AMATEUR WIRELESS, Sept. 11, 1926.

SECOND EXHIBITION NUMBER

A CONVERSATION *on the* NEW WAVELENGTHS

Amateur Wireless And Electrics

Vol. IX. No. 222 SATURDAY, SEPTEMBER 11, 1926 Price 3d

CONTAINS :—

MANY ORIGINAL SHOW ARTICLES

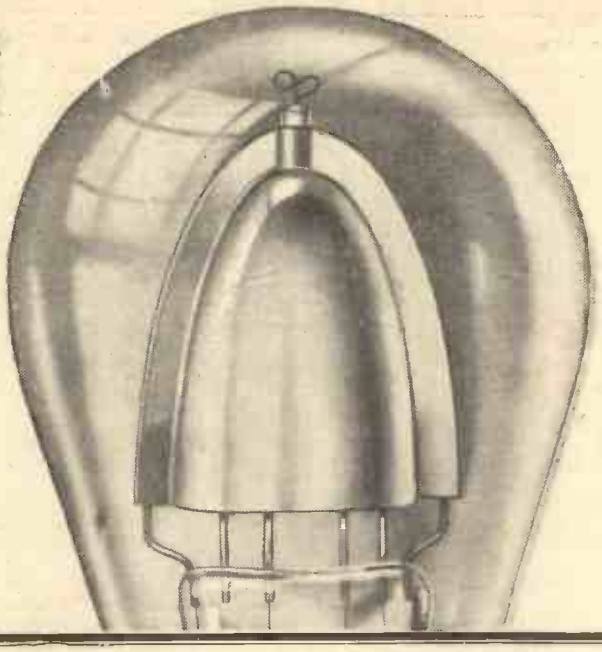
Specially Written and Illustrated by our Technical Staff after a

FIRST-HAND INSPECTION OF EXHIBITS

ALL Our Regular Features

52-page ISSUE FULL OF GOOD THINGS

According to Homer, Stentor was the name of a Greek herald in the Trojan War whose voice was as loud as that of 50 other men combined. As the name for a new Cossor Power Valve it is, therefore, peculiarly appropriate.



Already a sensational success

ALREADY technical experts and radio journalists are enthusing over the new series of Cossor "Point One" Valves. "The best Valves Cossor has ever made," said one, whose name is a household word among home constructors. "These new Cossor Point One valves have quite converted me to the 2-volt idea," writes another prominent radio journalist. "Your new Valves prove that this country has nothing to learn from other nations in valve design," is an extract from a letter recently received from a third expert.

We could quote numerous other letters in similar strain and it is significant that many of those who have taken the trouble to write to us during the past two or three weeks are men who have grown up in the wireless industry.

Men whose seasoned judgment in radio technique is invaluable—men who are not easily roused to enthusiasm by the introduction of a new valve.

They are the men who are the pace-makers of the whole Radio industry—their opinions are the straws which show which way the wind is blowing. And there is unmistakable evidence that the new Cossor Point One has been given warmth of welcome accorded to no other valve. Wireless enthusiasts have been quick to realise the importance of the wonderful new system of Coaxial Mounting, which ensures perfect uniformity of characteristic between all valves of the same class. An exclusive Cossor feature. The broadcast listener tired of frequent replacements, has appreciated the tremendous advantage of a shock-proof filament system which ensures an incredibly long life. While its exceptional economy in current consumption (the new Cossor Point One consumes only .1 of an ampere at 1.8 volts) proves that there is now available a valve capable of giving superb results from ordinary dry batteries.

The wonderful new Cossor "Point One" Dull Emitters

Plain Top: For Detector or L.F. (Consumption .1 amp.)	14/-
Red Top: For H.F. use (Consumption .1 amp.)	14/-
Stentor Two: For Power use (Consumption .1 amp.)	18/6

All operate at a voltage of from 1.2 volts to 2 volts

When your present valves become useless, choose the new Cossor Point One Series — the only valves in the world to utilise Coaxial Mounting. We can promise you a new pleasure in Radio—greater volume—improved stability — a fidelity of reproduction that will astound you — an increased sensitiveness that will add miles and miles to the range of your Set. And remember, finally, the prestige enjoyed by Cossor—the good name that stands squarely at the back of every Cossor Point One and Stentor Two.

Cossor Point One

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Amateur Wireless and Electrics

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Edited by BERNARD E. JONES

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Chief Contents

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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.

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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.

WHAT WILL HAPPEN?

An Interesting Discussion on the New British Wavelengths

By "HALYARD" of the "Wireless Magazine"

IT is as well to have a friend with a profound knowledge of mathematics these days of great changes in the world of wireless and wavelengths. Luckily, I have such a friend, and I have just been discussing with him the problem as to what will happen when the new British wavelengths come into use.

"What do you think of the Geneva plan for the distribution of European wavelengths?" I asked my mathematical friend.

"It seems to me an excellent scheme," he replied. "How does it strike you, though?"

"Well," I said, "I'm no great shakes where numbers are concerned, you know, and so it merely looks to me as if the old scheme of disorderly disorderliness has been replaced by a scheme of orderly disorderliness. What will happen when the new British wavelengths come into use? Have you any idea?"

"Several very interesting things will happen. If only you possessed a little knowledge of elementary geometry you would foresee a number of entertaining problems."

"As for example?"

"Aberdeen and Birmingham on the same wavelength. It would be quite fascinating if you were to take your wireless set to some place equidistant from those two stations. Which station of the two would you hear?"

"I wouldn't like to say. By the way, what particular place is the same distance from Aberdeen as from Birmingham?"

"If you will get me a pair of compasses, a ruler and a map of the British Isles I will soon tell you."

I obtained the desired apparatus, and my mathematical friend, after twiddling the compasses about a bit, drew a straight line across the map, the line marked A B in Fig. 1.

"There you are," he said. "Any place on that line would do. Newcastle, Carlisle and Belfast are only just off the line. If you want to make a holiday of your in-

Fig. 1—Map showing the effects of the new wavelengths.

vestigations, I would recommend Silloth on the Solway Firth or Donaghadee in Ireland."

"Do you mean to tell me that at any place along your line AB you would hear both Aberdeen and Birmingham equally well on their common wavelength?"

"Theoretically, yes. At any place along the line AB the signal strength of Aberdeen should be exactly equal to the signal strength of Birmingham. I wonder what really would happen along that line. A most interesting problem, it seems to me."

"What about the relay stations with the common wavelength?"

"The same kind of thing would apply to any two relay stations fairly near to each other. May I have the map again?

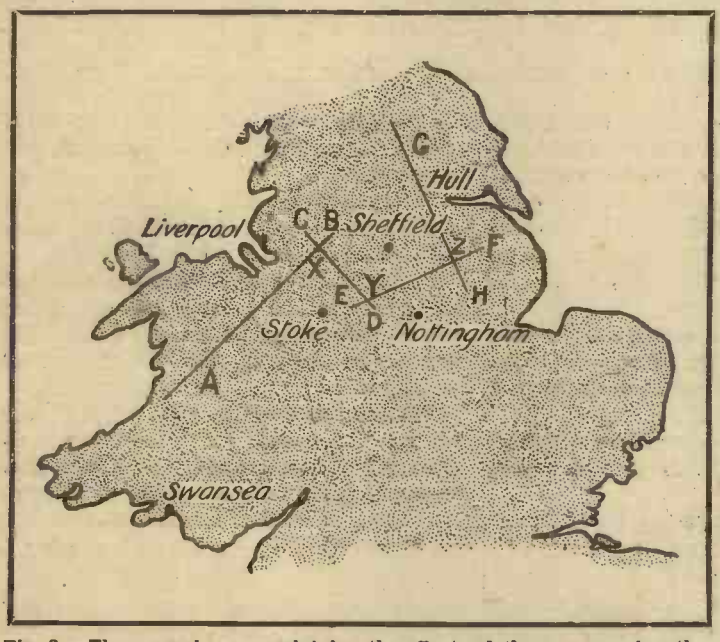


Fig. 2.—The second map explaining the effects of the new wavelengths.

Thank you. I will draw a similar line for Dundee and Edinburgh. There you are. I have called it the line DE. All places on that line are equidistant from Dundee and Edinburgh. For example, Kinross is on this line and, as it is about twenty-five miles from either Dundee or Edinburgh, you should get double signal strength at Kinross when both relay stations are sending out the same programme on the same wavelength."

"What about Swansea and Plymouth?"

"I'll draw you a Swansea-Plymouth line, if you like. There it is, look! Let us call it the line SP. Yeovil is pretty well on this line, and so is Southampton. Bideford Bay looks an interesting place when you consider Swansea and Plymouth. At Bideford you should hear Plymouth. If you cross the bay to Barnstaple you should leave Plymouth behind and come into the range of Swansea. Here's an interesting thing on the map, though. With Eastbourne as centre you can draw a circle passing through, or very nearly through, Plymouth, Swansea, Stoke, Sheffield and Hull. Now which relay station would you hear at Eastbourne?"

"Daventry?"

"Very probably."

"Which relay station would you hear in London?"

"Nottingham, I suppose; that is the nearest."

"What about the crowded relay stations in the north?"

"Let us mark them on another map. Liverpool, Stoke, Sheffield, Nottingham and Hull. Here is a problem of greater interest than ever."

My mathematical friend proceeded to draw the diagram which is reproduced here as Fig. 2.

"You see that line AB?" he said. "That is the line equidistant from Liverpool and Stoke. The line CD is the line equidistant from Stoke and Sheffield. What do you notice about those two lines, my boy?"

"They meet."

"So they do, and at that place, X, the three relay stations, Liverpool, Stoke and Sheffield, should come in with equal strength. Any wireless set at this place should receive three times the signal strength it has been used to receiving from any one of the three relay stations when all three work on the same common wavelength."

"Where is this place X?"

"I make it out to be somewhere in the Altrincham and Sale district of Cheshire."

"Are there any other of these three-cornered places?"

"Yes. Look at the map again. CD is the line equidistant from Stoke and Sheffield. EF is the line equidistant from Nottingham and Sheffield. CD and EF meet at Y, so that at this place Y, Stoke, Sheffield and Nottingham should come in with equal strength. I make this place Y to be somewhere near Ashbourne in Derbyshire. GH is the line equidistant from Sheffield and Hull. This line meets our line EF at Z. Therefore at Z, Hull, Sheffield and Nottingham should come in at equal strength. Z is somewhere to the south of Gainsborough. Anything more?"

"I think you have given me all I can manage for the present, thank you. If you see me go off with a portable set about the middle or end of September, you'll know that I am bound for X, Y or Z, one of your three-cornered stations. I incline towards Y, the Ashbourne and Dovedale district of Derbyshire."

FORECASTING OR PREDICTING ATMOSPHERICS

A NOTE BY DR. FOURNIER D'ALBE

THE trouble occasioned by atmospherics, or statics, as they are more appropriately called, would be minimised if they could be accurately predicted.

An important contribution towards the solution of this problem was made by the famous French astronomer H. Deslandres at a recent meeting of the Paris Academy of Sciences. It is certain that statics, as well as magnetic "storms," are due to the eruption of masses of charged particles from the sun. Such eruptions are occasioned whenever the pressure of the upper layers of the sun's atmosphere is insufficient to resist the mighty expansion of the lower strata. Now Deslandres observed that the distribution of lines is symmetrical about the axis of the sun. The largest disturbances occur about every fourth day, and the feebler ones at intervals of two days, with a still slighter daily period. This would be accounted for if the lines of weakness were meridians 60 degrees apart, with subsidiary lines 30 degrees and 15 degrees apart respectively.

As the sun rotates in about twenty-four days, each of these eruptions should reach us at regular intervals. But there are several complications which make the matter more difficult. The sun's period of rotation varies from twenty-four and a half days near its equator to thirty and a half days near its poles. The earth's revolution round the sun reduces the latter's apparent rotation by about 1 degree per day, and the sun's own magnetic field, feeble though it is (about a ten-millionth of a "gauss") has a distinct effect upon the path of the charged particles expelled from it.

Sun-spots

Sun-spots are almost always accompanied by magnetic disturbances, during which the eruptions from the inner layers are particularly violent. A stream of electrons shooting directly away from the sun takes on the average forty-five hours to reach the earth, so that atmospherics may be expected within that time after the passage of the sun-spot across the centre of the sun's disc. The magnetic storm of January 26 last was a good example.

There is little doubt that a careful daily scrutiny of the sun's surface will soon enable astronomers to predict the occurrence of magnetic storms and static disturbances with considerable accuracy.

E. E. F. D'A.

You ought to see the September "Wireless Magazine"; some great sets in it.

MAKING A CABINET HORNLESS LOUD-SPEAKER

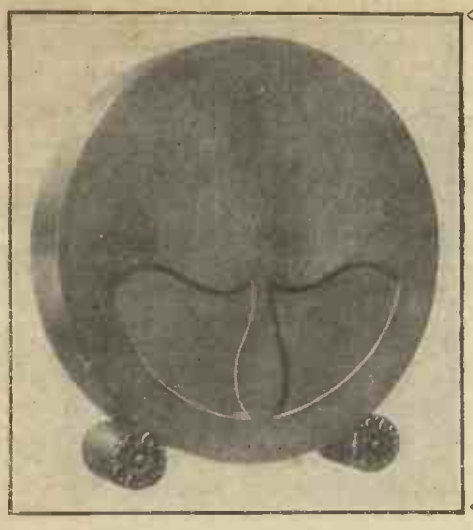


Fig. 1.—Photograph of Front of Loud-speaker.

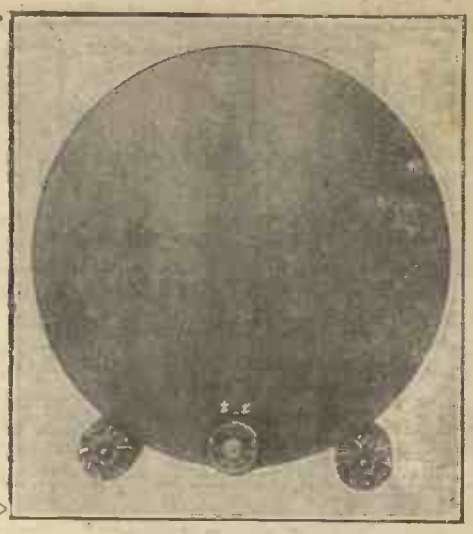


Fig. 2.—Photograph of Back of Loud-speaker.

THE ordinary type of horn loud-speaker is usually not a particularly nice-looking piece of apparatus. The type stays with us because it is very efficient as regards the volume of sound it gives.

Novel Construction

Below are constructional details of a speaker which gives reproduction of exceptional faithfulness, with no tone of "its own," and it is made without any metal trumpet at all. It should be stated, however, that although this loud-speaker gives wonderful quality, it will not give quite the same volume as a good horn-type speaker. Those listeners who set accurate reproduction before sheer volume will find it well worth making.

The instrument can be claimed to be of pleasing lines, and if well french polished can be a handsome piece of furniture. Its general appearance is indicated by the photograph (Fig. 1), while the photograph (Fig. 2), which shows the speaker from the back, illustrates how a standard loud-speaker receiver is attached. The loud-speaker receiver shown in the picture is off an Amplion Dragonfly, and used with this cabinet speaker it is as nearly perfect as anyone could wish. Another receiver that could readily be used with this speaker is the Lissenola.

Interior Arrangements

The drawings (Figs. 3, 4 and 5) show the general scheme. The receiver is inserted in an exact fitting hole at the back of the speaker, which gives access to the bottom of the double tapering sound passages. When the sound from the receiver rises up and reaches the top of these passages it is deflected into the double flares. The sound then emerges in its developed form from the silk-covered opening at the lower part of the cabinet, where the two flares meet again. The completely assembled speaker takes the form of a disc 15½ in. in diameter and 3 in. thick.

The back and the front are made of 6-millimetre birch 3-plywood, and the curved sides of 3-millimetre plywood. The sides must not be thicker, otherwise they would not bend readily. The pieces that go to make up the centre tapering passages are shown in Fig. 4, and can conveniently be made of ¼-in. fretwood. The circular back and the front section are prepared to receive the sides by cutting away two sections of the 3-ply, approximately ½ in. deep. This can be done with a cutting gauge or, as in the case of the speaker illustrated, on a circular saw by setting the saw guide close up against the saw. Having prepared the half by either method, the tapering passage is assembled on it, being fastened with brads and glue. The segments of a circle which go to make up the insides of the flares are tacked and glued as well.

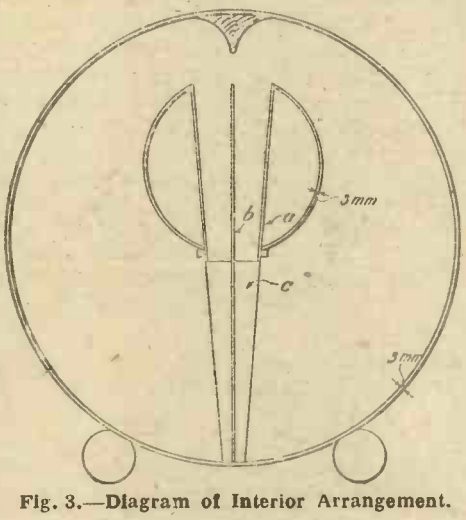


Fig. 3.—Diagram of Interior Arrangement.

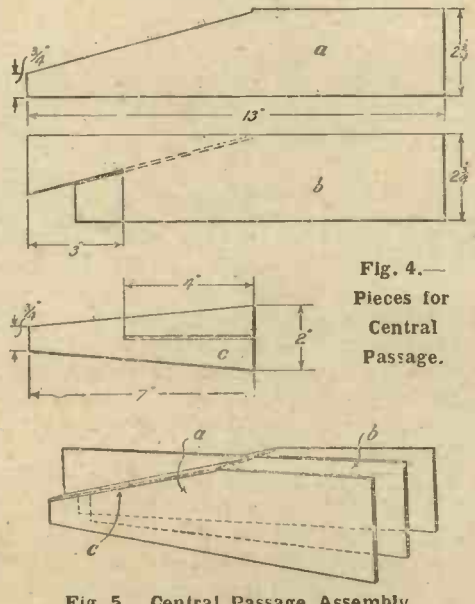


Fig. 4.—Pieces for Central Passage.

Fig. 5.—Central Passage Assembly.

Assembly

It is best to attach the bent sides to the back before considering the front. These side pieces are joined together by being tacked and glued on the triangular piece at the top. The front must be stained before the silk is stretched and glued over the mouth of the speaker. Gluing the front in position is quite an easy matter.

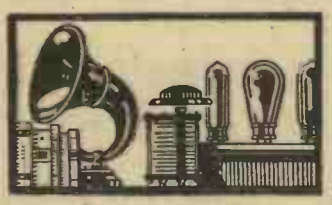
The feet of the speaker consist merely of 2¾-in. lengths of 2-in. wooden rod, and they have flats rasped on them so that they can be securely glued and pinned to the case of the speaker. D. G. O. H.

COMPLETING HOME-MADE COILS

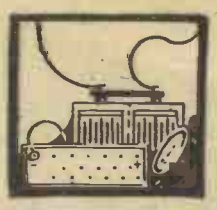
A GREAT improvement in the appearance of amateur-made coils can be effected by binding them, when complete, with yellow Empire tape. The tape is easily wound on, and hides any faults that may have been made in the winding of the coil.

The Empire tape protects the turns from the harmful effects of moisture in just as effective a manner as does shellac varnish, and efficiency is increased in that the total self-capacity of the tape is less than that of the varnish. K. U.

The fact that a letter addressed to the "A. A. of Wireless, Somewhere in London," arrived safely at its destination, is evidence that the activities of the Wireless Association are becoming established.

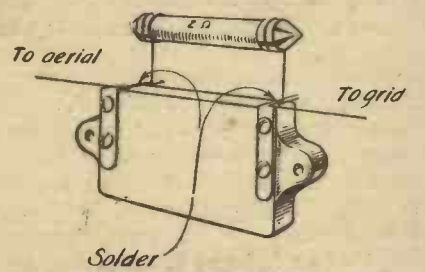


PRACTICAL ODDS & ENDS



Mounting Grid Leak

CONDENSERS not fitted with grid-leak clips can easily be adapted to take a grid leak by means of two pieces of wire shaped as in diagram. If No. 16 square tinned-copper wire is used, and good soldered joints are made, it will be



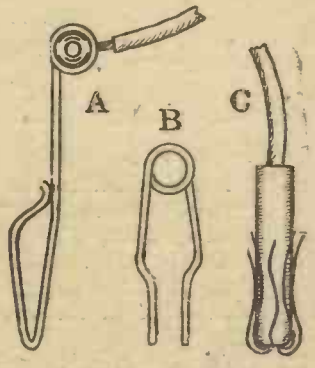
Novel Grid-leak Mount.

found that there is ample support for both the grid leak and the condenser, and it will not be necessary to use any other method to secure them to the panel.

Of course, using this method of grid-leak connection, that is, with the grid leak in parallel with the grid condenser, it is best to connect the grid-return wire to L.T. positive. G. H.

Makeshift Wander Plugs

WITHOUT the aid of ordinary wander-plugs most experimenters experience difficulty in connecting up an

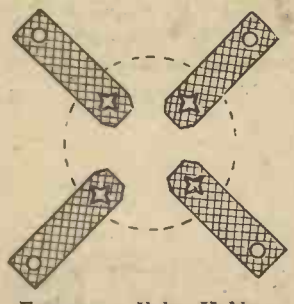


Novel Wander Plugs.

extra H.T. battery. The bared end of a flexible lead may be pressed into a battery socket by means of a match stick, and this will be quite satisfactory, providing such a "plug" remains permanently in position, but when the plug is allowed its true "wandering" privilege some sort of spring contact is essential. A very good substitute consists of a piece of springy brass wire, which is bent as shown at A, looped at the top, and fitted with a small terminal to which is joined the flexible lead. A much better method, however, is indicated at B, where an ordinary safety-pin is arranged as shown, and also fitted with a terminal as at A. Another very good substitute consists of a short length of rubber tubing, or systoflex, which is used in conjunction with the bared end of the flexible lead in the manner indicated at C, the fine strands of wire being separated and bent upwards, outside the tube, so as to make contact with the walls of the socket when the tube is forced into same. O. J. R.

Emergency Valve Holder

IN the absence of a spare valve holder or a set of sockets the problem of hooking up an extra valve often presents a difficulty. The sketch shows a very simple makeshift which will be found effective for experimental purposes. The receiver panel, or separate ebonite mount, is



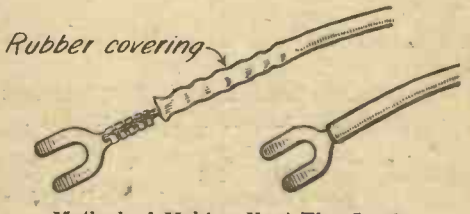
Emergency Valve Holder.

drilled to pass the four valve pins, and over these holes are placed the ends of short strips of brass or copper gauze, pierced by means of a bradawl, so that the burrs thus formed make good contact with the valve pins. The outer ends of the gauze strips are punched to take small bolts, which clamp them to the ebonite and also provide means of making the necessary connections. B. M.

Neat Flex Leads

ONE of the most common sights on a receiving set is the array of untidy, and incidentally often inefficient, flex leads to batteries, loud-speakers and so on. A simple method of avoiding such untidiness is shown in the sketch.

Ordinary twin electric-lighting flex is obtained, and the two wires separated, cut into convenient lengths, and then the thick braided covering removed, exposing the rubber covering underneath. By carefully pulling back the end of the rubber, a short length of stranded wire can be exposed. A spade terminal is slipped over this wire and secured to it by clamping together the "teeth" of the terminal, and then the rubber covering is allowed to slip back in place and cover up the wire altogether, thus securing what is required —a neat flex lead. J. B.

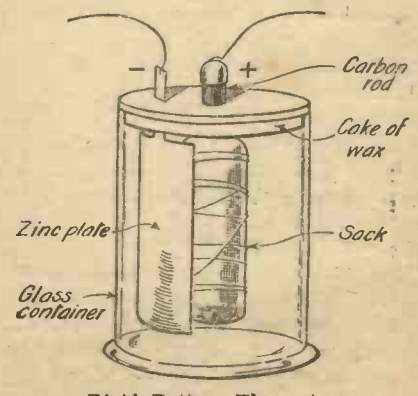


Method of Making Neat Flex Leads.

Rigid "Wet" H.T. Elements

A LARGE number of amateurs have made up "wet" H.T. batteries with the elements obtained from flash-lamp cells, with varying degrees of success. One of the chief stumbling-blocks when making such batteries is the secure fixing of the elements in the glass or other container.

