/2" thick.

Prices for Sloping Type, Oak or Mahogany.

4 inches back to front at top, 7 inches at bottom. To hold panels of sizes mentioned.

No.	Panel Size	Price	Ebonite, 1/2" Panel
No. 41	12 x 8	13/6	5/6
No. 43	12 x 10	15/9	6/-
No. 46	16 x 12	21/-	9/6
No. 47	18 x 12	23/6	10/6

Same first-class quality ebonite as above, 1/2" thick.

MORTONE
CABINETS OF DISTINCTION SUPPLIED
IN PARTS READY FOR ASSEMBLY

B & D



Advt. of H. & G. O. LEWTAS, Chester Road, Manchester



They simply roared with laughter when he told them!

Coming from a man who had never known the first thing about wireless, it was too ridiculous for words. Actually claimed he'd just made that 3-Valve Set. Said he picked up America the other night, too. No wonder they laughed—then he told them about the wonderful "EZI-WIRING" SERIES. How amazingly easy and interesting it was even for an absolute novice like himself to build an efficient set. He explained the secret of it. A simplified system of wiring diagrams—you can read them at a glance—coupled with clear explanations and data.—Now there are three more "EZI-WIRING" SETS.

The 3-valve Receiver

("EZI-WIRING" SERIES No. 2, by F. H. Haynes)

The tuning arrangements of this receiver are self-contained and cover a band of wavelengths between 200 and 2,000 metres. All the B.B.C. Stations are therefore within the range of this receiver when used in conjunction with an average outdoor aerial. A straightforward three-valve set, consisting of a high-frequency amplifier, detector and note magnifier, with reaction on the aerial inductance.

The "Ezi-Wiring" Series also includes:

- No. 1. 3-Valve Portable Receiver, by Hugh S. Pocock.
- No. 3. 2-Valve and Crystal Reflex Receiver, by W. James.
- No. 4. 4-Valve Combination Receiver, by W. James.

2/- each. Postage 2d.

Complete with 4-COLOUR WIRING DIAGRAMS, detailed measurements and explanations as to components, progressive working drawings and plates showing the set in various positions, with disposition of components, and full instructions on operation. No loose sheets.

Ask your Bookseller or Wireless Dealer to show you the "EZI-WIRING" Series and see for yourself how simple and interesting Home construction really is by this new system.

THE WIRELESS PRESS, LIMITED,
12-13, Henrietta Street, Strand,
London, W.C.2.

THE W.P. EZI-WIRING

MIKRO Ltd.,

The Proprietors and Patentees of the

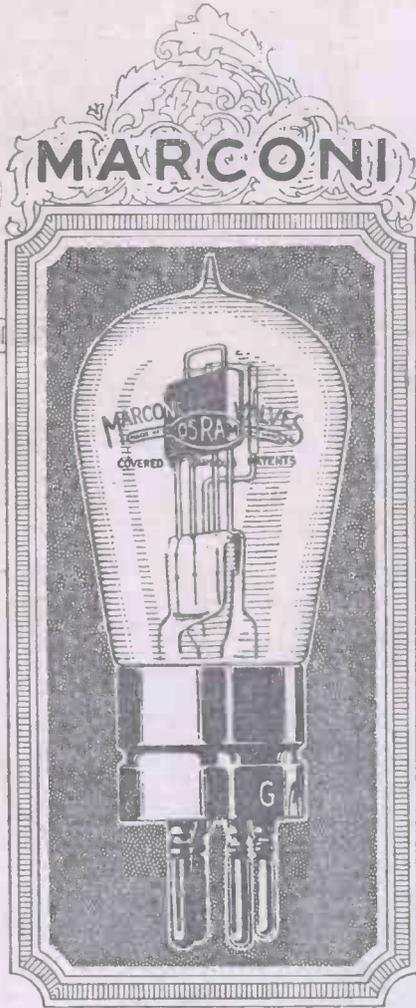
SKINDERVIKEN BUTTON and LOUD SPEAKER CRYSTAL SYSTEM

are now in a position to supply parts to all experimenters who wish to make their own sets. WRITE TO-DAY FOR PRICE LIST AND BOOKLET—"The Marvels of the Microphone"

3rd Edition. Post free 6jd (P.O., not stamps).