The sketch shows a method which has proved successful in doing this in practice. Obtain some pure paraffin-wax, and then warm it until it is plastic. Roll it out to

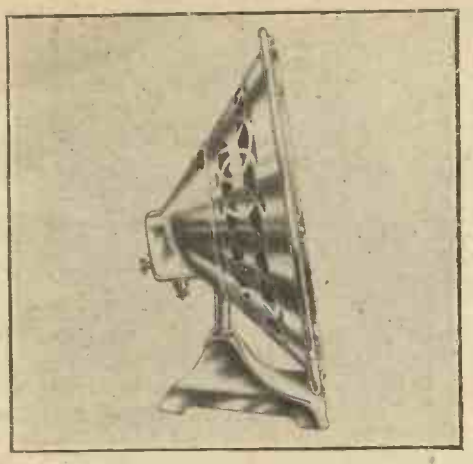


Rigid Battery Elements.

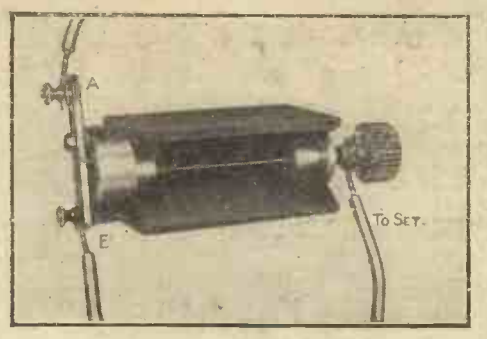
about ½-in. thickness and, using one of the containers as a mould, cut out as many circles of wax as are required. When still plastic push the zinc and carbon rods through the wax, and plunge into cold water to harden the wax. If the operations have been carefully carried out it will be found that perfectly rigid support for the elements is obtained, as shown in the sketch. A. S. H.

SEEN AT THE SHOW

Pictures of a Few of the Many Novelties



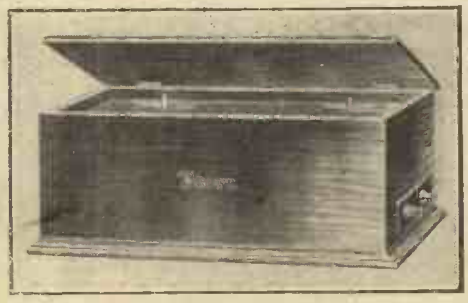
This is the new Brown Disc Loud-speaker, which is of entirely novel design. The makers are S. G. Brown, Ltd., Western Avenue, North Acton, W.3.



This ingenious device enables one to earth the aerial effectively from the inside of the house. It is made by The Universal Bracket Co., of Alpine Steel Works, East Molesey, Surrey.

A unique plug-in coil, called the Igranic centre-tapped Xllos; is shown above, made by Igranic Electric Co., Ltd., of 147, Queen Victoria Street, E.C.4.

Here is a portable set which incorporates the famous Celestion Loud-speaker. It is made by Celestion Radio Co., of 29-31, High Street, Hampton Wick.



The new Brown Crystal Amplifier, which does not require valves, is shown here. It is made by S. G. Brown, Ltd., of Western Avenue, North Acton, W.3.

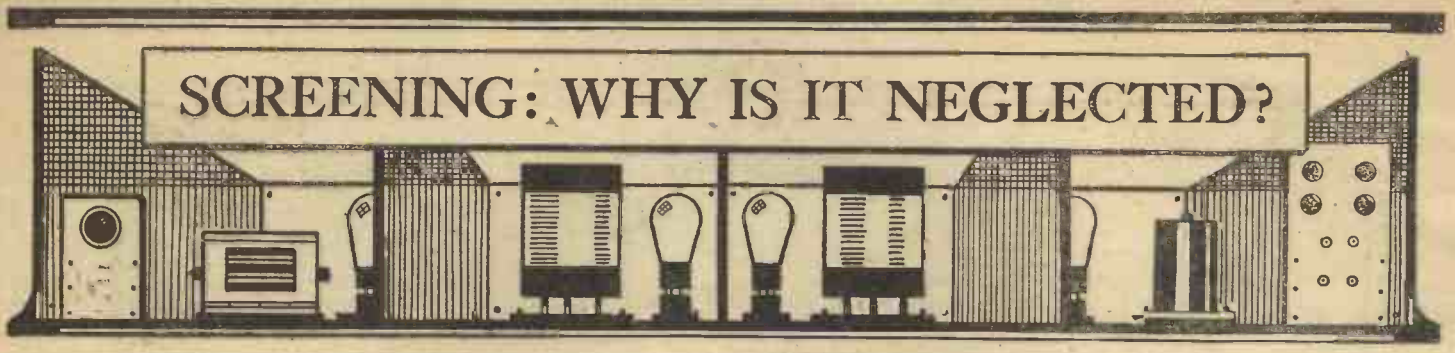
An ingeniously mounted loud-speaker is incorporated in this Rotola portable set, made by Rotax (Motor Accessories), Ltd., of Rotax Works, Willesden Junction, N.W.10.

Above is shown an example of the Rectaloy L.T. Trickle Charger, made to suit different voltages, by Rectaloy, Ltd., of Vulcan House, 56, Ludgate Hill, E.C.4.

The Rotola Baby Grand is the name of this distinguished-looking cabinet receiver. It is made by Rotax (Motor Accessories), Ltd., of Rotax Works, Willesden Junction, N.W.10.

Here is the Rectaloy H.T. Battery Charger, which is made for use with A.C. mains in two models by Rectaloy, Ltd., of Vulcan House, 56, Ludgate Hill, E.C.4.

SCREENING: WHY IS IT NEGLECTED?



IT is very surprising that at the present time, when so much attention is being given to the prevention of interaction between the various circuits of a wireless receiver, the great advantage of screening parts or the whole of the set is so often apparently overlooked.

The reason is probably that most investigators have concentrated their attention on eliminating or counteracting the effects of stray couplings due to capacity, more especially that between the grid and filament of the valve. Possibly the fact that unwanted electro-magnetic couplings are easier to eliminate has had the effect of inducing experimenters to attack the more difficult problem first.

Successful H.F. Amplification

At the same time it may be doubted whether the inter-electrode capacity of the valve is the real stumbling block to the successful employment of tuned H.F. amplification which some authorities would have us believe. The actual capacity between the grid and filament is extremely minute. It is sometimes stated that the trouble lies mostly with the capacity between the pins of the valve base and the sockets of the valve holder. But does it? Take a valve, remove the base altogether, support the valve in some way and solder the various leads direct to the wires issuing from the pinch of the valve, thus doing away with the valve holder.

If this valve is used in the second or third H.F. stage it is ten to one that it will still oscillate. The same thing happens with the various special anti-capacity valves and special holders. It would seem that stray magnetic couplings have quite a lot to do with the present impracticability of tuned H.F. amplification (carried to a number of stages) as have the stray capacities. It is not beyond the bounds of possibility that the magnetic couplings are the real trouble.

As these latter may be eliminated with so little trouble, it would, at any rate, be worth while to do so in those cases where interaction has a detrimental effect upon the working of the set. It is, however, quite a mistake to think that no magnetic coupling can exist between coils which are placed at right angles to each other.

Even if two coils were placed in such relative positions that experiment showed no interaction to exist, the effect of changing the coils (supposing them to be of the plug-in type) would probably be to upset the "balance" so that the coupling between them would no longer be zero.

Special Coils

The use of toroidal coils, and other coils of special construction, certainly helps to reduce the amount of the coupling, but it is exceedingly difficult, in fact practically impossible, to prevent some leakage of the lines of force.

A much more thorough method of preventing interaction is to screen the coils concerned by partially or wholly surrounding them with sheet metal. But the screening, if it is to be efficient, must be very carefully carried out.

Absorption Losses

If any conducting material is placed within a varying magnetic field, eddy-currents are induced in the conductor which therefore represent the absorption of so much energy from the field. In the case of screened coils the effect of the production of eddy-currents in the screening material would be to increase the damping of the circuit in which the coil was included.

On the other hand, when several coils have to be screened, space considerations will limit the practical distance of the screen from the coil, and it is a matter requiring careful consideration to design screened coils which will at the same time be efficient and not too bulky.

Instead of enclosing each individual coil completely within its own metal case, sets containing several stages of tuned H.F. amplification are often built with a flat metal partition between the various stages. In such a case there is not likely to be any great loss owing to eddy-currents being induced in the screens, but the screening action is not so complete. Still, it is often quite sufficient for the purpose in hand.

The use of screening is often advantageous from other points of view than that of preventing interaction between the various circuits of the receiver. For instance, it is sometimes desirable to shield the circuits from outside interference, such as that from near-by power mains or telephone wires, etc.

D.F. Work

Again, a direction-finding set cannot be relied upon to indicate accurately the direction of a transmitting station if it is possible for signals to be picked up on the internal wiring of the set. For absolutely accurate D.F. work it is necessary that the only signals impressed upon the grids of the valves should be those received via the frame aerial.

In such cases as the above, the set, batteries, and all external accessories, except aerial and phones, may be entirely enclosed within an earthed metal case. One way of doing this is to line the cabinet and the back of the panel with metal foil, but a simpler system would seem to be to use a metal case instead of a wooden cabinet and to mount the components on a metal panel, using ebonite bushes where necessary. J. F. J.

PROTECTING DULL EMITTERS

OWING to their very small current consumption it is difficult to contrive any device which will protect the filaments of dull-emitter valves from the effects of an accidental short-circuit between high-tension positive and low-tension negative. Fuses are not sufficiently delicate, since they require an appreciable amount of current to make them "blow." A very satisfactory protecting device for multi-valve sets can, however, be installed with the aid of a certain kind of flashlamp bulb. This is a bulb rated at 1.25 volts .3 ampere which can be obtained for sevenpence. Actual tests show that these bulbs burn out almost instantly when the current rises to about .4 ampere. Now, if you are using five ".06" dull emitters, the filament current is .3 ampere. Thus one of these bulbs placed in the low-tension negative lead will just carry the filament current; but if this is increased by the occurrence of a short, the flashlamp will burn out before damage can be done to the filament. Assurance can be made doubly sure by putting flashlamps in both the low-tension leads and in each of the high-tension leads. Where valves with a high current consumption are used, different flashlamp bulbs will be required. Thus two valves, consuming .25 ampere apiece, could be protected by a .6-ampere flashlamp which can be obtained for the same price. R. H.

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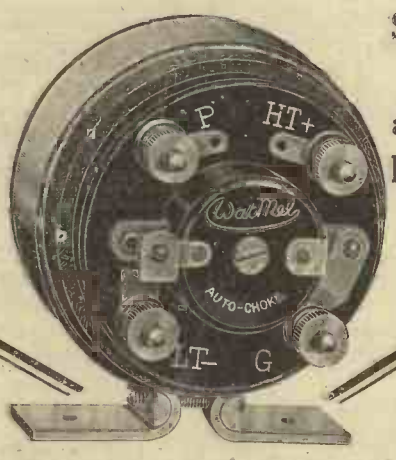

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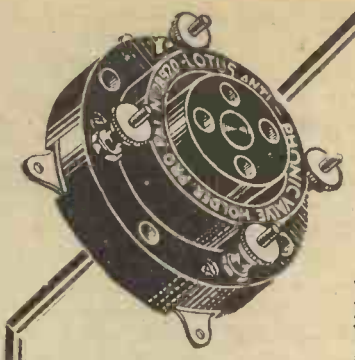

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On Your Wavelength!

Well-behaved Stations

THE success of the new wavelength scheme depends naturally upon the closeness to which stations adhere to their allotted wavelengths. Thinking the other night that it might be interesting to run through the broadcast band and see how many could be accused of serious wandering, I set my wavemeter to work and got down to it. I was quite surprised to find how very few were more than a tick or so off their wavelength; in fact, on the beautiful curve which I had drawn previously on a fair sheet of graph paper I was able to dot in nearly every station at just where it ought to be. I noticed only two that were really wide of the mark—Toulouse and Rome. Toulouse has always been a bit of a wanderer, having been responsible probably for more heterodynes than any other station in the lists. On this occasion he was working on 425 metres instead of 430, and Rome, I suppose, had dropped 5 metres in self-defence, for he was using 420 metres instead of 425. Milan had gone up a little from his nominal 321 metres, for the very good reason that he had been blotted out of existence by a powerful heterodyne.

A Serious Problem

This was the fourth harmonic of 5 X X on 320 metres which I have noticed for some weeks now. It is so strong that you can listen to the Daventry morning concerts quite comfortably if you tune your receiving set to 320 metres. In the evenings it fairly messes up everything between 325 and 315 metres. Unless it is suppressed it may work havoc under the Geneva scheme, since it seems likely that it will heterodyne both Dublin and Leipzig. This question of harmonics from broadcasting stations is, so far as I can see, one that affects to an important degree the new scheme. There are far more of them than most people realise.

When you drop down to below 300 metres you will be surprised to find what a number of stations there are at the present time suffering from heterodynes. Many of these heterodynes are caused not by stations upon neighbouring wavelengths, but by harmonics of main stations whose wavelengths lie between 400 and 600 metres. The first harmonic is exactly half the fundamental wavelength, hence interference is caused between 200 and 300 metres. Under the new scheme there are rather more than fifty stations to which wavelengths below 300 metres have been allotted, and unless care is taken to suppress the first harmonics of those between 400 and 600 metres I fear that heterodyne trouble is to be expected.

I have little doubt, too, that a good deal of the interference that we experience above 300 metres is caused by harmonics—the third, fourth and fifth in these cases—of high-power stations working on wavelengths of 1,000 metres and more. Another problem that seems likely to remain is that of sparks, of C.W. signals and of mush. For a good many weeks I have noticed much less spark interference over the whole broadcast band, but during the last few days there has been a fresh outbreak. I cannot, for example, understand what a strong spark signal is doing on 240 metres, another on 345 metres, and yet another on 420 metres.

Run to Earth

Complaints from a certain district having been received of a very queer kind of interference, sleuth-hounds were laid on the track, with the result that the cause was at length found to be one of the queer electrical machines in a barber's shop. It is surprising to find what an amount of interference even at quite long distances apparently innocent pieces of apparatus can cause. I have had some rather strange experiences myself in this connection. One of them happened a good many years ago before the days of broadcasting. The offending noise sounded rather like the jerky tearing of a piece of American cloth. It was eventually traced to an X-ray plant some distance away, in which an old-fashioned rotary converter was in use. Another time, a friend who had just installed a wireless set told me that his loud-speaker appeared to be haunted. Apropos of nothing, it would suddenly emit a roar which began with a deep booming sound right down in its boots and work up to a shriek. At this point there would be a pause of varying length, after which the process would be repeated. The trouble here was an electric lift in a neighbouring house.

Another Experience

One of my worst experiences occurred a couple of years ago, when my set suddenly went mad, refusing to produce anything but crackles, fizzes, tearing noises and bangs of a strength that had to be heard to be believed. Not the slightest effect was produced by substituting another battery, trying fresh valves or changing the grid leak. Tests showed that there was nothing wrong with condensers, transformers, coils or anything else. I had never heard atmospherics produce such noises, but just to make sure I went to the telephone with the intention of asking a friend if he was also being troubled. To my astonishment I found that the telephone was behaving in exactly the same obstreperous way. What had happened here, as I found out a couple of days later, was that a big underground lighting cable had developed a leak.

Begin Now!

If you have abstained from long-distance work during the summer, feeling that it was not worth while, you may return now to your old pastime with the sure and certain hope that you will be able to log quite a number of foreign stations. So great has been the improvement in conditions during the last few weeks that with anything like a set you can now bring in certain foreigners as early as seven o'clock in the evening. Hamburg is quite a good daylight signal, as is Frankfurt, who seems to have increased his power, for at my station he now comes in at about the same strength as Birmingham, though the latter is only seventy-five miles away. There was talk some time ago of bringing Frankfurt up to 10 kilowatts, though I have not seen any official announcement that this has been done.

A station that you can hardly fail to get at any time after eight o'clock is Berne, who at the present time is one of the best of the Continentals, and seldom suffers from serious interference. There is little trouble about identifying Berne, since his woman announcer always gives the call-sign before each item. You will almost certainly find a good many other stations, but I will not raise your hopes too high or make your mouth water by giving a list of those in this neighbourhood.

The Short Waves

Next turn your attention to the shorter waves, putting on a set of coils that will tune down to 250 metres or less. With these you are almost bound to pick up several of the German relays, nearly all of which, by the way, have the same power as our main stations. The best of them just now are Hanover, Dortmund, Cassel, Elberfeld and Kiel. One thing I would beg of you—do not imagine that it is permissible to oscillate just because you are not listening to the B.B.C. stations. Now that the neutrodyne circuit has been developed it is absolutely unnecessary to oscillate. If your own receiver is of the howling type, take my tip and rebuild it before the autumn, neutralising its H.F. side. If you do so you will find that you are getting twice the pleasure out of your reception, since you tune stations straight in without hearing any squeal, and you have the comfortable feeling that you are not annoying anybody else. The man who puts his set into oscillation and goes round picking up carrier waves is an outsider who deserves to be kicked at sight by all decent wireless folk.

On Your Wavelength! (continued)

Super-piracy

There has been a great deal of trouble, I hear, over in South Africa, where wireless piracy is so rampant that it is doubtful whether two, at any rate, of the stations—Durban and Johannesburg—will be able to carry on. The companies responsible for these stations both show considerable losses on the year's working, and this kind of thing cannot last very long. Legislation in South Africa provides, as a matter of fact, for very severe penalties for those who are convicted of using receiving sets without the necessary permit; in addition to a heavy fine, all gear may be confiscated. For all that, it is estimated that there are probably at least as many pirates as licensed listeners in some parts of the Union.

It would be a thousand pities if these two excellent stations had to close down. Johannesburg in particular has one of the best broadcasting plants to be found in our overseas possessions, and has always prided itself on the quality of its programmes. Many other countries have had their troubles with pirates; the position became serious in both Canada and Australia, but in both cases vigorous measures produced a very great improvement. To me there is something utterly unsporting about the man who makes other people pay for his entertainment by refusing to take out the broadcast licence. In this country there are probably a great number of pirates, for prosecutions, followed in nearly every instance by convictions, are still found necessary.

I Wonder Why?

I have often wondered why some of our wireless manufacturers do not employ in their designing rooms men skilled in mechanics. So often one sees a device which contains a thoroughly sound idea, but which fails to work properly because there is something faulty about its moving parts. The electrician is too often not a practical mechanic, with the result that when he has a bright idea he frequently fails over its practical application. I know, for example, of one variable condenser which is a really beautiful job in every respect except as regards the suspension of the spindle which carries the moving plates. True, the action is perfectly smooth as you turn them, but if you press on the knob you find that it is possible to move it a little way inwards. Now most of us when we are tuning do exert a little pressure on the knobs, and if there is end-play this alters the distance between the fixed and the moving plates. Hence when we remove our hands after making the necessary adjustments signal strength falls away or even declines to nothing at all. As a rule, we ascribe this to hand-capacity effects, though in many cases it is due purely and simply to the end-play. Again, I have seen slow-motion dials incorporating really ingenious ideas which would not work properly just because there was some small defect in the mechanical design.

One can put these things right in one's own workshop, but it should not be necessary to undertake such jobs. I should be very sorry to see American components ousting our own, but there can be no doubt that they are becoming very popular in this country largely owing to their mechanical excellence. The workmanship is seldom so good as that of our home-made articles, and our own manufacturers have nothing to fear if only they will pay a little more attention to mechanical details.

Try It Yourself

I am becoming more and more impressed with the possibilities of the indoor aerial. I do not mean the frame, which I never have cared about except when it is necessary for some special reason to make use of its directional properties—and even then the frame is not always perfect, since too often it insists obstinately on being pointed towards the fireplace, no matter what the direction of the required station may be. What I use is simply a single strand of No. 18 or No. 20 d.c.c. slung round three sides of the room by being threaded through small insulators fixed to nails driven into the walls about a foot below the ceiling of the room. I find that this contrivance gives very little less signal strength than the outdoor wire, whilst it greatly increases one's selectivity and gives one much greater freedom from atmospheric interference. Though mine is not a particularly good locality, I can receive 2LO thirty miles away quite comfortably on a crystal with an aerial of this kind, and with a neutrodyne three-valve set I can run round all of our home broadcasting stations (including several of the relays), as well as being able to tune in at excellent strength over a score of foreigners. The addition of another note-magnifying valve makes it possible to work any amount of stations on the loud-speaker. If you are bothered by interference from power lines and so on, if you are not satisfied with your selectivity, and if you want to work in comfort when atmospherics are about, fix up an indoor aerial and use it when the outdoor wire is not giving you satisfactory results.

Radio Film "Stunts"

Much ink has been spilled over the broadcast of the dramatised version of the film "The Greater Glory." The B.B.C., ever alive to new fields of work, agreed to co-operate in producing in radio dramatic form the story of this film. Beyond that there was no intention of going, but I hear from listeners that some form of synchronisation was expected. I fear that this was the result of the copious film trade notices.

It would seem a pity that a section of this industry does not realise the limitations of radio advertising in this country, inasmuch as the result has been a certain amount of disappointment among radio listeners, to the detriment of future production in this line.

There is no doubt that the day will come when the film industry will work in co-operation with radio, but the listener, for the purpose of advertisement, should not form wrong conclusions from the announcements of interested film parties. It is obvious that to synchronise a big film stupendous preparatory work must be undertaken by both industries. The dramatising of the story of "The Greater Glory" had a certain "stunt" value from the broadcasting viewpoint. It would seem that a strict rationing of this type of production should be made. The actual broadcast proved to be a success from the entertainment point of view. It was merely a fairly good dramatic turn, but no advance in radio-film co-operation can be claimed. All that actually happened was that an interested firm obtained the broadcasting of the story of one of their films

Breaking it Gently

When I was having tea at a country house the other day my hostess asked if I would mind inspecting the wireless equipment. As I had made a remarkably hearty meal, I felt that I must do something in return for it, so off I went with her, fearing the worst. The switch having been thrown over, there was a blinding glare from the bank of bright-emitter valves and the loud-speaker leaped into life. Endeavouring to disguise my feelings, I listened until human nature could stand no more, then I flicked over the filament switch, saying that it was a pity to waste good juice on a poor item. And then came a rather awkward moment. Did I think that there was anything *really* wrong with the set? "No," I said, after a little thought. "There is nothing really wrong with it except that both the loud-speaker and the low-frequency amplifying department are a *little* out of date."

Actually, the set is one of the earliest broadcast models, and it helped me to realise not a little what improvements in reproduction have been made in the last year or two. When a piano solo was being played, practically nothing was to be heard except the notes contained in the octave immediately above the middle C. The bass notes were simply not there at all, whilst those at the higher end of the scale came through but feebly. When I was asked if I could suggest any improvements, all I could think of was that the set should be replaced by a new one.

On Your Wavelength! (continued)

"Hush, Hush" at 2 L O

I spent a most interesting afternoon last week at 2, Savoy Hill, in the course of which I was initiated into many of the mysteries of broadcasting, some of which I cannot tell you about, for they are still "hush, hush." I was put into a suitably humble frame of mind quite early in the proceedings. In one of the first rooms that we came to I noticed an accumulator of the sort that would take a Samson to lift. "What's that used for?" I asked. "Oh, that's a grid battery," said my guide nonchalantly! What impressed me most was the control room, in which, strange as it may seem, there is hardly a wire to be seen, though actually there must be untold miles of it concealed in cases and cabinets.

Have you ever wondered how it is that an instrumental solo, such as one upon the violin, can be brought out at full strength, whilst when an orchestral piece follows, in which a dozen or more instruments are used, producing a far greater volume of sound in the studio, no blaring or blasting occurs? This is due to the work of an expert, who sits before a small instrument upon whose panel are two knobs. On his head he wears a pair of telephones which enable him to hear what is going on in the studio; by means of the knobs he is able to keep the volume of sound always level, increasing or decreasing it when necessary.

The National Radio Exhibition at Olympia was opened last Saturday

The S.B. Board

And then there is the S.B. board, which looks rather like a gigantic bookcase with glass-panelled doors. Within, upon shelves, are trios of valves, each labelled 6 B M, 2 Z Y, 5 W A, and so on. When, say, Newcastle wants to have the London programme, he does not ring through or anything of that kind and ask the operator to plug him in. Instead, he inserts a plug into a jack in his own studio, thereby lighting up his particular three valves in far-away London and completing the necessary circuits. At the same time a little red lamp begins to glow, showing the responsible official in London that Newcastle is taking the programme and that all is well. Should one of the amplifying valves burn out, or should any fault develop in the circuit, an alarm bell begins to ring, and continues to do so until the defect is rectified. One scarcely ever sees a neater or more effective arrangement.

Overburdened Aerials

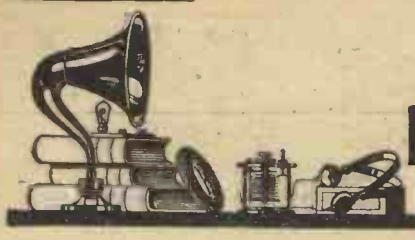
There is a tendency on the part of the amateur to overburden his aerial with heavy and unsightly insulators which add to the already disreputable appearance of makeshift masts. The extra weight involved is often "the last straw which breaks the camel's back," for the adding of a few pounds of porcelain or ebonite to the top gear of an already rocky structure effectively prevents the owner from attaining the symmetrical lines which are often sought after, but which, alas, are rarely obtained. The question of aerial insulation receives but scanty attention, and although the amateur realises that good insulation is needed, he does not know how good, and therefore errs on the side of the over-generous application of heavy apparatus when something much lighter would do quite as well.

The number of insulators used will depend largely on the design of the insulator and the material used. Best-quality porcelain and flint glass are the most efficient insulators for outdoor use, and they should have a long leakage surface or a surface so shaped that a portion of it cannot get wet. The reason for this is not only to keep the aerial free from high-resistance leaks when wet, but also to prevent the accumulation of carbon deposit on the surface of the insulator. It is not possible to specify any particular make of insulator which fulfils these requirements, but there are many on the market.

Steel Masts

Many amateurs possess aerial masts which are stayed into position by iron or steel wire stays, and just as many do not bother to split up the stays by means of insulators. It is not generally known, but such stays are often the cause of considerable losses in signal strength, one reason for which being that they act as screens, the other reason being that they act as a means of reducing the effective height above earth of any aerial, no matter how carefully the aerial may be insulated from the mast. As a proof of what I am saying, let the amateur connect to the lanyard of his aerial a copper wire, say, one or two feet from the pulley, and earth the free end. He will be surprised at the great loss in signal strength.

THERMION.



OUR INFORMATION BUREAU

RULES:—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. Always send stamped, addressed envelope and attach Coupon (p. 3).

Particulars of Dynamo

Q.—*I have a "Fulmen" dynamo of* 120 *watts capacity which requires attention. Could you please tell me what is wrong with it and where I could get it repaired?—N. R. S.* (*Sevenoaks*).

A.—It is impossible to say what is wrong with the machine without examination and test, but if sent carriage paid to B.K.B. Electric Motors, Ltd., Hibbert Street Works, Luton, Beds, marked for the attention of Mr. Avery (their Technical Adviser), a report can be prepared at a nominal cost and an estimate supplied for any necessary repairs.—A. H. A.

Using a Potentiometer for Grid Bias

Q.—*How can a potentiometer best be used to control finely the grid bias applied to a L.F. valve?—G. H.* (*Birmingham*).

A.—If the potentiometer is placed across the grid-bias battery the latter will soon be exhausted if, as is usual, it is composed of small dry cells. A better way is to connect the potentiometer winding across the filament battery to join the positive end of the G.B. battery, not to L.T. negative, but to the potentiometer slider. The negative end of the G.B. battery is connected up to one end of the transformer secondary in the usual way. The actual grid bias can now be adjusted roughly by altering the number of G.B. cells in circuit and finely by moving the potentiometer slider.—J. F. J.

Correct Transformer Ratios

Q.—*I am building a set for which a L.F. transformer having a ratio between* 2- *and* 3-*to-*1 *is specified. I have on hand a transformer having a ratio of* 5 *to* 1, *and should like to know whether this will be suitable if I remove half the turns from the secondary?—L. C.* (*N.*3).

A.—We do not advise you to make the suggested alteration. You require a transformer having a high primary impedance, and it will obviously not help merely to reduce the secondary impedance of your present transformer. If you cannot obtain a transformer with the ratio specified, we suggest you try using your present transformer without altering the windings.—J. F. J.

"Dry" or "Wet" H.T. Battery

Q.—*I have up to the present been using dry-cell H.T. batteries. Do you think that an accumulator H.T. battery would be worth the greater outlay?—K. D.* (*Newport Pagnell*).

A.—Much depends upon whether you would experience any difficulty in getting the accumulator H.T. battery charged, upon the H.T. consumption of your set, and upon how often the set is used. The chief advantage of an accumulator H.T. battery is that it can supply a fairly heavy current without the voltage dropping. It is therefore of great advantage for use with sets employing a large number of valves, say four, five or more. If you have only a one- or two-valve set, dry batteries should be very satisfactory, but the accumulator might be worth while if you can charge it at home. You should also remember that an H.T. battery composed of small Leclanché cells is better than a dry battery and does not cost so much as an accumulator battery, and also that it does not have to be taken to a charging station.—J. F. J.

Home-made Sets

Q.—*Is there any reason why I should not make and sell crystal sets?—H. I. P.* (*Stoke*).

A.—There is no reason why you should not make and sell any kind of sets providing that these do not contain any patented arrangements.—B.

Telephones in Series and Parallel

Q.—*I have two pairs of telephones, one* 8,000 *ohms and one* 4,000 *ohms. When these are used separately, results are perfect, but when both pairs are used together very little can be heard on the* 8,000 *phones, while the strength of signals in the* 4,000-*ohm phones remains unchanged.—B. M.* (*Andover*).

A.—If you are using the telephones in parallel, most of the available telephone current will travel by the easier path—that is, through the low-resistance telephones. When using telephones of different resistance values, always connect them in series. In this way all the telephone current must pass through both pairs.—J. F. J.

Action of Flewelling Super

Q.—*I do not understand how the "quenching oscillations" are produced in the Flewelling super circuit. Can you please explain this?—J. B.* (*Basingstoke*).

A.—The critical adjustment in the case of a Flewelling circuit is the grid leak. If reaction is tightly coupled oscillations commence. If the grid leak is then adjusted to a value which will not allow the electrons accumulating on the grid to leak away as fast as they accumulate, this will cause the grid potential to become more and more negative until a point is reached where the excessive negative grid potential will cause oscillations to cease. No more electrons will therefore be deposited on the grid, and the charge already there will soon leak away and the grid resume its normal potential, when the same sequence of operations will take place over again. In practice the grid leak is adjusted to a value which causes this quenching frequency to be just so high that the self-oscillation (at the frequency of the incoming signals) is checked just as it commences and so the super-regenerative effect is obtained.—J. F. J.

When Emission Falls Off

Q.—*What causes the filament of a dull-emitter valve to lose its emitting properties?—L. D.* (*Rochdale*).

A.—After a considerable amount of service the emitting properties of dull-emitter filaments will deteriorate in any case, so that your trouble may be due merely to old age. If the trouble develops prematurely, however, it is probably because the filament has been run at a temperature higher than that for which it was designed.—J. F. J.

Advantage of a Variable Grid Leak

Q.—*Is it any real advantage to use a variable grid leak instead of one of fixed value?—P. S. F.* (*Bournemouth*).

A.—It is not really necessary to use a variable grid leak in most circuits, as the value of this component is not usually at all critical. As a refinement, of course, it is very convenient to be able to adjust the grid-leak value at will, but if used, a variable grid leak of first-class make only should be used. Inferior leaks will cause crackling and scratching noises which may entirely spoil the reception. In such circuits as the Flewelling, of course, a variable grid leak is an essential part of the circuit.—B.

Push-pull Amplification

Q.—*Do two valves used in a push-pull stage of L.F. amplification give as much amplification as two ordinary L.F. stages in cascade?—N. C.* (*Wandsworth*).

A.—In the push-pull system two valves are required for each stage of amplification, so that the amount of amplification obtained in such a stage is only equal to that given by a single valve used in the more usual manner, providing this latter is being worked efficiently. The advantage of the push-pull system is that each valve is only doing half the work in its particular stage, so that there is less likelihood of the valves being overloaded. In other words it enables ordinary receiving valves to be used where otherwise a power valve would be required.—J. F. J.

Correct Method of Connecting Phones

Q.—*When several pairs of phones are to be used with a crystal set, should they be connected in series, in parallel, or in series-parallel?—K. B. N.* (*Essex*).

A.—You do not state whether the phones are all of the same resistance or not. If they are not they cannot all be connected in parallel, as in such a case nearly all the available energy would flow through the phones with the lowest resistance. You must understand that for best results the total resistance of the phones should be approximately equal to that of the crystal contact, so that everything depends upon the resistance of this contact, the individual resistances of the various pairs of phones, and the number of pairs of phones. It will pay you best to try various methods of connection to determine experimentally how best results may be obtained. If all the phones have the same resistance, all three methods you mention may be tried. If the phones have different resistances and you use the series-parallel method of connection, you should make sure that each bank of phones has the same resistance.—J. F. J.

OUR WEEKLY NOTE

SAVE YOUR "SCRAP"

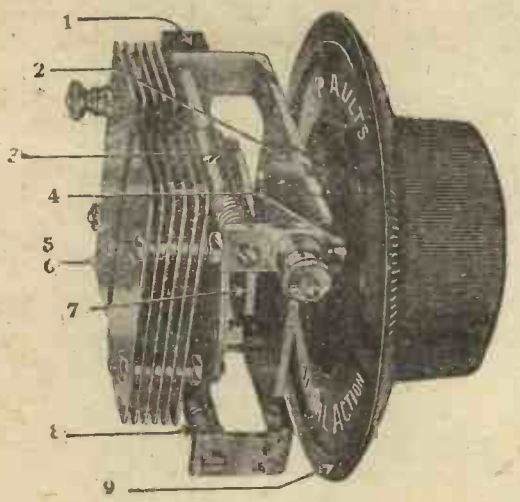
The experienced wireless experimenter never throws anything away. His is one of the most expensive of hobbies, and he never knows when he may be called upon to buy a new valve, transformer, or H.T. battery. Although items of this nature call for the expenditure of a considerable sum from time to time, it is surprising how much money can be spent, in a few months of constructing, on such odds and ends as terminals, plugs, small pieces of ebonite, etc.

It is a good plan to keep a scrap-box, so that when dismantling a set all the odd bits can be stored there. Also when building a set the bits of ebonite trimmed off the panel when cutting it to size, the short lengths of wire left over when connecting up, and other such oddments, can be added to the collection.

In a short time it will seldom be necessary for the constructor to purchase anything save the more important components when building a new set. Even the most unlikely-looking bits of "scrap" will come in useful sooner or later.

THE BUREAU.

A real Engineering Job!



An entirely new principle in Condenser construction—gives S.L.F. characteristic with remarkable saving of space.

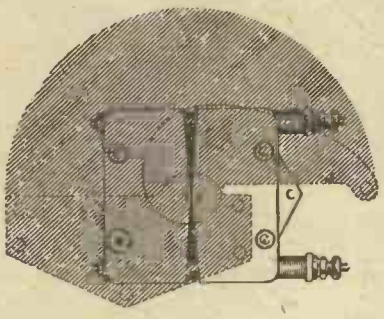


Diagram shows the comparative area taken up by the "sweep" of the old type Straight Line Frequency Condenser and that occupied by the uniquely constructed Ripault Straight Line Frequency Condenser.

Special Constructional Features.

1. *High Grade Ebonite Insulating Bar.*
2. *Rigid Heavy Gauge Main Frame placed out of the magnetic field, avoiding eddy current losses.*
3. *Slider contact, silent in action and making permanent connection to terminal.*
4. *One Hole Mounting.*
5. *Solid Heavy Gauge Brass Plates giving true lateral action.*
6. *Minimum space occupied at back of panel. 4" Dial covers whole condenser.*
7. *Specially shaped Driving Cam, by which Straight Line Frequency characteristic is obtained.*
8. *Special Compensating Springs, ensuring permanently smooth movement. Backlash cannot develop.*
9. *4" Dial, divided into 360 degrees for most precise control and easier tuning.*

You can see for yourself what a real Engineering job these Ripault Condensers are. Inspect them at Stand No. 92, Main Hall, National Radio Exhibition.

While every up-to-date advantage is built into the Ripault Condenser, its revolutionary design and construction place it far ahead of all previous instruments.

It incorporates the three important features that stamp a condenser of high quality, namely, very low dielectric loss, complete absence of backlash, smooth and silent action. But study the illustration.

Note the vital differences in the construction of this condenser over all others with a Straight Line Frequency characteristic. The long narrow plates, needing so much space on the panel, are eliminated by a cam moving the plates with a lateral action. This is a Ripaults patent.

The whole component is mounted centrally behind a handsome 4 in. dial, which completely covers the area occupied at the back of the panel. There are no swinging plates to get out of alignment. The Dial scale reads to 360 degrees, which, in conjunction with the Straight Line Frequency characteristic, gives exceptionally wide spacing on the lower wavelengths. Separate vernier movement is quite unnecessary.

The Wireless World, of August 4, wrote: " . . . A straight-line frequency condenser which *does* give us dial readings proportionate to the frequency, or true separation between stations, is really the only logical instrument to use. . . . It is to be noted, however, that the usual elongated plate construction of an S.L.F. condenser results in a large amount of room being taken up on the panel. . . . Doubtless, British manufacturers will in time produce a more compact form of straight-line frequency condenser than is at present available."

Ripaults Lateral Action Condensers meet this vital condition. They can be incorporated in your present set with but little alteration, and will take up no more room. Test them for yourself and note how infinitely easier tuning becomes. Selectivity is increased and longer range assured, owing to the increased efficiency of the tuning circuits.

Try your skill at this interesting free Competition. Valuable Prizes. Particulars at Ripault Stand No. 92, Main Hall, National Radio Exhibition. or in return for postcard. from address below.

All you have to do is simply this: Ask for an entry form either at stand or by post, and place 10 special features possessed by Ripault Lateral Action Condensers in what you consider their order of merit. This is not a "popularity" contest but a straightforward competition, in which your opinion is as good as that of the next man. The technically correct order of merit has been worked out by a well-known Radio Engineer, who alone knows the solution.

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GETTING RID OF DISTORTION

THE secret of pure, natural-toned reception of wireless telephony is to avoid overloading. This is also the way to save oneself from becoming an "ether hog." Many wireless enthusiasts still seem to imagine that if they do not push reaction to the utmost limit they are doing all that is possible in the avoidance of "frizzling" or "bubbling" noises (often mistaken for atmospheric interference). These must, of course, be eliminated by paying attention to the soundness of connections and insulation (including that of the panel and freedom from accumulations of dirt or dust) and the maintenance of the batteries in efficient condition. The

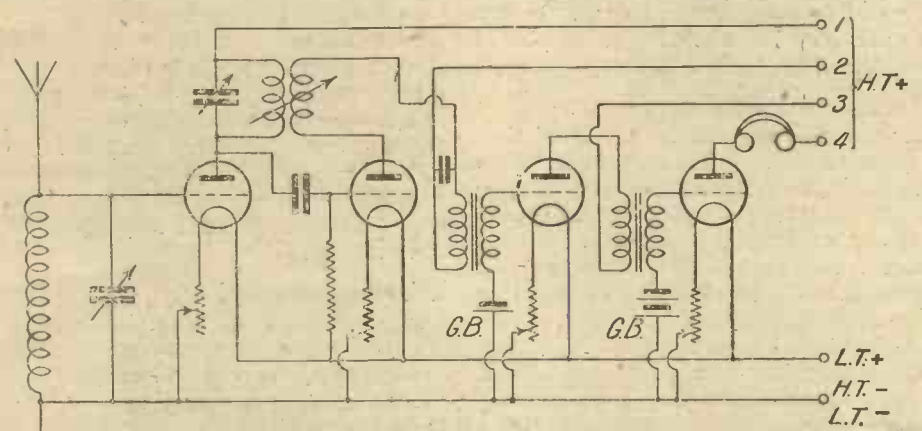

Fig. 1.—Diagram showing Bad Points of Standard Four-valve Receiver.

overloading. This is not the case. A valve may be overloaded without being on the verge of oscillation.

Nor are the valves the only parts of the set susceptible of being worked beyond the limit of their powers. Neither is a technical overloading, or the incorrect adjustment or design of components, necessarily the cause of distortion, for there are essentially distorting *methods,* both of amplification and of rectification, and with these no more than an approximation (albeit, it may be a very close approximation) to pure reproduction can be obtained.

Absolutely perfect production is not yet attainable at the transmitting end, but the B.B.C. transmitters, at any rate, are usually much in advance of the receivers in this matter. And, after all, it is our own end of the stick we should look after. Looked at from the receiver's standpoint, this means that our ideal must be an exact reproduction of the modulations (including side bands) of the transmitted wave. This can be done much better than it generally is.

Let us examine the weak points in the average valve receiver, taking the standard four-valver of Fig. 1 by way of example. At the outset we must distinguish between distortion and interference. Interference is the reception of *unwanted* ether waves. Distortion is the failure of the apparatus accurately to reproduce the waves received. There is also a third source of trouble, namely, noises generated within the receiver itself, generally crackling, H.T. battery should always have large reservoir condensers between *each* tapping point and the negative pole to smooth out any irregularities in its action. It is unfortunate that the resistance-capacity method of intervalve coupling, which, as we shall see later, is to be recommended for pure reproduction, is very liable to the development of these noises if everything is not kept in the best order.

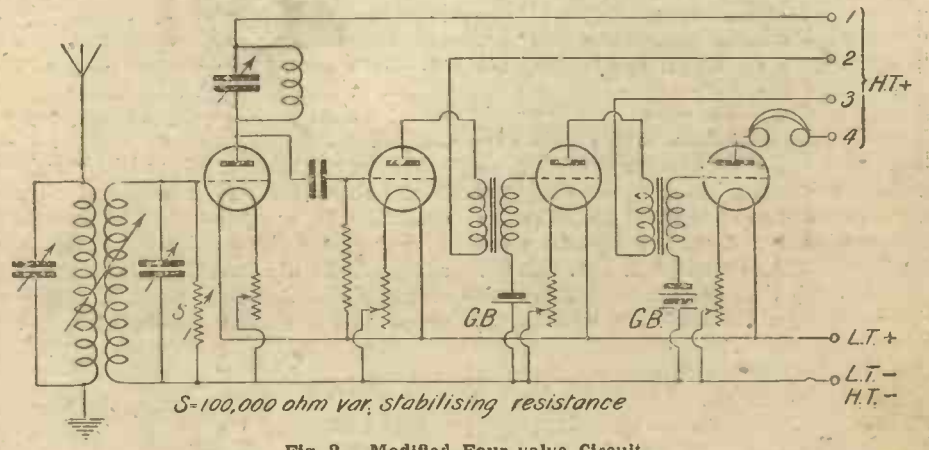

Fig. 2.—Modified Four-valve Circuit.

Interference is fatal to enjoyable reception, and selectivity is therefore essential. This brings us to the first possibility of introducing distortion and incidentally raises the whole question of reaction. The receiver of Fig. 1 has a single tuned-aerial circuit. Provided a really good low-loss coil and condenser are used, this is generally fairly selective, but not unduly so. Every additional tuned circuit between the aerial and the rectifier operates to improve this selectivity, and (apart from other considerations) the tuned H.F. anode will probably make the Fig. 1 circuit practically as selective as a loose-coupled tuner preceding a simple detector valve.

Reaction Effects

But the use of reaction complicates matters. Reaction operates to reduce the resistance of the circuit into which it is introduced to the frequency to which it is tuned, *but not to other frequencies.* It thus greatly sharpens the tuning, but if reliance is placed on it to provide selectivity, as well as to increase signal strength, it is very likely—quite apart from oscillation—to introduce distortion by cutting out the side-band frequencies.

A telephony receiver should not be so selective as to cut out frequencies differing from that of the unmodulated carrier wave by less than the highest audio-frequency. It can easily be made so, if excessive reaction is applied. The soundest way of ensuring reasonable selectivity is to reduce the aerial damping by looking to the proper insulation and connection of that circuit (especially the earth) and the efficiency of the tuner. It is often worth while to go in for a loose-coupled tuner and abolish the swinging reaction coil altogether (see Fig. 2). There will still (if the circuit is efficient in other respects) be enough reaction, by virtue of the coupling of tuned-anode to undamped secondary through the H.F. valve. It may even prove excessive if the coupling is very loose.

A generally accepted method of correcting for excessive reaction in an H.F. valve

(Continued at foot of next page)

WHA WIRELESS HAPPENINGS ABROAD

AS a reply to the point raised by Ludwig Kapeller, editor of the Berlin radio journal *Funk*, as to whether international slang is permissible in broadcasting, the well-known Parisian humorist and speaker in the Journal Parlé at the Eiffel Tower station, M. Georges Delamare, has sent me the following interesting note on the origin of the word "Boche," a term still sometimes used at the Paris stations and apparently much resented by German listeners: "Vous voulez savoir quelle est l'étymologie de l'expression 'Boche'? Eh bien, au lendemain de la guerre de 1870, les Allemands, et aussi les Italiens, reçurent, dans l'argot des bouchers de la Villette alors fort répandu, la terminologie de 'boche,' ce qui donna Alboches et Italboches. Quand éclata la guerre de 1914, le peuple retrouva dans sa mémoire cette expression de 'Alboche,' mais, comme aujourd'hui on abrége tout, on adopta 'Boche,' tout court."

New High-power Stations

They say that the new station on the Rhine at Langeberg will have a power of 60 kilowatts; that there will soon be a 50-kilowatt transmitting station at Madrid, and that the Eiffel Tower station is also going up to 50 kilowatts; and that the Berlin high-power station, Königswusterhausen is to raise its power to 100 kilowatts, five times the present strength of Daventry! No doubt Daventry will have to follow suit.

There is even some talk in certain inner circles that the great station at Rugby is to experiment with some musical transmissions at 200 kilowatts. I should like to hear that! Although it is nominally given out in Germany that the high-power stations are for the benefit of German crystal users, nevertheless, if one listens closely to what is being said, and reads a little between the lines in the foreign radio papers, it is very evident that the real object of these big stations in Germany is international propaganda and the widening of German influence abroad. It is a regular scientific race for the Empire of the Ether!

Continental Technics

It must be very interesting to wireless experimenters and inventors to listen to the talks from the French and German engineers on radio topics which are continually cropping up at all sorts of stations on the Continent; it seems to me that many valuable ideas might be gathered this way. One gets all sorts of curious suggestions while unsuspecting inventors are rattling away before the microphone in distant countries, for they let things slip out which probably they would rather have kept to themselves. One is not so cautious whilst speaking as whilst writing, and a thought, a hint, is often very valuable. For example, a Dutchman claims to have invented a means of eliminating atmospherics, and an Austrian inventor claims to have perfected television.

German radio fans, "Funk-Bastlers," have been running a heated argument in the magazine *Funk* as to whether it is possible to regenerate H.T. batteries; many experiments have been tried with varying success. One Bastler tried heating the old battery on an ordinary gas-ring; he was not very successful, although the heat "made it wake up" for a time. Another experimenter tried recharging the battery exactly as though it were an accumulator, and seems to have been more successful; he claims to have often "regenerated" flash-lamp batteries in this way, and reports that batteries can be recharged like this unless the zinc cells have been too much eaten away. Yet a third Bastler reports that the best thing for H.T. batteries is to always store them at a temperature of 25 degrees, but use them at a temperature of from 40 to 50 degrees, and claims that a battery used in this way will retain its original strength for at least a couple of months in daily use, the internal resistance per cell only rising from .5 to .6 ohm.

Wireless Abroad

If you intend taking a receiving set with you to listen-in at times during a Continental tour, you will find many formalities have to be attended to in entering certain countries. In Switzerland, for example, you have to notify the authorities what you are taking, where you come from, where you are going to, who you are, what you are, when you were born, when you expect to die, and all the rest of it. And you have to pay subscriptions and leave deposits, and all sorts of unnecessary technical precautions. It seems to me that radio facilities for the traveller abroad will have to be made more reasonable and of a more international nature. To show your British licence ought to be sufficient in any part of the world, without having to comply with more regulations. LYONS.

"GETTING RID OF DISTORTION" (*continued from preceding page*)

is the use of a potentiometer, giving positive grid bias and damping by grid current. But, in the quest for pure reproduction, we must reject this, since the grid current gives rise to unequal amplification (the very form of distortion which we use *negative* bias to counteract in L.F. valves). Small though this effect is with the weak H.F. impulses, it should be avoided if possible. A preferable method of damping is the use of a 100,000-ohm variable resistance across the secondary (as shown dotted in Fig. 2). But with no swinging-coil reaction no damping device may be needed.