32a, CRAVEN STREET, CHARING CROSS, W.C.2.

SKINDERVIKEN MICROPHONE BUTTON, PRICE 5/-



MARCONI VALVES

MADE AT THE OSRAM LAMP WORKS

LEADERSHIP

THE design of the Valve in the Purple Box is directed from the leading laboratories in the science of Wireless—those of the great Marconi and Osram organisations.

It is made at the factory with the greatest experience in valve manufacture in the British Empire—the Osram Works.

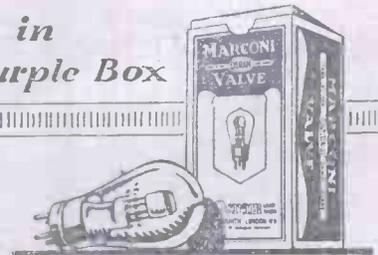
The characteristics of each type of valve have been decided on as the result of the unrivalled experience of experts, not only in valve design, but also in the design of wireless sets.

Sold by Wireless and Electrical Dealers, Stores, etc.

Read the authoritative wireless book, *The Book of MOV*. Get a copy from your dealer, or write direct to The M.O. Valve Co., Ltd., Hammersmith, London, W.6.

Get the Valve in the Purple Box

ANNOUNCEMENT OF THE M.O. VALVE CO. LTD



Mullard Double

Mullard H.F. & L.F. Dull Filament Master Valves

The introduction of the dull filament valve was met with sincere appreciation from those who realised the marked advantages made possible by this design. With customary thoroughness, the Mullard dull filament type valves showed steady improvements in design, till to-day you can obtain Mullard specialised dull filament valves for both H.F. and L.F. operation.



The "REAL" Long-Distance Valve.

Mullard Double Ring Valves (named to distinguish them from the Bright Filament H.F. and L.F. Single Ring Valves) have an efficiency in operation that will surprise you, the secret of their reliability and power being the wonderful precision in design and assembly that is maintained during their manufacture, and the extreme care that is taken to ensure their perfect evacuation and final testing. Their sensitivity does not become weakened in service, and their mechanical strength does not permit any possible internal contact between the filament and electrodes.

Mullard

THE • MASTER • VALVE

OBTAINABLE FROM ALL ELECTRICIANS, WIRELESS DEALERS, IRONMONGERS, ETC., ETC.

Ring DULL FILAMENT Valves

Are you Missing

- | | |
|---------------------------------------|----------------------------|
| (1) POWERFUL AMPLIFICATION. | (4) LONG FILAMENT LIFE. |
| (2) MINIMUM CURRENT CONSUMPTION. | (5) PURITY OF TONE. |
| (3) REDUCED BATTERY COST AND TROUBLE. | (6) CONSTANT SENSITIVITY. |
| | (7) MECHANICAL ROBUSTNESS. |

Then you need Mullard H.F. and L.F. Dull Filament Valves in your set.

Ask for Mullard H.F. Double Red Ring Valves for H.F. AMPLIFICATION.

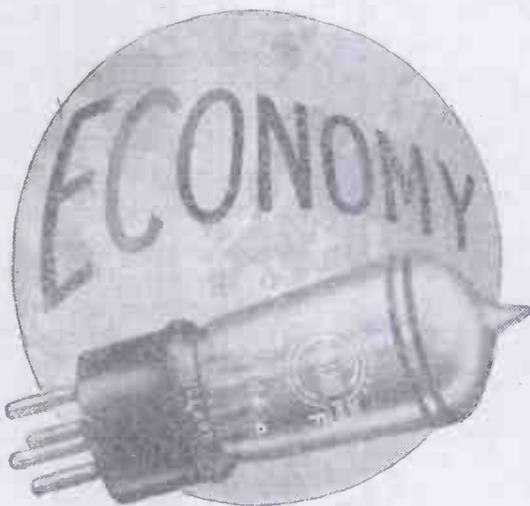
Type D.3 for Accumulators. 21/- each
Type D.06 for Dry Cells. 25/- ..

The "REAL" Long-Distance Valve.

Ask for Mullard L.F. Double Green Ring Valves for L.F. AMPLIFICATION.