We must next consider the rectifier. Fig. 1 shows the all but universal "leaky-condenser" or "cumulative" method. *This is essentially distorting.* Cumulative rectification was evolved for receiving morse, not telephony. There is not space to go into the theory of it here, but a glance at the diagrams in any textbook will show how radically the shape of the curve of rectified current departs from the true unrectified half-wave. By suitable adjustment of leak and condenser values very good results can be obtained, but they are never perfect. Why, then, is the method so popular in preference to the practically undistorting ones, (*a*) the crystal and (*b*) the valve operated at its "lower bend"? Probably because it (*a*) is less trouble to operate, and it (*b*) gives *louder* signals. H. W. S.

(To be concluded.)

See THE COCKADAY SET on the "A.W." Stand (No. 99)

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THE NEON TUBE IN WIRELESS

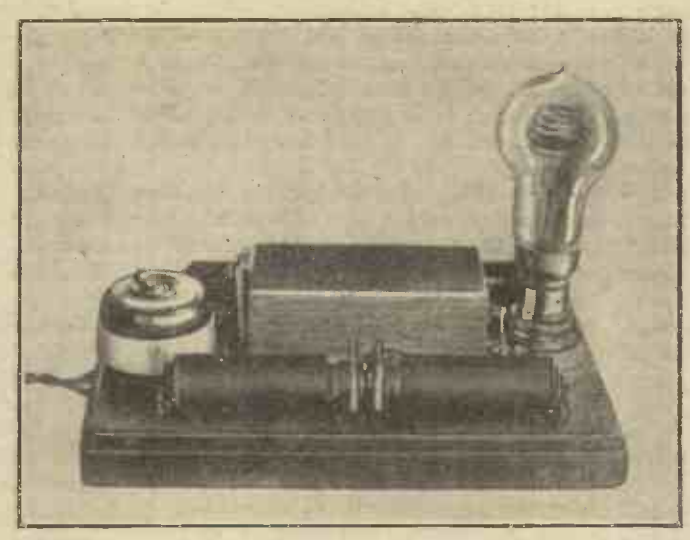
A simple piece of apparatus with a surprisingly large number of uses

DURING the past few years there has been developed and placed on the market a very useful, and, at the same time, inexpensive adjunct to wireless experimental work, the Neon tube, commercially known as the Osglim lamp. This lamp has so many uses that it is thought that a description of some of them and other technical details might prove interesting.

General Considerations

It will be as well to outline a few of the physical properties of the Neon tube in case any aspect of the uses of it be neglected in this article.

Perhaps the most startling of its characteristics is the fact that it does not obey Ohm's law. The sketch, Fig. 1, illustrates a characteristic curve taken from one of a batch of tubes. It will rarely be found that any two tubes have the same characteristic, neither therefore will they have the same resistance. It appears that this is largely a matter of manufacturing detail, and there is at present no need for exactitude owing to the fact that the tube is used largely for such purposes as illuminated advertising signs. The tube has not therefore reached the stage of scientific perfection such as is demanded for radio experiments. Some lamps will be found to possess sudden kinks in the curve where the discharge between the electrodes changes in direction with a given change in the applied voltage and spreads across some other portion of the electrode. This would appear to depend to a large extent upon the shape of the cathode of the lamp, and those which are the least prone to this feature are of the beehive spiral-shaped wire variety. Fig. 2 shows the elements of a typical commercial Neon tube. It will be seen from the curve in Fig. 1 that no discharge between the electrodes occurs at a voltage of less than 130 volts. This curve was taken when applying a maximum voltage of 155 volts in the first place, and it will be noted that the current dissipation ceases at 130 volts, in other words, as the voltage pressure was reduced the lamp entirely ceased to glow at 130 volts.



Voltage Reduction and Filter Apparatus Employing Neon Tube.

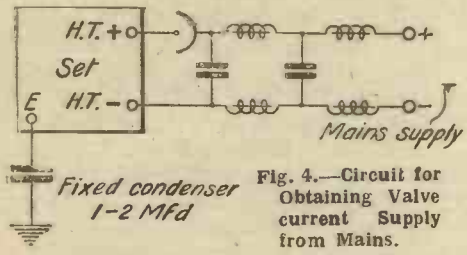


Fig. 4.—Circuit for Obtaining Valve current Supply from Mains.

The curve, Fig. 3, illustrates a curve taken on a tube with the voltage applied *from a minimum* of 130 volts. It will be noted from this that the lamp did not commence to pass current until the voltage was considerably higher than that at which the discharge ceased in the test applied in order to obtain the curve shown in Fig. 1 (135 volts).

The next feature of interest is the fact that the lamp is more conductive in one direction than in another. Maximum current passes when the larger element is the cathode or negative pole. Like all other incandescent lamps, Neon tubes must never be run at voltages in excess of those at which they are rated.

Some Adaptations

From the above considerations it becomes obvious that the tube is capable of many applications for wireless work. That which will probably appeal most of all to the amateur experimenter is the fact that the tube may be used for breaking down high voltages so that they are suitable for ordinary receiving valves. A method is shown in Fig. 4. This diagram shows a Neon tube connected up to the 230-volt public supply mains with a filter device applied to smooth out the ripple caused by the commutators of the machines at the generating station.

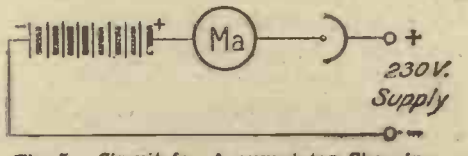


Fig. 5.—Circuit for Accumulator Charging.

The filter system comprises two pairs of

(Continued on page 338)

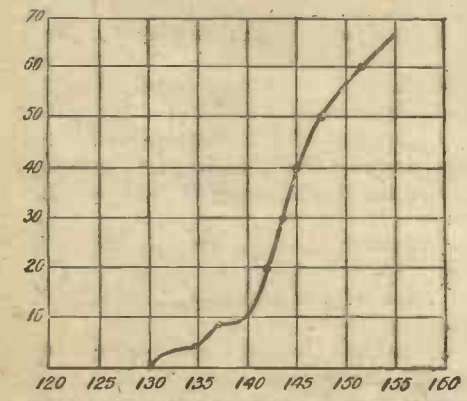


Fig. 1.—Characteristic Curve of Neon Tube.

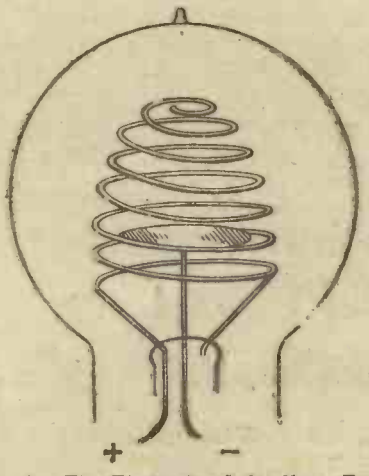


Fig. 2.—The Elements of the Neon Tube.

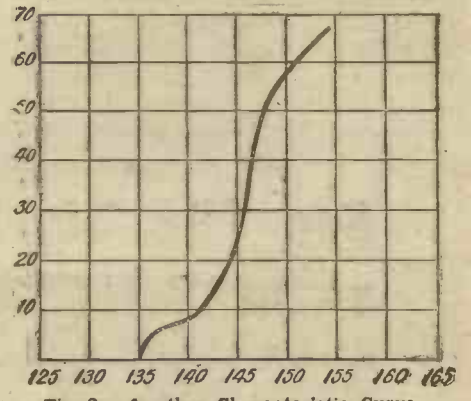


Fig. 3.—Another Characteristic Curve.

We lead off our Special Exhibition Articles with "Thermion's" Impressions

"THERMION" LOOKS AT THE EXHIBITION

OUR CONTRIBUTOR'S FIRST-HAND IMPRESSIONS

EACH wireless exhibition is naturally better than the one that preceded it; but never has such progress been made as in the twelve months, or rather less, that have passed between the closing of last year's exhibition and the opening of the present one. And you have a chance now such as never came your way before of gauging the extent of the forward march. Previously you have been able to see the products of only one section of the trade; but the exhibition that is now being held at Olympia is open to every genuine manufacturer of wireless goods in Great Britain. Thus for the first time you have under one gigantic roof a really representative display, from which you can judge what has been done and what is likely to be done in the immediate future.

The Chief Improvements

What are the chief improvements that have been made? Well, there are heaps of them. First and foremost I would put those that have taken place in the matter of high-frequency amplification. Not so long ago we were content with a very modest amount of magnification for each stage; we had to be, because in order to hold down our receivers and prevent them from misbehaving themselves it was necessary to introduce various "losser" devices into the H.F. circuits. This meant that we didn't get anything like the selectivity or the sensitiveness that should theoretically have been ours. The coming of the neutrodyne has changed all this. There is hardly a good "straight" set at the show that is not neutrodyned or balanced by some means that does not introduce damping.

The problem of direct pick-up has been successfully tackled, too. One reason why we used not to be able to obtain selectivity was, though few of us realised it, that our coils were acting, with misguided zeal, as small frame aerials and bringing in unwanted signals no matter how hard we tried to "out" these with the tuning condensers. And not only did they pick up signals from the undesired station direct; they picked them up from one another! Immense progress has been made in the scientific arrangement of inductances in receiving sets and in screening them in such a way as to confine their activities to their proper sphere.

Wireless has been wonderfully simplified in the last year. Knobs, in fact, are out of fashion except in very small numbers. Most complete receivers have very few excrescences upon their shining panels. In several cases two knobs suffice to control a five-valver; some sets have but one, and I was shown a wonderful six-valver (still in the "hush-hush" stage) in which perfect control of three H.F. stages is accomplished by means of a single dial.

Terminals, if there are any, are decently hidden from sight; but as often as not they are replaced altogether by the neater and far more convenient plug and jack. Wireless is becoming wire-less, *outside* the cabinets of receivers at any rate. You will hardly find a trailing flex lead, except those which yoke up loud-speakers, in the whole exhibition. Sets on the whole are far more compact than of yore, though there are a few of pretty large size. However, the cabinets of many of the big fellows contain not only the loud-speaker, but also the batteries and other things that we used to regard as externals.

Semi-automatic

We have now reached a stage at which a person with no knowledge whatever of wireless or of electricity can install in his home a small cabinet which enables him to hear the local station by the mere flicking over of a switch, whilst to tune in several other stations is, even for the totally unskilled, no more difficult than cranking up the gramophone or changing a record.

Receiving sets are, as an American would say, much easier to look at than they used to be. At one time we had severe cabinets that, however beautiful they might be to the eyes of the radio enthusiast, were merely ugly, though not perhaps offensively so, to the less enlightened. Then, a year or two ago, manufacturers went mad, turning out ornate monstrosities in the way of cabinets that were nightmares to everyone. Now there is a pleasing return to sanity. Makers have realised that the receiving set can be made into a handsome piece of furniture, something whose presence will be welcomed in the drawing-room instead of merely tolerated. You have only to visit the first half-dozen stands at Olympia that you come to to realise what progress has been made in beautifying the receiving set, and by the time that you have completed your tour of the whole one hundred and eighty or so you will be fired with a desire to have something on the lines of the best-looking designs in your own house.

A great deal has been done towards enabling those who have electric light to use

(*Continued in second column of page* 322)

National Radio Exhibition, Olympia, London, W. Opened by Vice-Admiral Sir Ernle Chatfield, Third Sea Lord and Controller of the Navy, on Saturday, September 4th, 1926. (Daily 10.30 a.m. to 10 p.m. Saturday, Sept. 4th to Saturday, Sept. 18th.)

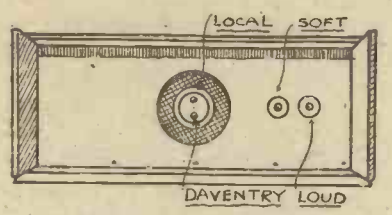
A General View of the National Radio Exhibition, Olympia, London, W.

At the Exhibition

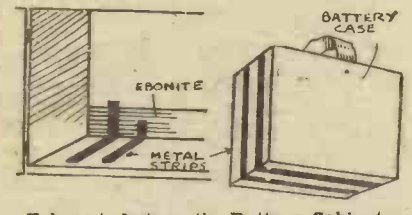
IMPROVEMENTS IN DESIGN

AS NOTED BY OUR CONSTRUCTIONAL EXPERT

TWO general trends are noticeable at the exhibition this year. The first is towards fidelity of tone reproduction and the second aims at maximum simplicity of control. No extravagant claims are made—none that cannot be justified by a demonstration.



Felcourt Press-button Set.



Felcourt Automatic Battery Cabinet.

The present-day purchaser expects that any five or six-valve set will have a range of at least 1,000 miles and, under favourable conditions, double that distance. This sensitivity has been obtained by the use of components having a very high efficiency, and once this sensitivity had been obtained the manufacturers were able to devote their attention to the features of simplicity and pure reproduction.

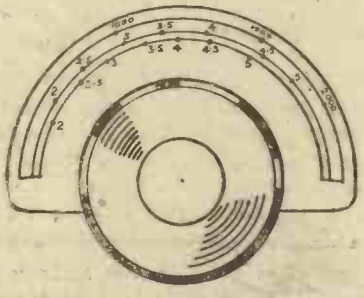
The sketches on this page show some of the receivers that will be sold to the public this season.

One of the exhibits most interesting to the novice is the "press-button" receiver shown by Felcourt Products, Ltd., at Stand No. 24. This receiver is a straight three-valve circuit with jack switches to give a choice of two or three valves. These jacks are labelled "soft" and "loud," whilst the tuning is fixed for two definite wavelengths suitable for the local station and Daventry. Either station may be heard at will by merely pressing one of two buttons. All that appears on the panel are the two press-buttons and the "loud" and "soft" jack switches. Even the battery connexions are semi-automatic, the H.T., L.T., and grid-bias batteries being mounted in a special cabinet having flat copper contact strips on which similar contact strips, mounted on each battery case, rest. By a special arrangement it is impossible to place the battery in the cabinet the wrong way round.

Another interesting exhibit of the same type is made by Wilkins and Wright and is shown at Stand No. 74. This is a set which possesses one tuning dial and a switch to change over from the local station to Daventry. The dial operates a variable condenser which tunes an inductance consisting of several basket coils.

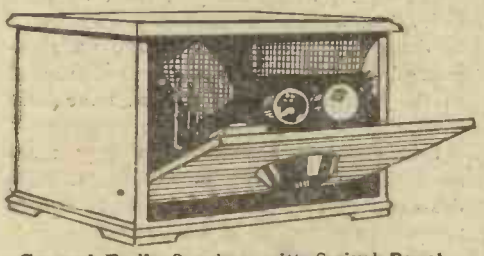
Fixed regeneration is introduced into both these circuits, and the volume obtained is quite sufficient for loud-speaker reception.

For those to whom a receiver surrounded by and connected to various untidy batteries is anathema, a corner cabinet set will be interesting. The top portion of the cabinet contains a built-in loud-speaker having a wood horn attached to an Amplion loud-speaker unit. The middle portion contains the four-valve receiver, whilst the bottom portion houses all the batteries. Once the set has been tuned all the doors to the cupboards may be shut except those covering the loud-speaker. The cabinet, which is extremely well made, may be obtained finished in oak or (we believe) mahogany. It may be seen at Stand No. 1—that of Jonathan Fallowfield, Ltd.



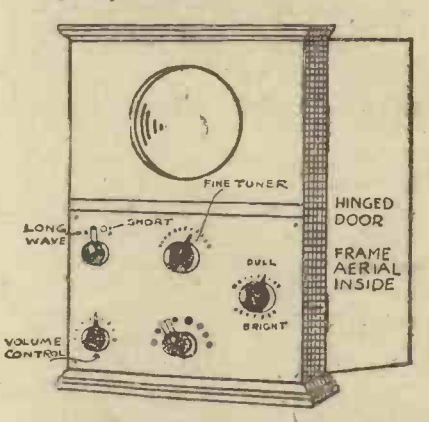
Dial Calibrated in Wavelengths Fitted to B.S.A. 7-valve Receiver.

For high-class workmanship combined with a design for faithful reproduction of speech and music the reader is recommended to visit the Burndept stands, Nos. 140, 141 and 144. Here they will see a



General Radio 2-valver with Swivel Panel and Baseboard

very attractive-looking super-heterodyne, which uses a frame aerial built on the Anderson principle. The intermediate frequency transformers are wound on low-loss principles, and each transformer is shielded, the shielding providing just enough damping to prevent instability. It is interesting to note that this firm are now using Marconi Ideal transformers in the last L.F. amplifying stage, but that the first L.F. stage consists of a resistance-capacity coupled valve.



Radio Instruments 3-valver.

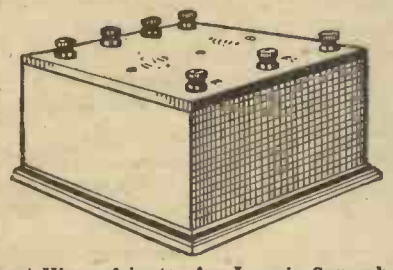
Some well-designed receivers are made by Radio Instruments, Ltd., and are shown at stands Nos. 145 and 147. There is a very handsome five-valve receiver housed in a cabinet that is itself a piece of furniture. The circuit consists of two impedance-coupled H.F. valves, a valve detector, and two L.F. amplifying stages. Variable condensers of unique design, employing an epicyclic form of slow-motion gearing, are used. These condensers have a particularly smooth action, and it is to be regretted that R.I., Ltd., cannot see their way to place them on the market. They inform us, however, that these components are so expensive to produce that they cannot be sold at a competitive price.

A smaller receiver, containing a built-in loud-speaker and provided with a frame aerial hinged at the back, is also produced. A point in the design of this set is the complete elimination of variable condensers. Several very interesting exhibits are to be seen on these stands, and they are well worth a visit.

Quite an interesting development in the design of tuning systems is the actual calibration in metres of the tuning dials. Such a system has everything to commend it, simplifying tuning, as it does, to an enormous extent. A good example of this will be found at the B.S.A. stands, Nos. 13 and 163. The tuning dial of the seven-valve Universal set, which is an improved form of the older Western Electric super-heterodyne, is calibrated in metres.

"Improvements in Design" *(continued)*

Another well-designed feature to be seen on the B.S.A. stands is the special tuner unit used in the two- and three-valve sets. This tuner operates in a dual capacity, first providing an automatic change-over from the lower to the higher wavelengths, and secondly enabling the



Short Wave Adapter for Igranic Super-het.

user to apply reaction on either wavelength band.

In one or two cases we have noticed the use of metal panels—an idea which hails from America. At the B.S.A. stands, and also at the Success (Beard and Fitch) stand, No. 83, will be seen examples of oxidised metal panels, giving a very attractive appearance as well as effectively shielding the set from outside interference. At the General Radio Co.'s stand, No. 103, is shown a two-valve receiver mounted in a small cabinet, the metal panel of which and the baseboard may be swung forward on two pivots, thus giving instant access to the valves, etc., mounted behind the panel.

Super-heterodynes are very prominent, and there are some very ornate examples to be seen on almost every stand. There are also one or two very compact portable super-heterodynes, one of which, made by the Radi-Arc Electrical Co., Ltd., at stand No. 89; we had a recent opportunity of hearing the number of stations that could be tuned in. Most of the principal European stations could be received on the loud-speaker.

At the Igranic Electric Co.'s stands, Nos. 72 and 73, an interesting fitment is shown which, when attached to their super-heterodyne receiver, renders the latter suitable for reception on a wavelength band of 40 to 80 metres.

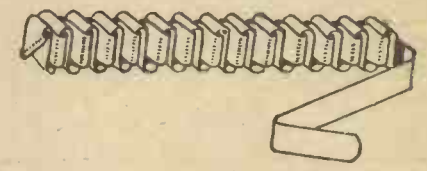
With regard to tuning coils and methods of tuning, there is plenty of originality shown in the way in which a number of separate tuning circuits may be controlled by one dial. An ingenious experimental receiver employing the method indicated above is shown at Peto-Scott's stand, No. 161.

The tuning coils themselves vary so much in design that it is impossible to give details of the hundreds of different designs, good, bad or indifferent. We can state definitely, however, that the majority are good—really good—and very few are bad. Screened coils seem to be gaining a little in popularity, although in our opinion some of the screens used are so close to the coil they screen that the damping introduced must be considerable and tuning flat. Screening is a ticklish problem, and is in danger of becoming a fetish.

Valve Exhibits

Some very interesting valve exhibits are shown at the several valve manufacturers' stands. At the General Electric Co.'s stands, Nos. 61 and 63, will be seen their complete range of valves and receivers, including the new power rectifying valves, the U4 and U5. The latter possesses a double plate and gives full wave-rectification, and will supply sufficient current and voltage for the plate supply of any valve receiver, including the multi-valve super-heterodynes. At this same stand a model of the Baird Television system is shown.

The Mullard Radio Valve Co. also show their complete range of valves, including the rectifying valves DU5 ano DU10. In the many H.T. and L.T. battery eliminators that are on show at the exhibition these two valves are used. They enjoy a deserved popularity, which we are



Benjamin Zig-zag Earth.

able to justify by our own tests. The DU10 is one of the best valves for the purpose it fulfils on the market.

It is only natural that Alfred Graham and Co., manufacturers of the well-known Amplion loud-speaker, should bring out a series of valves which they know will suit their own loud-speaker. These valves are for the most part manufactured under the "Shortpath" patents, and are exhibited at stands Nos. 131 and 132.

Incidentally another firm, Benjamin Electric, Ltd., are producing valves under the Shortpath patents, and these are to be seen at stand No. 105. Here is exhibited a new form of earth plate called the Zig-zag, which, the makers claim, has a much higher efficiency than that obtained by connecting to a water-pipe or other device customarily employed. The makers back up their claims by giving curves showing the micro-amperes passing in the phone circuit of an ordinary crystal set.

"'THERMION' LOOKS AT THE EXHIBITION" (*continued from page* 320)

the mains for running their sets. Progress here has been hampered by the amazing variety of voltages and periodicities in use in this country, and there are probably many places where direct working off the mains would still not be found satisfactory. You can, however, make use of a particularly neat kind of apparatus that several firms are showing. This is a permanently fixed charger for both high- and low-tension accumulators, a contrivance, not much bigger than a cigar-box, which is controlled by two switches. When you close down for the night you put these in the "charge" position; both batteries are given a refill whilst you sleep. When you want to use the set turn the switches over to "receive." This cuts out the mains and connects up the batteries to the set. Simple, isn't it?

Now for the gadgets, which to the constructor will be perhaps the most interesting part of the exhibition. My impression with regard to these is that at long last one can obtain the kind of components that in the past have been but beautiful dreams. Of coils you will find every variety, but everywhere efficiency is the keynote. Coils are now designed really scientifically; there are types with dense fields, such as we need in coupled circuits, and types with no field at all worth speaking of, which are just what we need in multi-stage high-frequency amplifiers. Methods of winding have been greatly improved, and much ingenuity is displayed in the efficient mountings that have been designed.

Like cabinets, components this year are *sane;* there are few, if any, of the ill-designed and useless things that used to tempt the thoughtless enthusiast to stud his panels with little knobs, none of which had any particular effect upon his results, save perhaps that their multiplicity caused him to get thoroughly lost whenever he tried to alter his tuning. Everything is eminently practical. Examine, for instance, the pierced copper ribbon intended for making sound connections easily, quickly and without the use of solder; you can see at once that it is just what you want in your wireless workshop, for it has a hundred other uses besides. Look at the fixed resistors, the neutralising condensers, the valve-holders incorporating grid leak and condenser. You know that they are made on the right lines, that they are going to save trouble instead of causing it.

Those, then, are my first impressions of the exhibition. To sum up, the biggest advance that we have yet seen has been made in the last twelve months. The whole tendency in receiving sets is towards simplicity combined with high efficiency, whilst in components our makers are now producing such good things that they should have little to fear from America, who at one time looked like capturing a large part of this market, so far, at any rate, as instruments with moving parts were concerned. THERMION.

THE NEW LOUD-SPEAKERS

A STAFF REVIEW OF THE LATEST DEVELOPMENTS

THE loud-speaker is an instrument to which there is little history attached. Five years ago it was practically unknown. And then came broadcasting, and a type was developed which was little more than a large phone with a trumpet attached. Defects were very apparent, and there is no doubt that the results obtained did not do much to popularise broadcast reception. The *type* still persists; in fact it is probably the most popular form; but its performance has been improved beyond all comparison. A little later signs were not wanting that the horn type was not to be the only effective instrument, and to-day—at this season's Exhibition—we see them in forms which are scarcely recognisable as loud-speakers. In fact, this is one of the remarkable features of the exhibition.

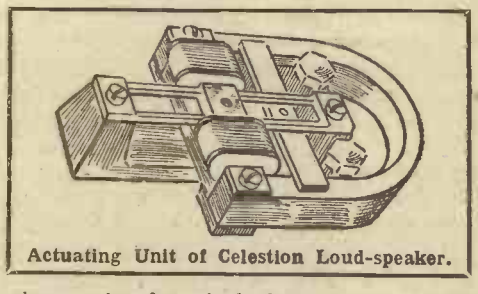
Present-day Types

Roughly, loud-speakers may be divided into four types as follows: the ordinary horn type, the concealed-horn type, the large fixed-diaphragm type, and the large free-diaphragm type. The horn type follows a fairly uniform practice and individual characteristics are evident chiefly in the shape, material and ornamentation of the horn and the methods of adjusting the diaphragm. This class of instrument is shown by most of the leading makers, among whom may be mentioned Alfred Graham and Co., S. G. Brown, Ltd., General Electric Co., Ltd., B.S.A. Radio, Ltd., British Thomson-Houston Co., Ltd., Wates Bros., A. J. Stevens and Co., Ltd., and Fellows Magneto Co., Ltd.

Much ingenuity is evident in the construction of the concealed-horn type, the complete instrument in most cases resembling a mantel clock; in fact in one example shown a clock actually has been incorporated. Notable amongst this class of instrument are the Amplion Radiolux, Brown Cabinet, and B.S.A.

Reflex Loud-speakers

In the same class are the reflex loud-speakers, which are a combination of horn and reflector. These are made in many ingenious forms; for instance there is the Claritone Wall Plaque and Claritone Statuette. Probably the most novel make of this type is the Beco, of which one design takes the form of a rose bowl and the other a solid silver épergne, the latter priced at one hundred and sixty guineas! In the former water can be placed without affecting the operation of the loud-speaker, the loud-speaker unit being in the base underneath the actual bowl. The diaphragm is of conical shape and is made of aluminium with a diameter of about five inches.



Actuating Unit of Celestion Loud-speaker.

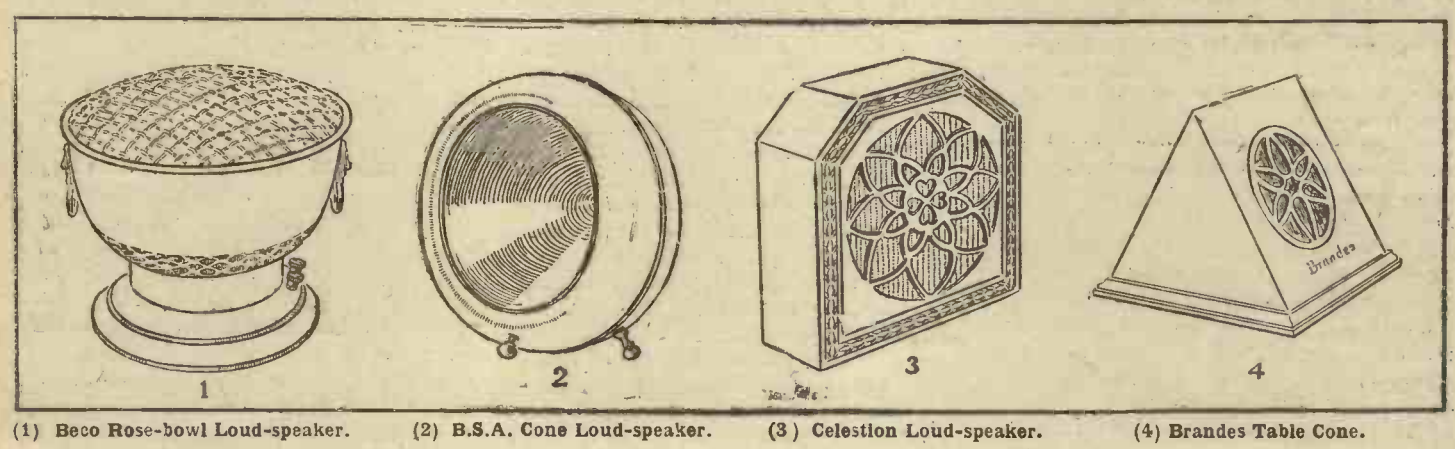
Diaphragm Types

The greatest variety of form is evident in the diaphragm types of loud-speakers, most of which are now made in cabinet models, as a rule resembling a mantel clock. These are really developments of the pleated-paper and cone loud-speakers, and, as mentioned earlier, are of two constructions, the fixed diaphragm and the free diaphragm, the former having the outer edge fixed and the latter free or partially free. In this group are the Sterling, Brandes, Pirillion, Clarissa, Celestion, and the Hedgeland Pictorial loud-speakers. In this last-named instrument there is nothing to indicate that it is anything but an ordinary picture which is hung on the wall in the ordinary way.

A loud-speaker of unique appearance is the new Brown disc loud-speaker, a photograph of which appears on page 305 of this issue. This instrument is particularly graceful in shape, and as it can be obtained in black and gold or oxydised silver finish is an ornament in itself. The operating unit embodies the tuned reed.

Two instruments of the mantel type, of unique design, are the Brandes Ellipticon and Table Cone, both of which are armature operated. Another instrument of this type, in which there are many unique features of interest, is the Celestion, which has a controlled diaphragm of special construction. An armature is used to drive the special large-diameter reinforced conical diaphragm, which it is claimed, is constructed to provide uniform response at all frequencies.

One of the most original and interesting loud-speakers is the Donotone, manufactured by The Donotone Loud Speakers, and exhibited at stand No. G236 in the gallery. The design of the instrument is absolutely unique. There is no reed or diaphragm, but there is a peculiar system of obtaining equality in resonance over the complete musical scale by introducing spiral steel springs.

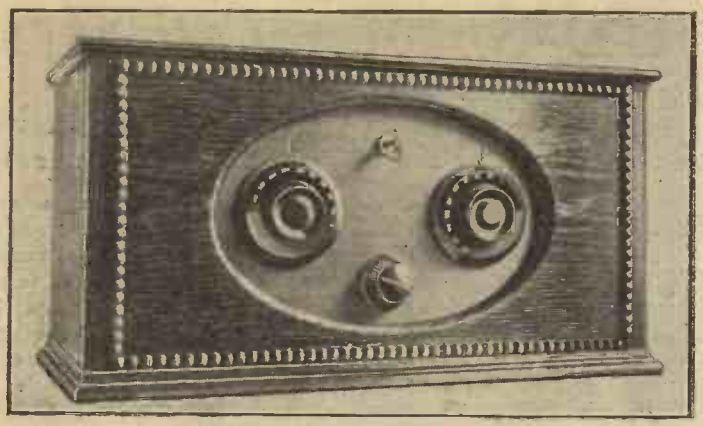


(1) Beco Rose-bowl Loud-speaker. (2) B.S.A. Cone Loud-speaker. (3) Celestion Loud-speaker. (4) Brandes Table Cone.

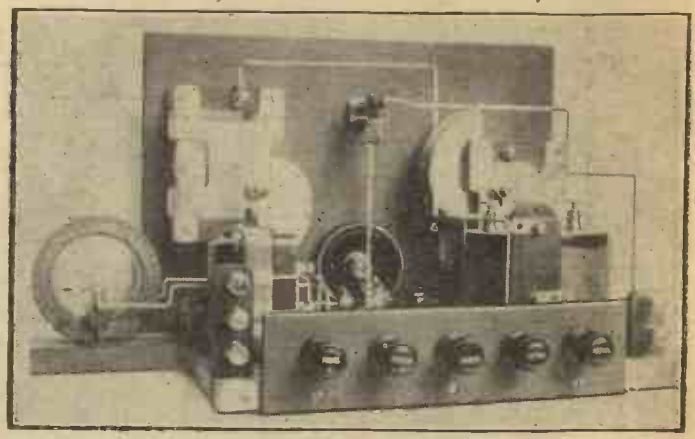
THE NEW WAVELENGTHS

As we go to press we learn that the new European wavelength scheme is not likely to come into operation until sometime in October. We regret that unfortunately this information was received too late to withdraw our revised Broadcast Telephony page. We therefore refer our readers to the previous issues for full particulars of the present wavelengths of both British and foreign broadcasting stations.

FURTHER EXHIBITION REVIEWS ON PAGES 327 and 328.



Front View of Receiver.



Back-of-panel View.

TWO-VALVE L
SET
REINARTZ-TY

SELECTIVE and SIMPLE

The Comple

THERE are different ways of increasing the selectivity of a receiver, but in the set to be described below this object has been attained by coupling the aerial circuit aperiodically to the grid coil. Moreover, it is also essential for tuning in distant stations to have a smooth reaction control, which has been obtained by using Reinartz method of reaction. Both magnetic and capacity reaction are employed, the former being fixed, while the latter is controlled by a variable condenser. This results in simplicity of operation, there being only two controls in the receiver, the aerial tuning condenser and the reaction condenser. The receiver has two valves (detector followed by an L.F. amplifier), but no switching has been incorporated for cutting off the last valve, as loud reception is not usually possible with detector valve alone. The circuit is shown by Fig. 1.

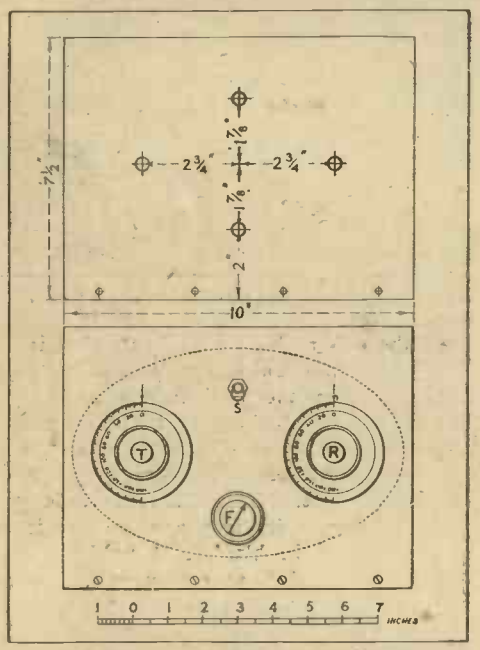


Fig. 2.—Layout and Plan of Panel.

A departure has been made in the general design of the cabinet, in that an elliptical hole has been cut in the front of the cabinet, which covers the part of the panel fitted with the control knobs. This not only improves the appearance of the receiver, but also keeps the size of the panel small, irrespective of the size and shape of the baseboard. The cabinet also contains the high- and low-tension batteries, thus avoiding the use of external leads.

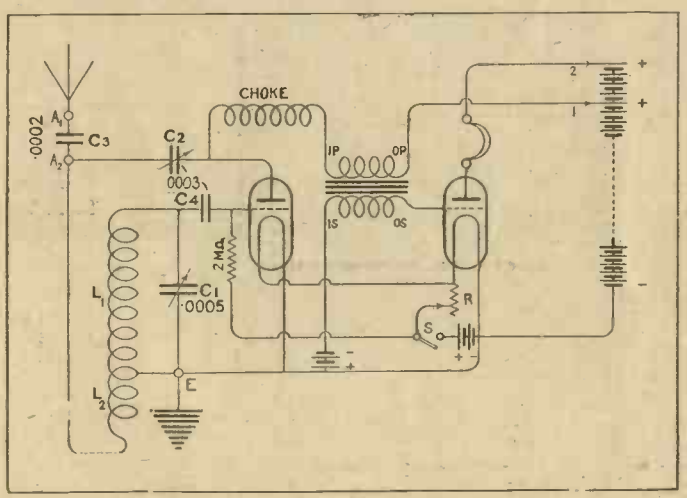
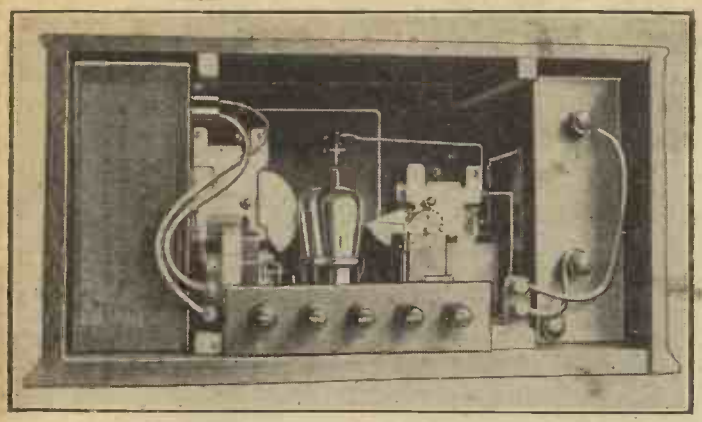


Fig. 1.—The Circuit Diagram.

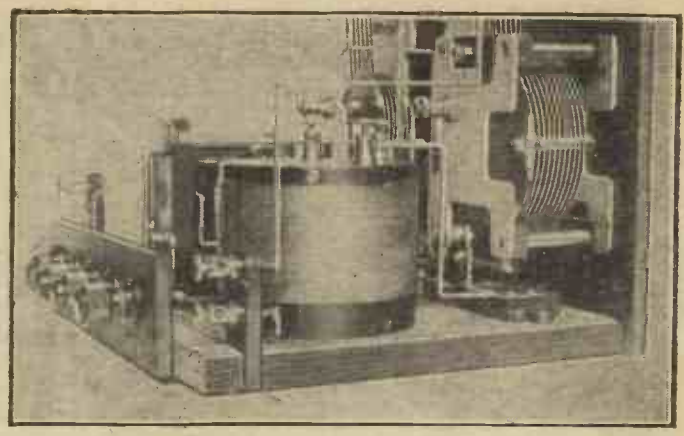
Components

The following is the list of components required, with the names of the manufacturers, though in certain instances other makes could be used: Two square-law low-loss variable condensers: C1 .0005 microfarad, C2 .0003 microfarad (Ormond); one ebonite panel, 10 in. long by 7½ in. wide by ¼ in. thick; one ebonite strip, 7 in. long by 1¾ in. wide by ¼ in. thick; one ebonite former, 3 in. diameter and 2½ in. long; one L.F. transformer, ratio 5—1 (Royal); one rheostat, 25 ohms (King); one fixed condenser, C3 .0002 microfarad (Edison Bell); one fixed condenser, C4 .0003 microfarad (Dubilier); one grid leak with holder, 2 megohms (Dubilier); two anti-microphonic valve-holders (Lotus); one push-and-pull switch; five Belling-Lee insulated indicating terminals (two aerial, earth, phones + and −); eight telephone terminals; one No. 250 honeycomb coil (Igranic); No. 16 gauge square tinned-copper wire; No. 26 S.W.G. d.c.c. copper wire; rubber-covered stranded copper wire; cabinet, etc.

The rheostat specified is for regulating the filament current of .06 valves; if valves of a different filament rating are used, a suitable rheostat should be selected.



Rear View with Back Removed.



Close-up View of Components.

A LOUD-SPEAKER WITH PE REACTION

VOLUME with GREAT PURITY

te Receiver.

The Panel

The layout of the panel is shown by Fig. 2, from which the positions of necessary holes can be marked. The panel, after being drilled, is fixed to the baseboard, as shown in Fig. 3. No brackets are used for the purpose, as the method of fixing the baseboard inside the cabinet keeps the panel vertical.

Aerial, earth, and phone terminals are next mounted on an ebonite strip 7 in. long by 1¾ in. wide and ¼ in. thick, which is fixed to the back edge of the baseboard. The terminals for high- and low-tension batteries are fixed on narrow strips of ebonite ¾ in. wide and ¼ in. thick, whose ends fit into the slots cut in the baseboard, as shown in Fig. 3. These strips are secured in position by ordinary wood screws.

In fixing the choke, which consists of a No. 250 Igranic coil, the coil is separated from the holder and clamped to the baseboard by a small strip of ebonite. Two terminals, to which are soldered the coil ends, are mounted on this strip to facilitate the wiring of the receiver. This method of mounting the choke keeps it away from the remaining components.

Due to a limited space in the receiver, a fixed grid battery is used, consisting of two cells taken out of an ordinary flash-lamp battery, and clamped in position by an ebonite strip screwed to the baseboard. The cells, before being fixed, are wrapped in waxed paper. It is only necessary to have a variable grid battery for experimental purposes, and once a suitable value has been arrived at by trial for a particular valve and a suitable high-tension voltage, it need not be changed provided the same kind of valve and the same H.T. voltage is used.

To save further space on the baseboard and consequent crowding of components, half of the grid leak holder is sawn off, the free end of the leak being fixed in one of the clips of the fixed condenser provided for the purpose.

Wiring

The remaining components are next fitted on the panel and the baseboard, when the receiver will be ready for wiring. Fig. 5 shows the actual details of wiring, while Fig. 1 gives the theoretical circuit. The wire used for the connections is No. 16-gauge square tinned-copper wire. As will be seen from the photographs, the wiring is simple and does not involve the removal of any component from the baseboard or the panel for soldering purposes. The fixed condenser C3 is held in position by soldering it directly to the connecting wires. Other details will be easily obtainable from diagram Fig. 5.

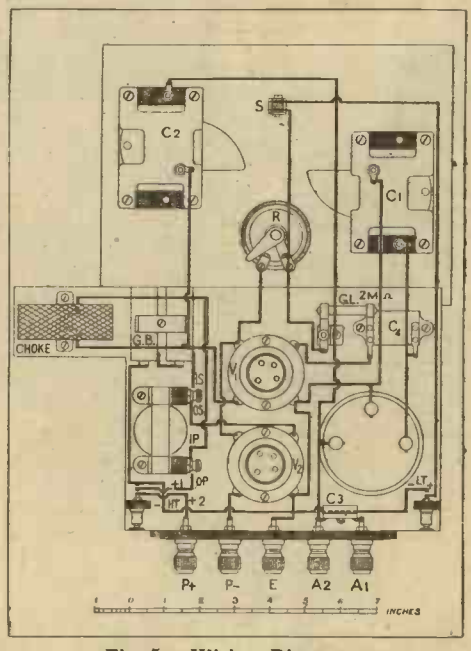


Fig. 5.—Wiring Diagram.

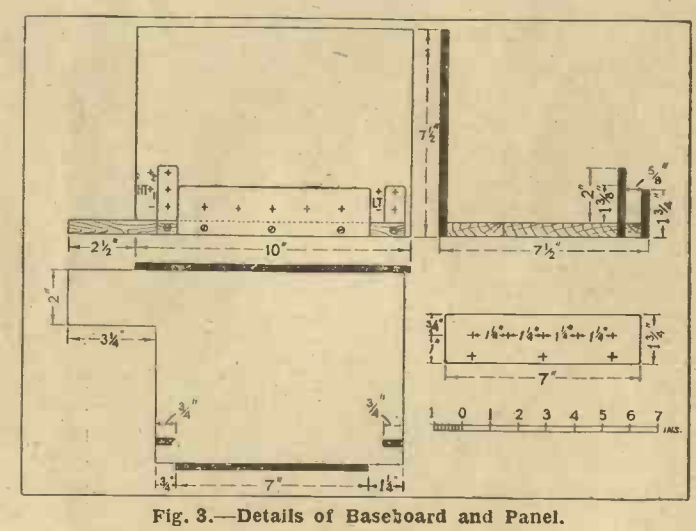


Fig. 3.—Details of Baseboard and Panel.

Tuning Inductance

The tuning coil consists of 60 turns of No. 26 S.W.G. copper wire wound on an ebonite former, which is 3 in. diameter and 2½ in. long. One end of the former is closed by a circular ebonite disc ¼ in. thick, as shown in Fig. 4. On this disc are mounted three terminals. The beginning of the coil is soldered to the first terminal, while the second is connected to a tapping taken at the forty-fifth turn, and the end of the coil is connected to the third terminal. Thus, the finished tuner, which should be given a thin coat of shellac varnish, actually consists of two coils connected in series and closely coupled to one another. The first 45 turns form the closed tuning circuit, while the remaining 15 turns act both as aperiodic aerial and reaction coupling.

For mounting this coil on the baseboard, a ⅜-in. square wooden piece is fixed inside the ebonite former by ordinary screws. Long screws passing through the baseboard and screwed in this wooden piece will secure the tuning coil in position.

The Cabinet

The exact dimensions and working details of the cabinet are given in Fig. 6. The front of the cabinet is also of wood with an elliptical hole 9½ in. long and 6 in. wide cut in it, which will be found to cover the control knobs on the panel. The cabinet is also fitted with a sliding back to facilitate the fixing of the baseboard.

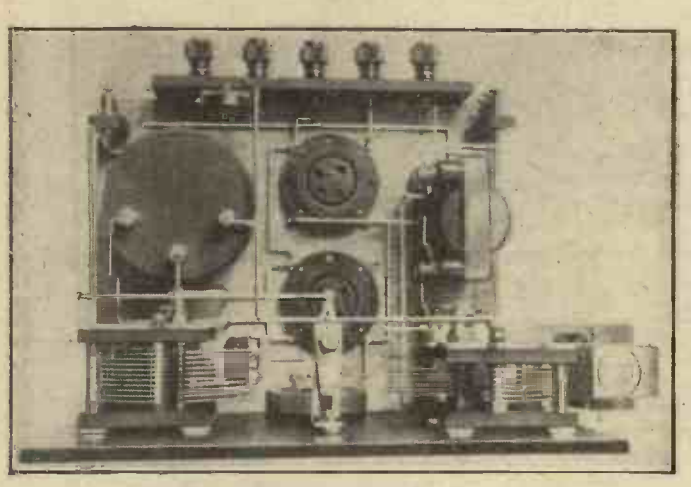
A 66-volt high-tension battery fits on the left, and as the space provided for this is limited, a battery of suitable dimensions should be selected. The low-tension supply is obtained from a three-cell dry battery (Ever Ready No. L.T.6) which fits on the right of the baseboard. This battery is supplied with terminals at positive, 3 volts negative, and 4½ volts negative. When fresh, only three volts should be used for lighting the filaments of the valves, which in the receiver described are of the A.R.06 type; after the battery has been working for some time, its full voltage should be used.

Further constructional details will be apparent from the photographs and diagrams, which are drawn to the given scales. If any dimension is accurately needed, the distance to be measured should be marked on the edge of a strip of paper, which is then placed along the scale given under the diagram, and the required length read between the two marks.

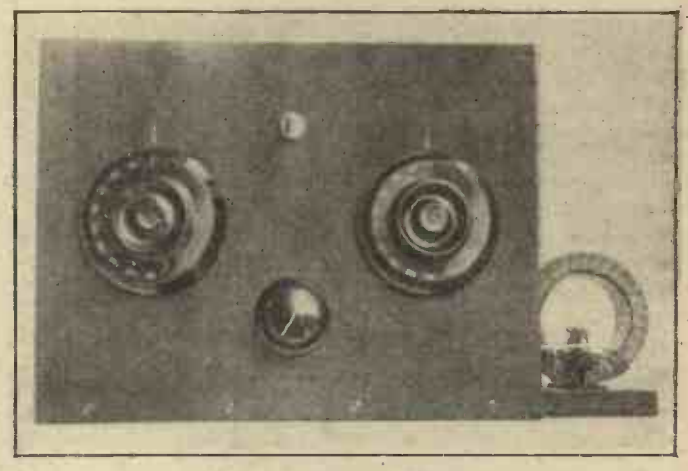
Assembling

The panel and the baseboard are inserted inside the cabinet from the back, and fixed in position by ordinary screws screwed through the base of the cabinet into the baseboard. The free edge of the panel is kept in position by ⅝-in. square wooden pieces, which are screwed to the top of the cabinet. These pieces also prevent the high- and low-tension batteries

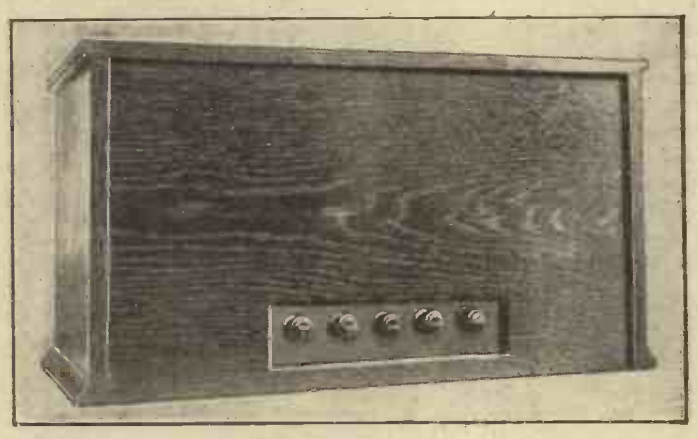
(Concluded on page 345)



Plan View showing Arrangement of Components.