Type D.3 for Accumulators. 21/- each
Type D.06 for Dry Cells. 25/- ..

The "REAL" Pure Tone Valve.



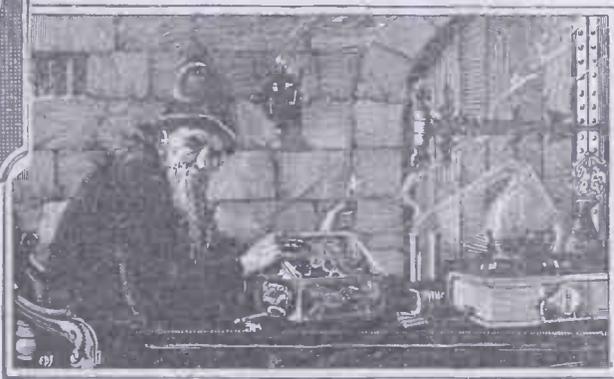
The "REAL" Pure Tone Valve.

Mullard

THE MASTER VALVE



Louden



The Secret

10/-

MAGICIANS and Sorcerers had their "Secrets of Healing" and "Secrets of Success" which they would dispense for a consideration, but in these less romantic times success is more apt to be won on sheer merit.

Take the case of the Louden Valve. Four months ago it was unheard of—to-day there are thousands of enthusiastic "slaves of the lamp" who will never go back to the old type of valve.

Why? Well, because however you consider the Louden Valve it is a sound investment.

It costs only ten shillings. It takes so little current that your accumulators will last twice as long as they do with ordinary bright filament valves, and in spite of the fact that the anode is "full of holes" volume is, if anything, above the normal, showing that a full use is made of the electron stream.

It is the *unwanted* charges that escape through the turns of the anode, and strangely enough this is precisely what we intend to happen.

It gives a silver clear reproduction which is the delight of all who have heard it, and the life of the filament is exceptionally long.

So naturally the Louden is outstripping all other valves in popularity.

There is no secret—only merit.

Louden VALVES



The plain Louden for detecting and Low Frequency Amplifying
The Blue Louden for H.F. Amplification
Filament Volts... 4.8-5
Filament Amps... 0.4
Anode Volts... 40-80

FELLOWS WIRELESS

Manufactured throughout in Great Britain. All Loudens are Silver Clear and free from "mush." The current consumption is very low and the life long.

Louden Valves - Silver Clear

ADVT. OF THE FELLOWS MAGNETO CO., LTD., PARK ROYAL, WILLESDEN, N.W.10.

E.P.S.6



CLUB DOINGS

St. Anns Radio Association

Hon. Sec.—MR. W. R. ARMSTRONG, 73, Tarslet Street, Newcastle-on-Tyne.

On November 14 Mr. Phillips gave a talk entitled "Power Amplification," illustrated by blackboard diagrams.

Kensington Radio Society

Hon. Sec.—MR. J. MURCHIE, 33, Elm Bank Gardens, Barnes, S.W.13.

At the meeting held on November 6 Mr. Symonds introduced the study of telephony as one closely allied to that of wireless, and enumerated the principles underlying the construction and wiring of telephone systems in order to obtain the maximum speaking and signalling efficiency. He concluded with a short description of trunk-line working.

Hackney and District Radio Society

Hon. Sec.—MR. G. E. SANDY, 70, Chisenhale Road, E.3.

At a meeting held on November 17 a film, which was loaned by the G.E.C., entitled "An Englishman's Home," was shown. The technical committee reported that the society's seven-valve set which is in course of reconstruction, is nearing completion, and an early try-out will be given.

Bokenham and District Radio Society

Hon. Sec.—MR. A. WEST, 3, Manor View, Beckenham.

On November 20 a novel coil holder was constructed during the evening which was remarkable for its low cost and simplicity.

Stoke-on-Trent Wireless and Experimental Society

Hon. Sec.—MR. E. A. HALIBURTON, 73, Stafford Street, Longton, Stoke-on-Trent.

At a meeting held on November 20 a lecture was given by Mr. Rattrick on "The Amplification of Radio Frequency." A short talk on the neutralising of potentials across the grid and plate circuits followed.

Tottenham Wireless Society

Hon. Sec.—MR. A. G. TUCKER, 42, Drayton Road, N.17.

A DEMONSTRATION of valves was given by Mr. F. J. A. Hall on November 16. Altogether he used 24 different valves in his demonstration, grouping them as bright emitters, 2-volt valves, .06- and 1-volt dull-emitters.

Coventry and District Co-operative Radio Society

Hon. Sec.—MR. A. CURTIS, West Orchard, Coventry. On November 19 Mr. F. Clegg lectured on the Armstrong circuit, for which an outside aerial is not required. Recently a party of members visited the Birmingham station of the B.B.C. and inspected the studio and transmitting station.

ANNOUNCEMENTS

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

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," La Belle Sauvage, London, E.C.4.

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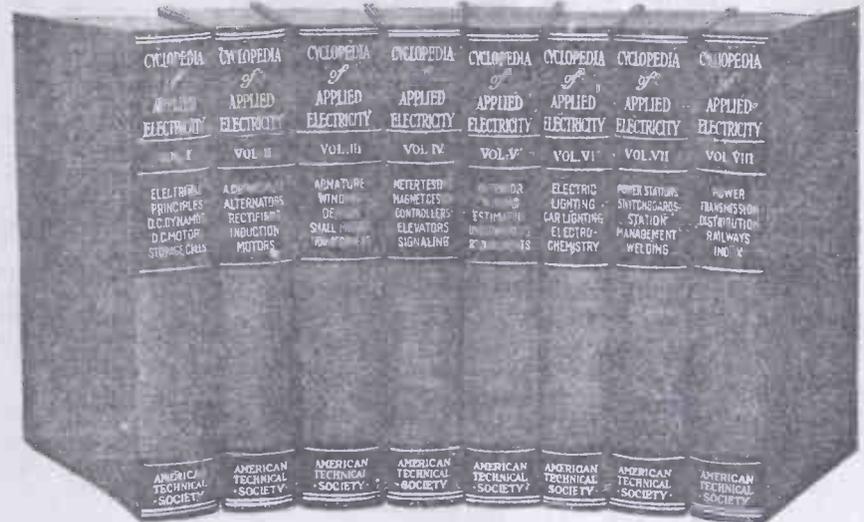
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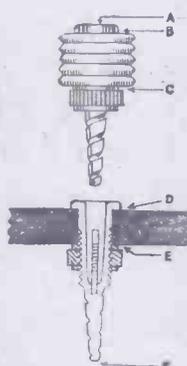
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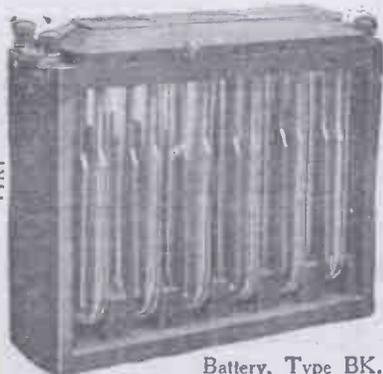
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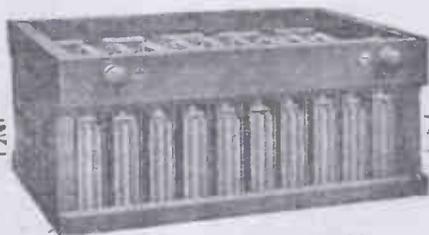
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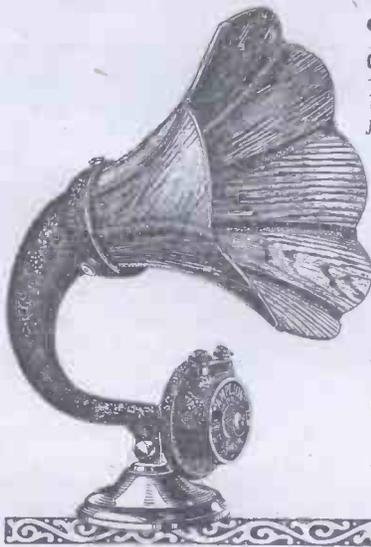
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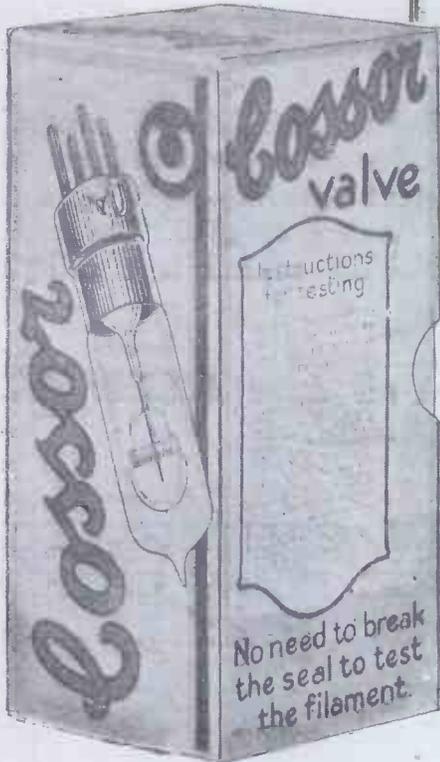
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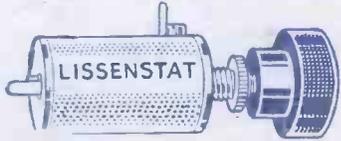
This idea is utilised in a Testing Showcard supplied to all Dealers. When you go to your Dealer next time and purchase a Cossor Valve you will know that the seal placed on the Box was put there by us after the Valve had completed the last of its tests in our works. It is a definite guarantee that we gladly make ourselves responsible to you for its long life and satisfactory service.