View of Front of Panel.



Rear View of Receiver.

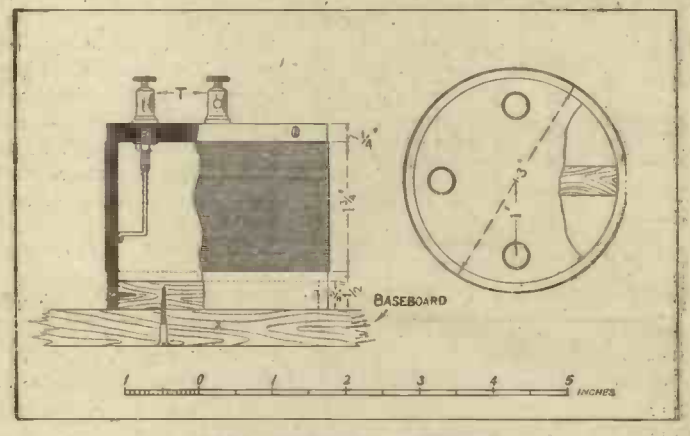


Fig. 4.—Details of Tuning Coil.

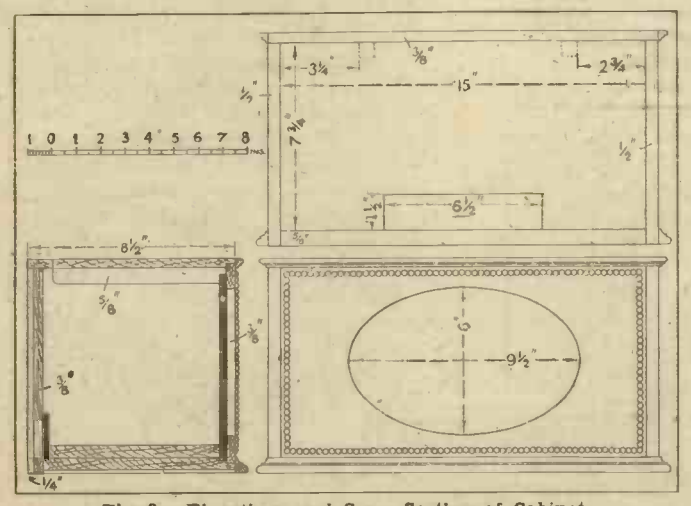


Fig. 6.—Elevations and Cross Section of Cabinet.

POPULAR CIRCUITS IN THE NEW SETS

AN ANALYSIS BY OUR TECHNICAL STAFF

FROM time to time during the past year we have heard of wonderful new circuits which were to revolutionise wireless reception. As far as Olympia is concerned no such revolution has yet been brought about.

When deciding upon the circuits to be used in their 1927 sets, manufacturers have played for safety. They have studiously avoided all those "freak" circuits which may (or may not) give super results in expert hands. They have, and very wisely too, relied upon the well-known and well-tried-out arrangements to give their sets the reliability and consistency in operation which appeal so much to the man in the street.

Super-regenerative circuits and other circuits of American origin, such as the Armstrong and even the Reinartz (so popular among those who construct their own sets), have been passed over in favour of the perfectly normal, plain, "straight" circuits.

Super-heterodynes

The super-heterodyne is of course an exception, but this class of circuit cannot in any way be considered as new or untried. However, even here the tendency seems to be to employ "straight" circuits (even if it is permissible to use the word in this sense). At any rate, most of the receivers employ a separate oscillator and do not stint the number of valves used. Eight is a common number.

An eight-valve super-heterodyne circuit with some novel features is shown in Fig. 1. The application of reaction from the plate circuit of the first I.F. valve to the frame aerial is unusual. Notice also that the plate circuit of the oscillator valve is tuned while the grid circuit is not. In this set the potential of all the I.F. valves is controlled by a potentiometer and a large fixed condenser is connected across the filament leads.

Examples of the reflex circuit will be found, but not in any great quantities. It would appear that further development is necessary before this class of circuit can attain the popularity which its theoretical advantages would appear to warrant. Possibly during the next year further experiment will enable one valve to do the work of two in practice as well as in theory.

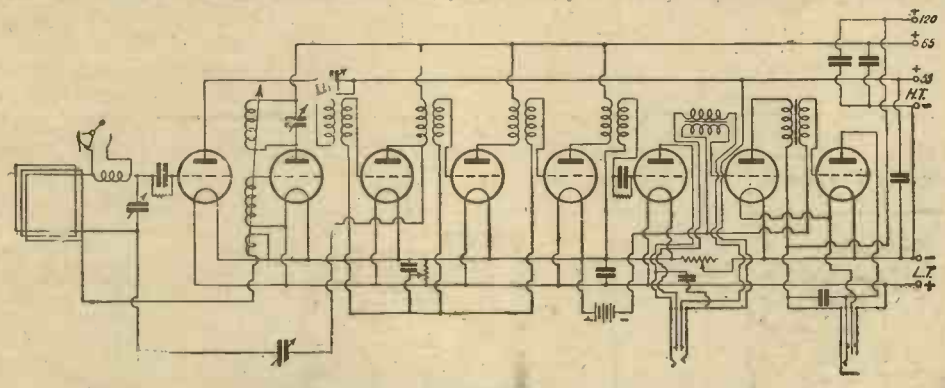


Fig. 1.—The Circuit of the Liberty 8-valve Super-het.

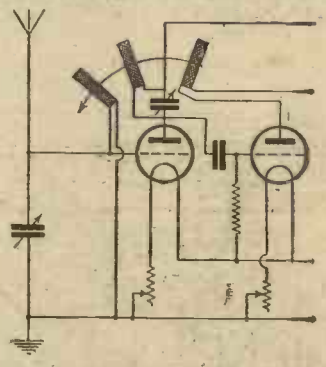


Fig. 2.—How Double Reaction is obtained in One Case.

Simple Circuits

Simplicity as regards the circuit used is the keynote everywhere at the Exhibition. Complicated switching arrangements are not in evidence. Neither are there many attempts to use more than one H.F. valve, though there are some notable (and successful) exceptions to this rule.

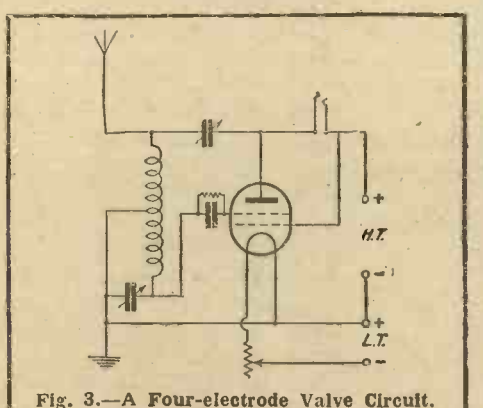


Fig. 3.—A Four-electrode Valve Circuit.

The question of selectivity (now so essential in all long-distance sets) is, however, claiming the attention of designers more than ever before. The use of loose-coupling is common. In the case of one five-valve receiver, besides loose-coupling between the aerial and first grid circuit, both the intervalve H.F. couplings are quite loose. This set *should* be selective!

In spite of the vaunted advantages of capacity reaction, it is not used to any great extent in the exhibition sets. The great majority of these sets stick to magnetic reaction, using a two-way coil holder in the old familiar way. One four-valve set (H.F., det., 2 L.F.s), however, employs double reaction. In this case a three-way coil holder is used, aerial, anode, and reaction coils being coupled as in Fig. 2.

A great number of portable receivers are being shown this year, and these, like the other sets, mostly employ two-, three-, or four-valves "straight" circuits—normal in every way. An exception is a single-valve portable set in which a 4-electrode valve is used.

The circuit employed in this set is shown in Fig. 3. As will be seen, it is a modification of the Reinartz. The chief object in using the 4-electrode valve is to reduce the weight of the set by making it possible to work with a H.T. battery of only 10 or 15 volts. (This is accomplished by inserting a second grid between the filament and the ordinary grid, and connecting the second grid to H.T. positive. The effect of the space-charge being neutralised, a useful anode current is obtained with the low H.T. voltage quoted.)

Separate H.T. and G.B.

A feature more in evidence than was the case last year is the provision of separate H.T. voltage to the different valves of the set and also the increased appreciation of the importance of applying grid bias to L.F. valves.

More sets are also being fitted with master-rheostats, in addition to the separate rheostats for each valve. The chief advantage of a master-rheostat is that the filament current is controlled gradually.

GADGETS AND IDEAS AT THE SHOW

SOME NOVELTIES THAT ATTRACTED OUR ATTENTION

INGENUITY, coupled with first-class workmanship, is the keynote of the many gadgets which are included in the manufacturers' displays at this year's show. Some of these gadgets which particularly attracted the writer's attention during a quick tour of the stands are described below, but there are many more which space does not permit mentioning.

A novel Detex plug fits a standard jack and has the great advantage of carrying the phones and loud-speaker leads in one holder. By means of the rotary switch incorporated in the base of the plug the user can switch from phones to loud-speaker and vice versa by a simple movement of the thumb.

With the aid of the L. and P. coil holder with dial it is possible to mount your coil holder behind the panel and read the angle of coupling between fixed and moving coils by means of the graduated dial on the panel. An ingenious construction, not only avoids back-lash, but also eliminates unnecessary fixing screws, so that the coil holder and dial are both mounted by means of a one-hole fixing nut.

A gadget all visitors should see is the Electone Programme Selector. This is a special clock which is connected in series with the L.T. battery and the set, and by making contact with plugs opposite the time required the programme automatically comes on and off. Corresponding to each half-hour on the face of the clock is a socket, and if any given plug is inserted in one of these sockets, when the time corresponding to the socket arrives the L.T. current is switched on for half an hour,

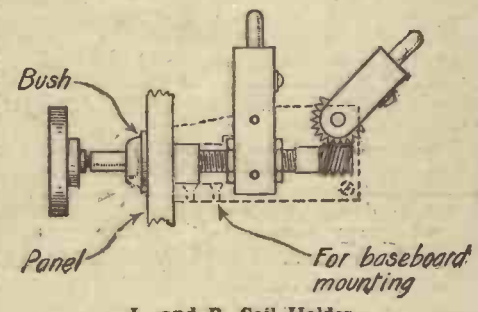
Varley H.F. Choke.

after which it automatically switches off. If, therefore, one requires a programme from, say, 7 o'clock to 9.30, not only must a plug be inserted in the 7 o'clock socket, but also one each in all the sockets up to 9.30. The mechanism is extremely simple, the main idea being that a brush (like a switch arm) is connected to the hour hand of the clock, and this makes contact with studs on the clock face at half-hour intervals. These studs are hollowed out to form the sockets on the clock face. The insertion of the plugs then connects the corresponding sockets to one L.T. lead. The circuit is from L.T. lead to metal frame of clock (i.e. to hour hand as well) through the brush to contact studs and thence to L.T. lead again. A most ingenious and useful gadget.

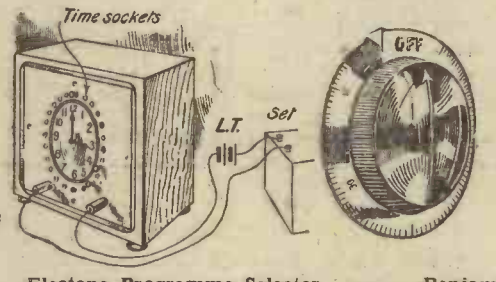
A new idea in H.F. chokes is by the Varley Magnet Co., who are showing their multi-cellular choke. This is wound in six sections by the Varley bi-duplex system, securing maximum air-space between turns and layers. The specially designed multi-cellular former for the winding ensures an almost zero value of electro-static capacity. It is an obviously well thought-out component, admirably designed and finished.

A gadget which avoids all untidy leads is the Eelex 8-way multiple connector, with which it is almost impossible to make a wrong battery connection. It is easily mounted and takes up but little space.

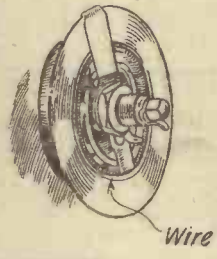
The Elphick safety switch should not be missed. This combines a lead-in tube, battery switch, safety spark-gap and aerial-earth switch. Pushing a knob at one end "unearths" the aerial, lights the valves and brings the spark gap into action. Pulling the same knob earths the aerial and switches off the valves. A useful gadget for the real radio "fan."



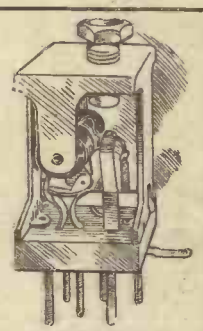
L. and P. Coil Holder.



Electone Programme Selector.



Benjamin Rheostat.

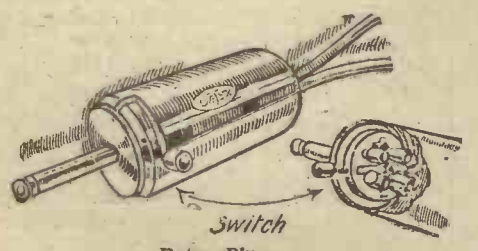


Utility Jack.

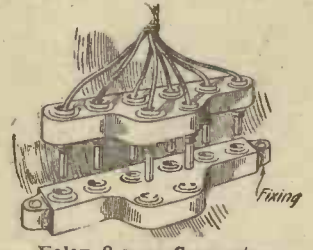
A neat little mount is shown for Igranic fixed condensers and grid leaks.

A new plug and jack which incorporates the well-known Utility switch principle, thus securing a perfect rubbing contact and low self-capacity, should be seen.

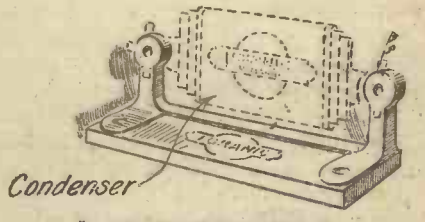
A great saving in back-of-panel space is effected by the use of the new Benjamin



Detex Plug.



Eelex 8-way Connector.



Igranic Condenser Mount.

rheostats. The windings are contained in the dial itself, so that only the actual soldering tags protrude behind the panel. This is a decidedly new idea in rheostat construction, and possesses advantages over the usual type.

A. S. H.

LIST OF EXHIBITORS AND KEY PLAN

THE NATIONAL RADIO EXHIBITION, 1926

1. Jonathan Fallowfield, Ltd.
2. Detex Distributors, Ltd.
3. Edison Swan Electric Co., Ltd.
4. Cable Printing and Publishing Co.
5. Penton Engineering Co.
6. London and Provincial Radio Co., Ltd.
7. Paragon Rubber Mfg. Co., Ltd.
8. Trader Publishing Co., Ltd.
9. E. K. Cole.
0. Tudoradio Co., Ltd.
1. J. W. See & Sons.
3. B.S.A. Radio, Ltd.
4. C.A.C. Valve Distributing Co., Ltd.
5. Blackadda Radio Co.
6. Tunometer Works.
7. British Radio Corporation, Ltd.
8. M.P.A. (Wireless).
9. Wates Bros., Ltd.
0. Autoveyors, Ltd.
1 and 22. Hobday Bros., Ltd.
3. Westam Accumulator Co.
4. Felcourt Products, Ltd.
5 and 26. A. J. Dew & Co.
7. Clayton Rubber Co., Ltd.
8. Celestion Radio Co.
9 and 30. East London Rubber Co.
31. Trelleborg Ebonite Works, Ltd.
32. Radiax, Ltd.
33 and 34. Sun Electrical Co., Ltd.
35. Ormsby & Co., Ltd.
36. Varley Magnet Co.
37. Thomas De la Rue & Co., Ltd.
38. Electron Co., Ltd.
39. Whittingham, Smith & Co.
40. Lisenin Wireless Co.
42. William Bullen.
43. A. J. Stevens & Co. (1914), Ltd.
44. Colonial Technical Press, Ltd.
45. H. Quartermaine.
46. Cleartron Radio, Ltd.
47. Odhams Press, Ltd.
48. Service Radio Co., Ltd.
49. The Radolian Co.
50. Watmel Wireless Co., Ltd.
51. Collinson Precision Screw Co., Ltd.
52. Masson, Seeley & Co., Ltd.
53. H. J. Galliers.
54. J. J. Eastick & Sons.
55. Eagle Engineering Co., Ltd.
56. Hart Accumulator Co., Ltd.
57. Radio Press, Ltd.
58. British Electrical Sales Organisation.
59. Halcyon Wireless Supply Co.
60. Alphian Wireless, Ltd.
61. General Electric Co., Ltd.
62. Retrosonic, Ltd.
63. General Electric Co., Ltd.
64. New London Electron Works, Ltd.
65. M.P.A. (Wireless).
66. New London Electron Works, Ltd.
67. M.P.A. (Wireless).
69. Houghton - Butcher (Great Britain), Ltd.
70. Ormond Engineering Co., Ltd.
71. Stratton & Co., Ltd.
72 and 73. Igranic Electric Co., Ltd.
74. Wilkins & Wright, Ltd.
75. Edison Bell, Ltd.
76. Bedford Electric and Radio Co.
77. Sylvex, Ltd.
78. Formo Co.
79. William Dibben & Sons.
80. H. Clark & Co.
81. British Ebonite Co., Ltd.
82. Neutron, Ltd.
83. Beard & Fitch, Ltd.
84. Garnett, Whiteley & Co., Ltd.
85. Cahill & Co., Ltd.
86 and 87. A. C. Cossor, Ltd.
88. Sel-Ezi Wireless Supply Co., Ltd.
89. Radi-Arc Electrical Co., Ltd.
90. Gambrell Bros., Ltd.
91. W. G. Pye & Co.
92. Ripaults, Ltd.
93. Bretwood, Ltd.
94. Redfern's Rubber Works, Ltd.
95. Camden Engineering Co., Ltd.
96. Pettigrew & Merriman (1925), Ltd.
99. Cassell & Co., Ltd.
100. Ever-Ready Co. (Great Britain), Ltd.
101. Day & Co., Ltd., Bertram.
101A. Bird & Sons, Sydney.
102. Cleartron Radio, Ltd.
103. General Radio Co., Ltd.
104. "D.P." Battery Co., Ltd.
105. Benjamin Electric, Ltd.
106. Gilfillan Bros., Ltd.
107. Portable Utilities Co., Ltd.
108. Iliffe & Sons, Ltd.
109. Telegraph Condenser Co., Ltd.
110. Fellows Magneto Co., Ltd.
111. Burne-Jones & Co., Ltd.
112. Oxford Wireless Telephony Co., Ltd.
113. Primus Manufacturing Co., Ltd.
114. Falk, Stadelmann & Co., Ltd.
115. Gent & Co., Ltd.
116. A. J. Stevens & Co. (1914), Ltd.
117. Wireless Listeners' League Ltd.
118. Hart Collins, Ltd.
119. Automatic Coil Winder and Electric Equipment Co., Ltd.
120. Brown Bros., Ltd.
121-125. Marconiphone Co., Ltd.
126. Bowyer-Lowe Co., Ltd.
127. British Thomson-Houston Co., Ltd.
128 and 129. S. G. Brown, Ltd.
130. British Thomson-Houston Co., Ltd.
131 and 132. Alfred Graham & Co.
133. Auto Sundries, Ltd.
134. Edison Swan Electric Co., Ltd.
135. Cleartron Radio, Ltd.
136. Mullard Wireless Service Co., Ltd.
137. Ericsson Telephones, Ltd.
138. Mullard Wireless Service Co., Ltd.
139. Britain's Best Crystal, Ltd.
140 and 141. Burndept Wireless, Ltd.
142. L. McMichael, Ltd.
143. Brownie Wireless Co. (of Great Britain), Ltd.
144. Burndept Wireless, Ltd.
145. Radio Instruments, Ltd.
146. Rotax (Motor Accessories), Ltd.
147. Radio Instruments, Ltd.
148. Climax Radio Electric, Ltd.
149. Radio Communication Co., Ltd.
150. Tungstone Accumulator Co., Ltd.
151. Cables and Electrical Supplies, Ltd.
152. Tungstone Accumulator Co., Ltd.
153. Selfridge & Co., Ltd.
154. Dubilier Condenser Co. (1925), Ltd.
155. Siemens Bros. & Co., Ltd.
156. A. W. Gamage, Ltd.
157. Brandes, Ltd.
158. Chloride Electrical Storage Co., Ltd.
159. Peter Curtis, Ltd.
160. Lissen, Ltd.
161. Peto Scott Co., Ltd.
162. Metro-Vick Supplies, Ltd.
163. B.S.A. Radio, Ltd.
164. C. A. Vandervell & Co., Ltd.
201. Worsnop & Co., Ltd.
202. Rectaloy, Ltd.
203. A. Hinderlich.
204. The Lithanode Co., Ltd.
205. George Bowerman, Ltd.
206. Finston Manufacturing Co., Ltd.
207. Belling & Lee, Ltd.
208. Radio Reception Co.
209. Burndept Wireless, Ltd.
210. C. A. Vandervell & Co., Ltd.
211. Louis H. Reid & Co.
212. Rotax (Motor Accessories), Ltd.
213. Universal Bracket Co.
214. General Electric Co., Ltd.
215. Reflex Radio Co., Ltd.
216. London Elect. Wire Co. and Smiths, Ltd.
217. St. Helens Cable and Rubber Co., Ltd.
218. S. Jones & Co. (London), Ltd.
219. W. & T. Lock.
220. Marconiphone Co., Ltd.
221. Manufacturers' Accessories Co., Ltd.
222. Spring Washers, Ltd.
223. The M.A.P. Co.
224. Wright & Weaire, Ltd.
225. Clarke Bros. (Leicester), Ltd.
226. The Econasign Co.
227. M. Raybould.
228. R. F. Graham & Co.
229. Wireless Apparatus, Ltd.
230. Webb Condenser Co.
231. J. J. Eastick & Sons.
232. Colonial Technical Press, Ltd.
233. Chloride Electrical Storage Co., Ltd.
234. British Wireless Manufacturers.
235. Jackson Bros.
236. Webster, W. King & Co.
237. Truphonic Wireless Co., Ltd.

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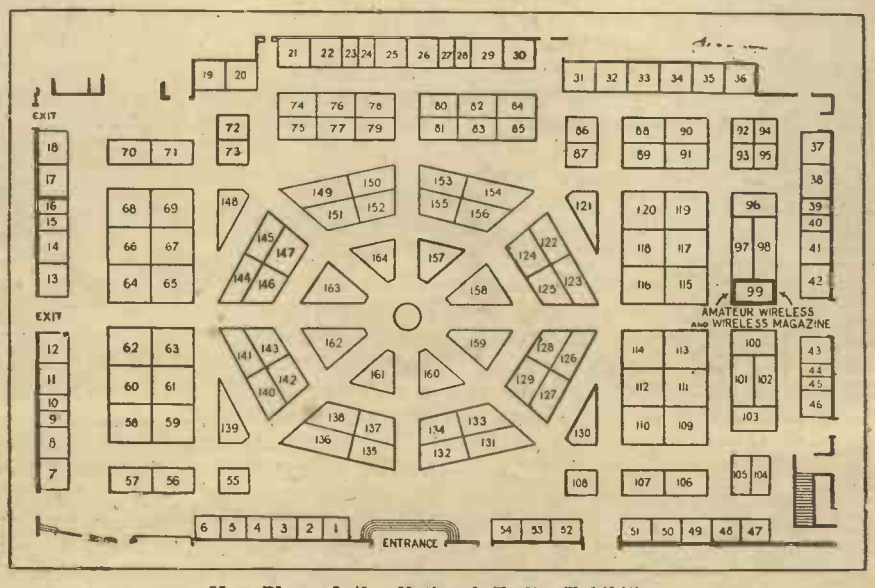


Key Plan of the National Radio Exhibition.

"A.W." TESTS OF APPARATUS

Conducted in the "Amateur Wireless" Research and Test Department

A Useful Apparatus

AN instrument that possesses an almost unlimited number of uses is being produced by Leslie Dixon and Co., of 218, Upper Thames Street, London, E.C.4.

The Dixon Onemeter.

The Onemeter, as it is called, is made on the moving-coil principle, and in conjunction with the range of multipliers that are supplied with the instrument, will give accurate readings in volts from a millivolt up to 1,000 volts or more, and in current from microamperes up to unit amperes. The instrument may also be used as a very efficient ohmeter. Full instructions are supplied with each instrument.

Multipliers for Dixon Onemeter.

We have carried out several tests with a sample supplied by the makers, and we can vouch for its remarkable accuracy. The experimenter should find the Onemeter a very useful instrument.