Advertisement of A. C. Cossor, Ltd., Highbury Grove, London, N.5.

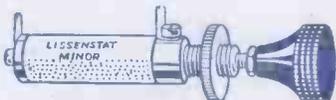
No need for the Dealer to break the seal to test the filament

LISSENIUM

Control the energies of your valve—



LISSENIUM Lissenstat (patents pending) gives the most acute tuning possible **7/6**



LISSENIUM Lissenstat MINOR (patents pending) is replacing thousands of discarded and inefficient rheostats. Provides LISSENIUM control at a popular price **3/6**



LISSENIUM Lissenstat UNIVERSAL (patents pending)—with its protective device for dull emitters **10/6**

Think of a mountain cataract, rushing wildly away—think of it again, harnessed and directed, providing power for factories, light for cities.

Think of the electron emission of your valve—rushing violently against the grid—inadequately controlled by an inefficient rheostat.

Think of it once more under LISSENIUM control—sensitive to a touch—responsive to every fractional turn of the knob—improving distant reception—putting a fine edge on detection—making tuning sharp at the critical point—the boon of LISSENIUM control is a thing no user should deny himself.

Made in three models—all have LISSENIUM ONE-HOLE FIXING, OF COURSE.

WITH LISSENIUM CONTROL YOU CAN FEEL FOR THE POINT OF FINE DETECTION—AND UNERRINGLY FIND IT.

SENSITIVITY

and its allied control, the LISSENIUM GRID LEAK



LISSENIUM ONE-HOLE FIXING, OF COURSE—POSITIVE STOPS BOTH WAYS **2/6**

LISSENIUM VARIABLE ANODE RESISTANCE (pats. pend.) 20,000 to 250,000 ohms, same outward appearance as the LISSENIUM VARIABLE GRID LEAK. **2/6**

Every valve you use has different characteristics—every circuit, too. Whether you are out for distant stations, or undistorted reception of near-by stations, you will find the LISSENIUM VARIABLE GRID LEAK (patents pending) very important in its effect. Only by using it can you be sure that you are using the correct grid potential for every condition of reception.

It covers a wide range of resistance values, with continuous variation throughout.

SMOOTH OUT YOUR LOUD SPEAKER DISTORTION BY PUTTING A LISSENIUM VARIABLE GRID LEAK ACROSS THE SECONDARY of the last transformer, or across the loud speaker itself. First position is best. The difference will be very noticeable.

LISSENIUM LIMITED

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Phones—3380, 3381, 3382, 1072 Riverside. Grams—"Lissenium, London."

PARTS THAT PULL TOGETHER—BUILD WITH THEM