Lewcos Battery Leads

WE have received some advance samples of the new Lewcos battery leads manufactured by the London Electric Wire Co., Ltd., of Playhouse Yard, Golden Lane, London, E.C.1. Several models of these leads are made, including the 5-way, 6-way and 7-way, the last providing for the two L.T., two grid bias and three H.T. connections. The leads are well made and fitted with substantial metal connectors, each of which is given a distinguishable colour. This method of connecting up batteries to a set has everything to recommend it.

Bowerman Head-phones

A WELL-MADE pair of phones which compare very favourably with much more expensive makes has been supplied to us by G. Bowerman, of 10 to 12, Ludgate Hill, London, E.C.4. Laminated pole-pieces are employed, the ends of which have been filed until the distance between them and the Stalloy diaphragm is sufficient to allow a good diaphragm swing, together with the maximum sensitivity.

Long leads of good quality are supplied, the polarity of the two metal tags being clearly indicated by a cross stamped on the positive tag. Double head-bands of Duralumin are employed, the earpieces and the headbands being adjustable to suit the wearer. The phones are extremely comfortable in use and are exceptionally light. The pressure on the ears is just sufficient to keep the phones in position.

As far as sensitivity is concerned the phones are better than many others selling at the same price, although they are not so sensitive as those having an adjustable device for the diaphragm. Reproduction is very good. The phones are British made and are sold with an unlimited guarantee.

A Novel Amplifier

To obviate the need for structural alterations in a receiver when it is desired to two stages of low-frequency amplification valve, an ingenious method of utilising the last valve-holder of the receiver to give two stages of low-frequency amplification has been produced by the Penton Engineering Co., of 15, Cromer Street, London, W.C.1. This piece of apparatus is called the Penton Xtratone Plus-Valve Unit, and is illustrated in the accompanying photograph, from which it will be seen that the unit itself is plugged into the last valve-holder of the set, and two valves are plugged into the staggered valve-holders mounted on the top of the unit.

The unit itself contains a resistance-capacity coupling which is inserted in the plate circuit of the last valve.

In order to fit into any set the whole device must of necessity take up a minimum amount of space. The overall dimensions of the unit, excluding the valves, are 4¼ in. high by 3½ in. diameter. An extra H.T. + terminal is mounted on the unit to supply the resistance-coupled valve, while a small two-way switch ensures that the grid circuit of the last valve is connected to L.T. —.

Bowerman's Telephones.

Incidentally this is the only drawback that we can see in an otherwise original idea, for a negative grid bias cannot be supplied to the last valve.

On test the unit gives a good increase in amplification and, provided the grid-voltage swing is not already large in the grid circuit of the last valve of the receiver, no distortion is audible. A valve having a very long straight characteristic to the left of the zero grid-voltage line should be used as the last valve.

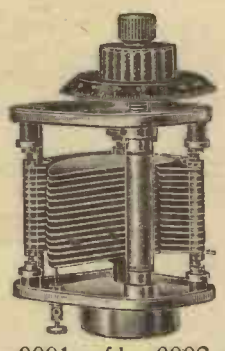
Penton Xtratone Plus-Valve Unit.

PYE BRING THE CAMBRIDGE TRADITION TO OLYMPIA

THE scientific world revolves around Cambridge. So it is not surprising that the most scientific radio sets and components will be found at W. G. PYE & Co.'s Stand at Olympia.

This Cambridge firm has been famous for years for its Scientific Instruments. Its radio products are designed and manufactured with the same care and precision as used, for instance, in the making of a microscope.

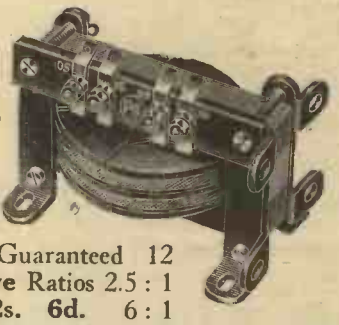
Below are shown four typical products. Visit Stand 91 and examine the whole range.



PYE VARIABLE CONDENSER

Very smooth 200-1 geared vernier control. Absolutely no backlash. Solidly built of brass with porcelain insulation. Stout stamped end-plates, dust proof cover for gear mechanism. Hand capacity negligible. Definite stops. One hole fixing. .0001 mfd., .0002 mfd., .0003 mfd., .0005 mfd., **£1 2s. 6d.** .00075 mfd., **£1 7s. 6d.**

PYE TRANSFORMER



No distortion. No noise. No crackling. Can be mounted in two positions. Voltages up to 300 v. with perfect safety. Guaranteed 12 months. **Intervalve** Ratios 2.5 : 1 and 4 : 1 **£1 2s. 6d.** 6 : 1 **£1 7s. 6d.** **Telephone** 120 ohms, 2000 ohms, **£1.** **Western Electric** 35 ohms, **£1.**

PYE DUAL RHEOSTAT

Very smooth action. Resistance wire wound tightly on fibre and the element on heat-resisting compound. Total resistance 25 ohms. Bright Valve resistance 3.5 ohms. One hole fixing.

4/6 each.

PYE ANTI-PHONIC VALVE HOLDER

A very efficient ANTI-MICROPHONIC Valveholder. Soundly designed and constructed.

Price 3/-.

STAND 91 — BRINGS RECEPTION TO PERFECTION — PYE — OLYMPIA

W. G. PYE & CO., LTD.
Granta Works, Montague Road, Cambridge

NEXT WEEK AT 2LO

By "THE LISTENER"

Miss Miriam Licette.

Miss Gwladys Naish.

SUNDAY afternoon will be again devoted to chamber music, this time played by the Boris Pecker Quartet Mr. Pecker is also connected with the Music Society String Quartet, and is also leader of the Chenil Chamber Orchestra. The programme includes Schumann's Quintet for piano and strings, Ethel Bartlett being the solo pianist. Carmen Hill will contribute songs.

The evening programme will be carried out by the band of the Royal Artillery, with Ethel Hook as vocalist. Miss Hook, the sister of Madame Clara Butt, makes her first appearance before the microphone.

The Wireless Orchestra will give on Monday what is termed a programme of "popular classics," which comprises items taken from the best-known works of Mendelssohn, Wagner, Brahms and Mozart, as well as Grieg, Schubert and Purcell. Gwladys Naish, the vocalist, will sing the familiar aria "Voi che sapete" from Mozart's opera *Figaro*. The 10 o'clock feature programme is devoted to variety, and the artistes include Flo Penrhyn, Fay Marbe, M. Henri Leoni and Charles Harris.

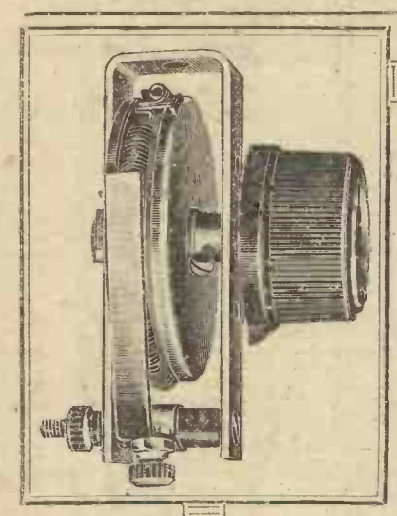
A play entitled *The Grandfather Clock*, specially written for broadcasting by Cameron Taylor, will be presented on Tuesday, followed by a performance of the Kneller Hall Military Band, with Kenneth Ellis as vocalist. Later, at 10 o'clock, will be heard songs by Geoffrey Gwyther, the writer responsible, with Max Darewski, for the musical numbers in the *Saturday Night Revue*.

A short variety programme is also announced for Wednesday, to be followed by the second of the studio operas. The opera is *The Bohemian Girl*. The cast includes the best of the B.N.O.C. artistes, including Miriam Licette, Sydney Russell, William Anderson, Heddle Nash and Gladys Palmer.

The National Radio Exhibition again plays a prominent part in Thursday's programmes. The evening commences with a performance of the Royal Air Force Band, followed at 8.30 by a programme from the excellent orchestra at the New Verrey's Restaurant, led by Arthur Salisbury, and with Cyrus Garside as vocalist.

On Friday the programme will be carried out by the Chenil Chamber Orchestra, the items being those under request. Corelli's Concerto for Christmas Night, broadcast last Christmas, and the Suite from works of Mozart, arranged by John Barbirolli, also conductor of this orchestra, will be included, and John Goss will sing.

Saturday is the closing day of the National Radio Exhibition, and the Wireless Orchestra will broadcast a popular programme from the studio at Olympia. Songs will be given by Vivien Lambelet and Franklyn Kelsey. At 10 o'clock there is to be an excerpt from the musical comedy *No No Nanette*.



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Filament current control with Igranic Rheostats is smooth and silent. The accuracy with which the resistance element is wound and the tangentially mounted contact finger eliminates the crackling noisiness so often experienced with rheostats. Igranic Rheostats permit of extremely fine, accurate and noiseless filament current control, and owing to their robust construction give long trouble-free service.

As illustrated, 4, 6, 8 or 10 ohms ... 2/9 each
With 2 in. Knob and Dial „ „ ... 3/- each
With Knob and Pointer, 20 or 30 ohms 4/3 each
With 2 in. Knob and Dial „ „ „ 4/6 each

IGRANIC "NONMIC" VALVE HOLDERS

Mount your valves in Igranic "Nonmic" Valve Holders and eliminate microphonic noises. Specially suitable for short wave reception, owing to their low capacity. Base Board or Panel mounting ... ... 3/- each

Send for New Igranic Catalogue (No. D26).

IGRANIC ELECTRIC Co LTD
149 Queen Victoria Street, LONDON
Works: BEDFORD

RADIO IGRANIC GADGETS

SEE THE FULL RANGE OF IGRANIC RADIO DEVICES on STANDS Nos. 72 and 73 OLYMPIA September 4th to 18th

S.P.18 RED SPOT
An excellent all-round-purpose Valve. Very effective as an L.F. amplifier, especially in last stage. Exceptionally good as a rectifier and very efficient as an H.F. amplifier.
Fil. Volts: 1·6-1·8.
Amps.: 0·3.

Price 14/-

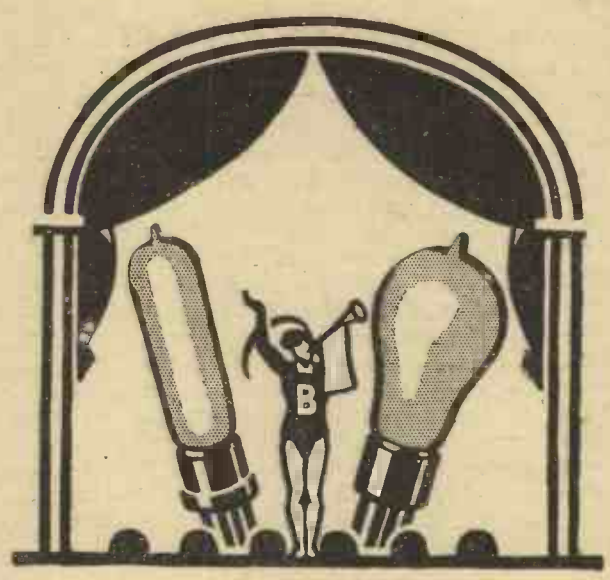
S.P.18 GREEN SPOT
Specially designed for resistance-capacity and choke coupling. Also suitable for use in early stages of L.F. amplification. A very efficient H.F. Amplifier and even a better detector than Red Spot.
Fil. Volts: 1·6-1·8.
Amps.: 0·3.

Price 14/-

S.P.18 BLUE SPOT
Extra high amplification Valve. With L.F. resistance-capacity coupling gives as much amplification as most valves with transformer. With a transformer, tremendous amplification. As an H.F. amplifier in stabilised circuits gives far greater amplification than otherwise obtainable. Takes only a fraction of the H.T. current taken by other valves.
Fil. Volts: 1·6-1·8.
Amps.: 0·09.

Price 14/-

STAND No. 105 at the NATIONAL RADIO EXHIBITION.



Making their bow

EVERYONE knows the name BENJAMIN—makers of the world-famous Valve Holder. This season BENJAMIN will be doubly in the public eye—for a complete range of BENJAMIN RADIO VALVES is now on the market. In these valves are combined every recent discovery and advance in valve manufacture.

Greater amplification, greater output, less distortion, exceptionally good rectification, and extremely low filament consumption are among their more important features. Better results can be obtained from *any* receiving set if BENJAMIN VALVES are fitted.

Ask your dealer about them—or send to us for leaflet giving full particulars.

BENJAMIN
SHORTPATH
RADIO VALVES

THE BENJAMIN ELECTRIC LTD.,
Brantwood Works, Tottenham, N. 17.

S.P. 55 RED SPOT
A perfect last-stage power Amplifier. Will handle an exceptional amount of power. Greater volume obtainable without distortion begins. Excellent in all stages with transformer or choke coupling. Also gives good results as H.F. amplifier or detector.
Fil. Volts: 5·5.
Amps.: 0·25.

Price 18/6

S.P. 55 BLUE SPOT
An extra high amplification Valve with a moderate impedance. Designed specially for resistance and choke-coupled L.F. and for tuned anode H.F. Ideal for anode rectification.
Fil. Volts: 5·5.
Amps.: 0·09.

Price 18/6

D.E. 55.
A very good general-purpose Valve for H.F., L.F., or detector work. Gives splendid results where the super-efficient SHORT-PATH Valves are not suitable because of their "liveliness." One of the most economical Valves with L.T. and H.T. current.
Fil. Volts: 5·5.
Amp.: 0·09.

Price 18/6

STAND No. 105 at the NATIONAL RADIO EXHIBITION.

RADIOGRAMS

ROGER MATTER, a French naval wireless operator, was transcribing messages at the wireless station at Rochefort when he began to transcribe one in which his name was mentioned. This message, relayed by a ship at sea, announced that he was heir to a sum of 24,000,000 francs (about £130,000).

Performances by the five winning competitors at the National Town Criers' Contest will be relayed from Pewsey, Wilts, on Sept. 15. The town criers to broadcast will be announced by name from the actual field where the competition takes place. Their normal competition range is so great that the microphone will probably be placed at a distance of 60 yards.

Owing to unavoidable circumstances the broadcast of speeches from the annual conference dinner of the Institute of Journalists in Glasgow had to be cancelled.

The construction of the new Danish high-power broadcasting station has been entrusted to a Berlin firm of electrical engineers, and will, it is thought, be of a similar pattern to the plant recently installed at Munich. Its power is to be 10 kilowatts in the aerial, and it is hoped to hurry the work forward in time for tests in the early part of 1927.

A thrilling series of historical sketches, by Col. W. P. Drury, will be included in the new session's broadcast talks running on Wednesdays during November and December. The talks will be simultaneously broadcast from Plymouth to all stations.

Commercial news that is broadcast in Germany is being picked up in the travelling express trains. In order to introduce the service and to collect experiences as to possible improvements the messages are available free of charge for the first month.

Wireless is now being used to help banish the ice peril in the North Atlantic. As soon as an iceberg is located a warning is broadcast to enable ships to avoid danger, and a continuous attack with high explosives, aided by the thawing effect of the Gulf Stream, completes the task.

The Aberdeen studio of the B.B.C. station was recently endangered by an outbreak of fire in the workshop of an engineering firm whose premises are below the studio.

A novel broadcast will be given by the Canadian National Railways on September 16, when CNRM (Montreal) will tie with CNRO (Ottawa) in broadcasting direct from the upper deck of H.M.S. *Calcutta* a special programme by the ship's Royal Marine Band, the *Calcutta*, which is attached to the North America and West Indies squadron, being at present in Canadian waters. The programme will be heard by settlers even in the remotest districts.

A talk is to be given on September 15 by Mr. J. Eggleston, a signalman on the London and North-Eastern Railway, who will give a talk on his duties. In addition to the actual talk, noises off, giving such effects as an express train dashing past the signal-box, will be given.

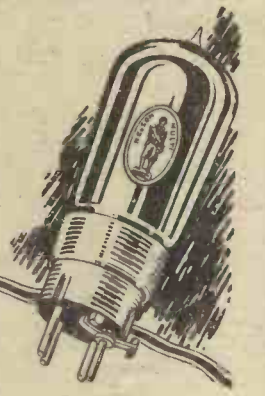
Scottish womenfolk are invited to open their hearts to Patty Putwise, of the Glasgow station, who is prepared to answer all sorts of questions as to domestic matters and love affairs. In view of the supposedly reserved natures of north-country folks developments are awaited with interest.

Starting in September, wireless is being installed in trains on the main railway lines in Austria. It was first tried on the line from Vienna to Innsbruck, but many difficulties had to be overcome, the radio connection ceasing at times while the train was running.

In the present state of financial unrest in France, the French Posts and Telegraphs has decided to ban the broadcasting of rates of exchange and Stock Exchange quotations by other than official or licensed transmitters. During the last few months over two hundred unlicensed stations have been discovered by the French authorities by means of direction finders, and the decision has been made in view of the fact that for personal interests false rates of exchange have been broadcast.

(*Continued on page* 335

Save from 2d to 5d on every valve You buy



You know the Nelson Multi 3 Filament Super Valves. You always knew they were the best Valve Value-for-money offered. But do you know that by buying direct from the Makers you can save 25 per cent. of the ordinary price?
Compare the figures given below.

Two New Types of Super Valves	Ordinary Price	Direct Price
D.E.5. Power Amplifier, 5 volt ·1 Amp. 11,000 ohms. Im, ed. Amplification Factor 7	21/-	15/6
D.E.5B Resistance or Choke Amplifier, 5 volt ·1 Amp. 45,000 ohms. Amplification Factor 13	21/-	15/6
Other Types available		
A. 4 to 5 v. ·45 Amp.	9/6	7/-
D.E.A. 2·6 v. ·18 Amp.	15/-	11/-
D.E.2. 1·8 to 2 v. ·35 Amp.	15/-	11/-
D.E.06. 2·8 to 3 v. ·06 Amp.	16/6	12/6

An entirely new pattern Anti-microphonic Nelson Valve will shortly be available.

BRITISH MADE THROUGHOUT AND GUARANTEED

Each Nelson Multi Valve has the life of 3 Ordinary Valves and is convertible to a Power Amplifier by switching on two filaments. If any valves prove unsatisfactory they will be exchanged free of charge (H.T. Burnouts excepted).

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3 FILAMENT SUPER VALVES

Send Cash or Order per C.O.D. to
NELSON ELECTRIC CO. LTD
138, Kingston Road, London, S.W.19.

Aldwych

The "All-Europe" Loud Speaker Set

The actual set is now on view at the showrooms of The Sun Electrical Co. Ltd., 118 Charing X. Road.

The "Powquip" components used in this wonderful set, will be on view at Stands No. 33 & 34, National Radio Exhibition, Olympia, Sept. 4—18.

POWQUIP
COMPONENTS
make good sets better

THE POWER EQUIPMENT Co., Ltd., Kingsbury Works, The Hyde, Hendon, N.W.9.
Telephone: Colindale 6196 and 7
Telegrams: "Powquip" Hyde London.

RADIOGRAMS (*continued from page* 334)

The Bohemian Girl will be the next of the opera series to be broadcast; this will be simultaneously broadcast on September 15 to all stations.

"I Love You" is the title of a programme which is being compiled by Mr. George Grossmith for the evening of September 28. It will link up a number of songs of every description in which these words appear.

On September 15 Malcolm Scott will appear before the microphone in the Olympia model studio.

Listeners in a London suburb had been experiencing interference for some time from an unusual source, since it was found on investigation that the offender was located in a hair-dresser's establishment where electrical apparatus had been used.

A feature of the Cambuslang (Lanarkshire) Miners' Welfare Institute, which is being erected at a cost of £8,500, will be a large wireless room, where enthusiasts can listen without disturbing the other patrons of the institute.

Broadcasting's power to make famous was never better exemplified than in the case of Jay Whidden and his Midnight Follies Band. The organisation, in making its first tour of Scotland, met with great success with public concerts in many towns.

The Agram (Zagreb) broadcasting station announces its programmes in the Slav, German, Italian and Greek languages.

For the supply of weather forecasts and reports in Finland, three wireless telegraphy stations are in regular operation, namely, Hango (O J D), Waasa (O J G) and Viborg (O J B). These are broadcast daily at 13.10 and 19.30 B.S.T. Forecasts cover weather conditions for twenty-four hours over the Baltic and Gulf of Bothnia. At other times, as occasions arise, storm warnings are given out by all three stations in the Finnish, Swedish and English languages.

During the New Zealand Day programme to be given in London on September 27, Maori songs and music will be rendered by Mr. Hubert Carter. Sir William Bragg will also take part in this programme.

The experimental station installed by the Philips Valve Works at Eindhoven, and which on many occasions may have already been heard by amateurs testing on a wavelength of 90 metres, has now been so far completed that it is hoped to bring it into regular operation at an early date. In the meantime concerts, given by a brass band of sixty performers chosen from the ten thousand employees of the firm, have been relayed to the Hilversum broadcasting station. A successful simultaneous broadcast on both 1,050 and 90 metres has been the result.

(*Continued on page* 336)

SETS FOR THE MILLION

Sets complete with the following accessories—

Long distance 2-valve L.F. and Detector Receiver in handsome polished cabinet; includes set as shown, 1 power, 1.06 D.E. valves, tuning coils, H.T. 100 volt, L.T. 3, Aerial Equipment, H.T. and L.T. Leads, 2 pairs of 4,000 ohms phones, or LOUD SPEAKER (Marconi Tax Paid)

£4 17s. 6d.

Also new circuit specially adapted for use with indoor aerials. Specification as above, **£5 10s.** Carriage and Packing, 5/- set.

SPECIAL OFFER VALVES.

RADIO MICRO.	DUTCH.
.06..... 3 v.....5/11	Power 5 v.....8/11
.25..... 2 v.....5/11	.06 .... 3 v.....6/11
Power. 3.....7/6	.13 .... 2 v.....6/11
Power .1.....9/11	Various D E at 4/11, 5/11, 6/11
(Power are 3-4 volts.)	2 to 4 volts.
Phillips 4 Electrode.	These valves will be sent by post if
4 pin for Unidyne, 8/11.	1/- extra for carriage.

CALLERS' COLUMN.

(SEND FOR POST LIST.)

EVERYTHING in demand stocked for Wireless.

BATTERY BOXES 63-v.—Metal, take 14 batteries, 3/6. Fitted Clips. Battery Testers, 4d. Bullseye Bulbs, 3d., 6 for 1/3.

EBONITE PANELS 3/16. For Crystal Sets, 6x6, 1/-; 7x5, 1/2; 8x6, 1/6; 9x6, 1/9.

H.T. BATTERIES, 60 v. 5/11; "Addco" 60 v. 6/11; 100 v. 12/11. 4 5 Flash Lamp Batteries, 6d. line, 6 for 2/6. "A B," 3 for 1/-; 4 for 1/3. Various, per dozen, 3/9, 3/11.

GRID BIAS (tapped 1½ volts), 6 v. 1/3, 9 v. 1/6, 1/9, 2/-. D.C.C. wire per ½ lb., reel 20 g., 9d.; 22 g., 10d.; 24 g., 11d.; 26 g., 1/-; 28 g., 1/1. Tinned copper, 1/16 sq. Bus bar, 2 ft. 1d. Empire tape, 12 yds., 6d. Earth Tubes, Copper, good value, 1/11. Climax, 2/3, 5/-.

TERMINALS, complete. Brass Pillar, WO Phone, 1d. Nickel, 3 for 4d. Studs, stop pins, 2 a 1d. Nickel, 4 for 3d. Screwed spades or pins 2 for 1½d. Nickel, 1d. Tags, 6 a 1d. Nickel, 4 a 1d.

EBONITE.—"Grade A," cut while you wait, 3/16 at halfpenny per sq. inch. ¼ in. three farthings.

SUNDRIES.—Adhesive Tape, 4d. 8 drills, 1/3. 5 Spanners, 6d. Taps 0, 2, 4, 6 B.A. 1/11. Screwdrivers, 8d. Breast Drills, 0-4 chuck, 3/11. Valve Windows, Nickel, 4d. and 6d. Basket Coil Holders, 10½d., 1/-. 6 ft. Phone Cords, 1/-, 1/3, 1/6. Loud Speaker Cords, 1/6, 1/11. Empire Tape, 12 yds., 6d. Spade tags, 6a 1d. Spade screws, 2 for 1½d. Red or Black, 2d. pr. Ins. staples 5 a 1d. Ormond screws and nuts, 2 a 1d. Switch arms and studs, 1/-. Nickel, 1/4. Wander Plugs, 2d., 3d., 4d. pr. Plug and socket, red and black, 3d. Twin Flex, red and black, 12 yds., 1/3. Miniature silk, 6 yds., 6d. Ins. hooks or egg insulators, 2 for 1½d. Aerial wire, 7/22, 100 ft., 1/11. Extra heavy weight, 2/3. Stranded aerial, 100 feet, (49 strands), 1/-.

VARIOMETERS FOR B.B.C.—Handsome Model, Ball Rotor, Ebonite Former wound silk, 3/11. Our famous wound D.C.C. Grand value, 1/9. Both with knob.

SWITCHES.—D P.D.T. panel, 1/-. S.P.D.T. panel, 9d. On and off switch, 1/-. Double Switch, 2/-. Tumbler, 1/-. Push and Pull, 1/-.

CRYSTAL SETS.—Handsome design, for local or Daventry Station. Everything complete, ready to fix up, 18/11. Comprises Set, Coils, Headphones, Aerial Equipment.

SPECIAL OFFER in Oak, American Type, hinged lid. Cabinets, with baseboard for 12 x 7 panel, 8/6. Ditto, back to front, 9/6. Also 12 x 8, 10/11; 16 x 8, 16/11.

ENCLOSED DETECTORS, small, 9d.; large, 1/-, 1/2, 1/4, 1/6, brass and nickel. Noted micrometer, nickel, 1/9. Service micrometer, 2/9. Permanent "R I.," Liberty, Brownie, etc.

EBONITE COIL STANDS, 2 way, geared, 2/11, 3/3, 3/6. Ebonite plugs, extra quality with fibre strip, 7d. Ebonite Low Loss, 7d.

LEAD IN TUBES, good quality, 6d., 8d., 10d., or made to size.

SPECIAL PRICES given over the counter for sets or parts of various circuits. Any parts you have no use for entertained in exchange or purchased. Goods may be brought without obligation either side. If you purchase new British valves I will buy a burnt-out one for each valve you take. This does not apply to Puratone. Right reserved to cancel this list without notice.!

Place of Payment London, W.C.2

KAY RAY

WONDERFUL VALUE IN STRAIGHT LINE FREQUENCY

CONDENSERS

LATEST MODEL NOW READY.

With knob & dial. Post 6d. set

.0005	8/11
.0003	8/3

4 inch Dial, 1/3 extra.

ACCUMULATORS.—2 v. 40, 7/11; 2 v. 60, 9/6; 2 v. 80, 12/6; 2 v. 100, 14/6; 4 v. 40, 13/11; 4 v. 60, 17/11; 4 v. 80, 26/6; 6 v. 60, 26/6; 6 v. 80, 35/6. ALSO another good make, 1/6 extra on each of above. Post 1/-.

HEADPHONES

All 4,000 ohms.

N. & K. STANDARD PATTERN 'PHONES. Superb Tone, 4,000 ohms. Special Price, 7/11 pair. **N. & K. GENUINE.** New lightweights, 11/6. Extra quality do., 13/6. **DR. NESPER**, unapproachable value, adjustable, 12/11. **TELEFUNKEN**, adjustable, genuine (20/- model), limited number at 14/11. **"BRUNET,"** stood the test of years, need no boosting, 11/9, 12/11, 14/6 3 models. **ERICSSON EV CONTINENTAL**, still as good as ever, exquisite tone, sample pair, 8/1.

BRITISH HEADPHONES. BROWN'S FEATHERWEIGHT, 20/-. BROWN'S A TYPE, (Reed) 30/-. B.T.H., 20/-. STERLING, 20/-. WESTERN ELECTRIC, 20/-. All makes stocked.

MARCONIPHONE.—Auto Series Par. Variometer, 16/-. Sterling Non Pong V.H., 2/9. Velvact Potentiometer, 9/-. Ideal L.F. Transformers, 25/-. (2-7-1, 4-1, 6-1, 8-1). Ideal Junior L.F., 18/6. Var. Res. 40,000 ohms, 8/6; H.F. Choke up to 4,000 metres, 10/6; Sterling Baby L.S., 4/6. Dinkie, 30/-.

LISSEN Loud Speaker Unit, 13/6; H.F. or L.F. Choke, 10/-; Potentiometer, 2/6; Coils, all sizes, List Price. DR. NESPER L.S. Unit, 15/11; Dr. Nesper I.S. "Grande," 37/6. 4,000 ohms.

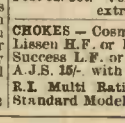
ADICO BATTERIES (H.T.), highest award this Month's Trade Test, 60 volt, 6/11; post 1/-; 100 volt, 12/11; post 1/6. The 100 volt is specially suitable for Loud Speaker Work. This brand personally recommended.

Grand Value in NON-MICROPHONIC VALVE HOLDERS. Board Mounting, 1/6.

SUNDRIES.

Newey 2-way geared coil-stant, 6/6. 4 point condenser, 17/6, 15/-. "R.I." New Type Aerial Tuner, 39/6. Gambrell Neutrovernia, 5/6. Voltmeters, D'Arc, Reading, 7/3. H.F. Transformers all wavelengths, Magnum, 7/-. Stradia, 6/6. Bowyer-Lowe, 7/-. McMichael, 10/- (A.7, 12/6), Var. Grid Leaks, Bretwood, 3/-, Watmel, 2/6, Anodes B., 3/-, W., 3/6.

LOW LOSS SQUARE LAW



This variable Condenser is simply marvellous value. It cannot be equalled in price or quality.

.0005	4/11
.0003	4/9

Post 6d. set. Vernier 1/- each extra.

CHOKES—Cosmos H.F. 6/6; Lissen H.F. or L.F. 10/- each. Success L.F. or H.F. 10/- eh. A.J.S. 15/- with unit 20/-.

R.I. Multi Ratio, L.F. 27/6, Standard Model 25/-.

ORDERS BY POST MUST BE ACCOMPANIED BY SUFFICIENT TO PAY POSTAL CHARGES.

Ormond Products.

SQUARE LAW LOW-LOSS. .0005, 9/6, .0003, 8/6 (1/6 each less no vernier). **FRICTION GEARED** .0005, 15/-; .0003, 14/6; .00025, 13/6. **STRAIGHT LINE FREQUENCY FRICTION GEARED**, .0005, 20/-; .00035, 19/6. S.L.F. .0005, 12/-; .00025, 11/-. SQ. LAW LOW-LOSS DUAL, .0005, for Elstree Six 16/11 each. ORMOND FRICTION DIAL 10/6 **FILAMENT RHEOSTATS DUAL** 2/6; 6 ohms or 30 ohms, 2/-; **POTENTIOMETER**, 400 ohms, 2/6. L.F. SHROUDED, latest model, 17/6.

IGRANIC TRIPLE-HONEY-COMB INDUCTANCE COILS 30, 2/9; 40, 2/9; 50, 2/9; 60, 3/-; 75, 3/3; 100, 3/6; 150, 3/9; 200, 4/-; 250, 4/6; 300, 4/9; 400, 5/6; 500, 7/-; 750, 9/6; 1,250, 14/-; 1,500, 16/-; Unitune Ap. F. Coupler, 250/500 M., 4/6. Micro-Condenser, .0001, 5/6. Dial 1/- extra. Vernier Balancing do., 5/6. Indiagraph Vernier Knob and Dial, 7/6. Microvern, 8/6. "E" Type L.F. Transformers, latest shrouded model, 3-1, 15/-; 5-1, 16/-. Fil. Rheo. and Potentiometers stocked. On and Off Switch, 2/5. Radio do. 2/6, Earthing Switch, 3/-. Jacks from 2/-. Plugs from 1/6. All parts available stocked.

OUR NOTED ONE VALVE and **CRYSTAL SET**, in solid polished cabinet, complete with valves, 'phones, H.T. and L.T. Units, Aerial Equipment, Daventry Coil. Extraordinary value, 45/11. Carriage, 2/-.

ASTOUNDING VALUE in L.F. Amplifiers in handsome polished box, 1 valve, 16/11. Carriage, 1/6. | 2 Valve Amplifier, 25/11, or **COMPLETE** with valves, H.T. and L.T. Units, 44/6. Carriage, 2/-.

H.T. BATTERIES.

EVEREADY 66 v., 12/6; 108 v., 21/-. L.T. 3 for D.E. Valves, 7/6. **SIEMENS** H.T. 60 v., 12/6. Hellesen's 60 v., 14/6. Various 15 D.E. Batteries, 1/6 to 3/6. **EBONITE.**—"Grade A," cut while you wait, 3/16 at halfpenny per sq. inch. ¼ in. at three farthings.

IN STOCK ALL NEWEST MAKES OF VALVES.

We give you immediate benefit of makers' reductions in price.

VALVES.—Cosmos S.P. 18 Red or Green, 14/-. New Blue Spot, 14/-. All Mullard, Edison, Osram, Marconi, Cossor stocked. Bright D.E. and Power, 8/-, 14/-, 18/6, 22/6, 24/6, 30/-, £2. Mullard P.M.4, 18/6. Do. P.M.3, 16/6. 1 burnt-out valve taken in part exchange for any of above. Usable valve exchanged. Offer subject to withdrawal without notice.

FIXED CONDENSERS.—Dubilier, .0001, 2, 3, 4, 5, each 2/6, .001, 2, 3, 4, 5, 6, each 3/-. Grid Leak, 2/6. Edison Bell, .00r, .000, 1, 2, 3, 4, 5, 1/-; .002, 3, 4, 5, 6, 1/6. .0003 and grid leak, 2/-. McMichael with clips, .0001 to .0005, 2/6 each. .001 to .006, 3/- each.

L.F. TRANSFORMERS.—Ferranti A.F. 3, 25/-; A.F.4, 17/6; Eureka Concert, 25/-; 2nd Stage, 21/-; Baby, 1st or 2nd, 15/-; Reflex, 15/-. Formo shrouded, 10/6. Success (black), 21/-. Ormond Royal, 20/-. Ormond newest model, 15/6. Writes' Supra, 10/6. Croix, 5-1, 3-1, 4/6. Marconi "Ideal," all stages, 25/- each. C.A.V., 15/-. Pye, 22/6. Gambrell, 2 stages, 25/6. Ideal Junior, 18/6.

COIL STANDS.—Lotus 2-way, 7/-; 3-way, 10/6; (extension handles extra). Polar 2-way, 6/-. 3-way, 9/6. Sterling Tripie, 21/-. Kay Ray, geared 2-way, 3/11. 3-way geared, 5/11. Back of panel, with knob and dial, 2/11. Panel 2-way, 2/-. Goswell, 3/-. All makes.

WATMEL PRODUCTS.

.0002 or .0003 and Grid Leak, 2/6. Fixed Condenser, all caps, 2/-. Variable G.L., 2/6 (3 to 5 meg.). Anode 50,000 to 100,000, 3/6. Ditto, 10,000 to 75,000, 3/6. Auto Choke L.F. Coupling, 18/6. Post extra.

WARNING.

SEE K. RAYMOND'S NAME ON PREMISES. THIS WILL ASSURE YOU GETTING THE GOODS I ADVERTISE.

PLEASE ASK "IS THIS RAYMOND'S?"

ELSTREE SIX

K. RAYMOND DUAL CONDENSER.

Above is a recommended substitute for Original Condenser vide "Modern Wireless." Aug., 1926.

SET ON SHOW IN OUR WINDOW.

PARTS FOR THE ELSTREE SIX

2 Baseboard Neutralising Condensers at 5/-. 1 Panel do. 5/-. Lissen Potentiometer, 2/6. Igranic Key Switch, 3/-. 1 Plug, 1/6. 2 D.C. Jacks at 2/6. 5 Indicators, 1/3. Lissen H.F. Choke, 10/-. 6 Benjamin Valve Holders at 2/9. 4 Magnum Coil Sockets at 1/9. 9v Grid Battery, 2/-. 6 Dubilier .002, Fixed at 3/-. 6 Resisters for 6v ¼ amp. at 2/6. Marconi Ideal L.F. 2.7—1, 25/-. Do. 6—1, 25/-. 2 Terminal Strips, 4/-. 4 Absorbers, 4/-. Glazite, 4/6. 4 Dimic Bases at 2/6. 4 Varley Anode 100,000 ohms at 7/6 and 4 Dimic Coils at 10/- each. Also choice of condensers—4 K Raymond Dual .0005 at 16/11 (with Pelican S.M. Dial at 21/6). 4 Cyldon .0005 Dual at 27/6. 4 "J.B." .0005 Dual at 21/- (£4 set of 4).

TOTAL.	£ s. d.	
With K.R. Dual	16 11 11	SET ON
With above and S.M. Dial	17 10 3	SHOW IN OUR
With Cyldon Dual	18 14 3	WINDOW.
With "J.B." Dual	17 4 3	

To encourage you to build this set, I will allow you up to £3 on your second-hand parts if you buy one of above lots.

ASHLEY PLUGS AND JACKS fit panels ¼ to ¼ thick, one hole fixing. S.C.O. 1-3. S.C.O. 1/6. D.C., 1/9. F.S.C., 1/9. F.D.C. 2/3. Phone Plugs, 1/6. Post extra.

EXIDE H.T. ACCUMULATORS 20 v. Unit 15/- (not sent by post).

'ESSANCO' MOUNTED COILS — Made under Burndept Licence Patent No. 16824. Nos. 25, 35, 50, each 2/-; 75, 2/6; 100, 3/-; 150, 3/-; 200, 250, 300, each 4/-.

RECOGNISED WEST END DISTRIBUTOR

of the manufactures of Edison Bell, Jackson's (J B) Polar, Igranic, Peerless, Eureka, Magnum, Burndept, Lotus, Dubilier, Marconi, Derwood, Sterling, Success, B.T.H., McMichael, Lissen, Utility, R.I., Bowyer-Lowe, Formo, Brunet, Ormond, Newey, P. and M., T.C.C., etc. etc.

BARGAIN DEPT.—Huge quantities of window-soiled and goods which have been taken in exchange for sale at ridiculous prices. Bargains not sent by post.

BEFORE YOU PURCHASE AT THE

EXHIBITION

CALL AND LET ME QUOTE YOU.

I can offer you 20 per cent. discount on many lines (not combine). Cheapest House in London.

WE HAVE THE GOODS!

K. RAYMOND

OPEN.
9 to 8 Daily.
9 to 9 Saturday.
11 to 1 Sunday.

'Phone: *Gerrard 4637.* *Gerrard 2821.*

27 & 28a, LISLE STREET, LEICESTER SQUARE, W.C.2.

1 MIN. LEICESTER SQUARE TUBE. OPPOSITE DALY'S GALLERY DOOR.

RADIOGRAMS (*continued from page* 335)

In the radiophonic section of the Prague Autumn Fair, which was held from August 29 to September 5, more than 60 Czecho-Slovak, French, British and Italian radio firms were represented.

Every Thursday evening symphony concerts are given by the Glasgow Station Orchestra, assisted by a first-class vocalist. These concerts rank among the choicest musical items provided by the B.B.C., and they are usually relayed to the other Scottish stations.

"A Day in the Life of Manchester" at the time this city was in Roman occupation will be reconstructed for the benefit of listeners, and will be broadcast at an early date.

The old Rome 1½-kilowatt broadcast transmitter is now being erected at Naples; when completed it will send out its own programmes on 333.3 metres.

A super-power station, of which the construction was begun at Herzogstand, near Kochel in Upper Bavaria, in 1924, and which has now been taken over by the German Posts and Telegraphs, is fast nearing completion. The aerial, stretched between two mountain tops, is actually at a height of 3,000 metres above sea level. The eventual power of the station when completed will be 1,000 kilowatts, thus giving Germany the control over one of the most powerful W.T. transmitters in the world.

The new Bratislava (Czecho-Slovakia) broadcasting station will be formally opened about September 15. It will transmit with a power of 500 watts on a wavelength of 300 metres. In view of the mixed population the station has decided to give lectures and news bulletins as well as most announcements in the Czech, Slovene, German and Magyar languages. The studio has been installed in the old police station of Pressburg, and in order to vary the nature of the programmes it is in direct connection with the national opera house and concert hall.

Salamanca (E A J 22) now regularly broadcasts daily concerts at 17.00 and 21.00 B.S.T. on a wavelength of 405 metres.

The German Posts and Telegraphs authorities have reserved the call-signs K 4 A A A-K 4 Z Z Z for the whole of Germany with the exception of Würtemberg and Bavaria. To the latter K 4 U A A-K 4 W Z Z has been allotted, and K 4 X A A-K 4 Y Z Z to the former. Amateur experimenters in the Free City of Danzig will be given K 4 Z A A-K 4 Z Z Z.

Several express trains between Graz and Vienna have been equipped with wireless receiving apparatus. In a number of carriages headphones are available for the use of passengers on payment of one Austrian shilling per hour, and the reception of the Vienna broadcast concerts has proved a great success.

The American broadcasting station W B B M (Chicago) has increased its transmitting power from 1.5 to 10 kilowatts. The new plant utilises six water-cooled valves.

The new high-power station under construction for Warsaw (Poland) is now being erected in that city, and tests will be made towards the end of September. The transmitter will broadcast with a power of roughly 10 kilowatts.

During the last three weeks the W G Y (Schenectady) programmes, relayed through the General Electric Company's experimental station 2 X A F, on 32.8 metres, have been clearly picked up in Vienna.

Tests are now being effected almost daily between 20.00 and 21.00 B.S.T., with the new short-wave Berlin broadcast transmitter. For the present experiments are being made on a wavelength of 54 and 37 metres.

In order to ensure the reception of the Buda-Pesth programmes throughout Hungary on simple crystal sets, the broadcasting station on the island of Csepel is to be endowed with a high-power transmitter.

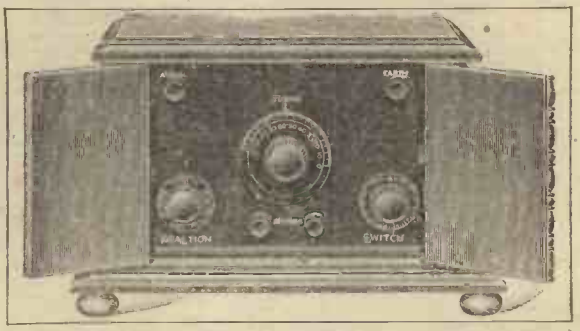
At the end of June, 1926, there were 108,844 broadcast listeners in Czecho-Slovakia, and of this number 74,008 belong to Prague, 23,522 to Brno, 5,218 to Pardubice, and 3,017 to Bratislava.

EDISON BELL RADIO

A MAGNIFICENT 2-VALVE SET SHOWN AT OUR STAND, No. 75, NATIONAL RADIO EXHIBITION, OLYMPIA.

EDISON BELL "PRINCE" 2-VALVE SET.

This very attractive set is shown with the doors of cabinet open. Size 13 by 12 by 10 inches deep, eboneum engraved panel, fitted in solid oak cabinet with folding doors of Jacobean design. Simple and selective control with Reaction and Filament Rheostat. This set comprises one Detector and one stage of Low Frequency, Patent Rotary Coil Holder, giving smooth and efficient reaction. Leads are supplied for H.T. and L.T., also Grid Bias, which should be 4½ volts with tappings to obtain the best musical quality. The well-known Edison Bell Coils are supplied for 280–500 metres. Undoubtedly the "Prince" represents one of the finest 2-valve sets on the market.



THE EDISON BELL "PRINCE" 2-VALVE SET.

PRICE £4 : 10 : 0

(*Valves, Batteries and Marconi Licence extra.*)

This and many other attractive and efficient Valve Sets, Components, etc., all guaranteed British manufacture, will be exhibited at our Stand, No. 75, at the National Radio Exhibition, which takes place at Olympia from September 4th to 18th. You are cordially invited to attend there and personally inspect these models. If you are unable to do so, ask your dealer for fully illustrated catalogue, or write direct to the Company, when same will be willingly forwarded, post free.

TESTED 500 VOLTS FLAT TYPE

EDISON BELL, LIMITED,

LONDON, S.E.15, AND AT HUNTINGDON.

TESTED 500 VOLTS UPRIGHT TYPE

INSIST ON EDISON BELL CONDENSERS

THEY ARE BRITISH MADE AND GUARANTEED BY A NAME WITH 30 YEARS REPUTATION BEHIND IT

FERRANTI

British-Made

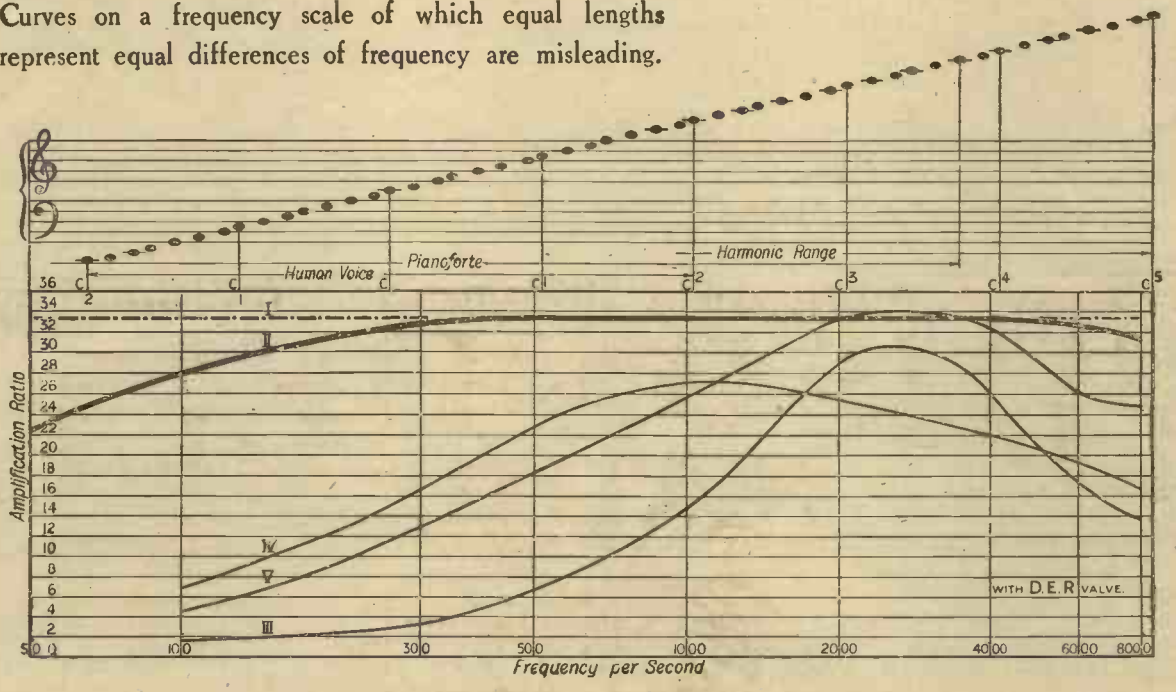
AUDIO FREQUENCY TRANSFORMER

TYPE AF3.

Transformer Amplification Curves are of interest to every Radio user.

The curves must be on the musical scale to give true value.

Curves on a frequency scale of which equal lengths represent equal differences of frequency are misleading.



I. Perfection.

II. FERRANTI AF3. NEARLY PERFECT.

25/-

No better Transformer is available at the price.

III, IV and V. Other well-known Transformers.

Ask your Dealer for Leaflet W-401.

FERRANTI Ltd., Hollinwood, Lancashire.

CHIEF EVENTS OF THE WEEK

SUNDAY, SEPTEMBER 12.

London	The Royal Artillery String Band.
Aberdeen	Orchestral Concert relayed from Cowdray Hall.
Birmingham	Symphony Concert.
Bournemouth	Concert relayed from Royal Bath Hotel.
Glasgow	Symphony Concert.

MONDAY

London	Popular Classics.
Belfast	*The Rising of the Moon.*
Cardiff	The Band of H.M. Royal Artillery.
Manchester	The Irwell Springs Brass Band.
Newcastle	The Roosters Concert Party.

TUESDAY

London	The Kneller Hall Band.
Aberdeen	The Roosters Concert Party.
Birmingham	Chamber Music.
Belfast	Looking Backwards.
Cardiff	Pre-War Reminiscences.
Manchester	*The Sweep.*
Newcastle	Novocastrian Nights—No. 5.

WEDNESDAY

London	*The Bohemian Girl.*

THURSDAY

London	The Band of H.M. Royal Air Force.
Aberdeen	*An Elder of the Kirk.*
Belfast	*Catherine Parr* or *Alexander's Horse.*
Cardiff	*The Open Door.*
Manchester	The Roosters Concert Party.
Nottingham	Birthday Programme.
Swansea	The West Wales Three Choirs Festival.

FRIDAY

London	*Ingoldsby Legends*, read by Nicholas Hannen.
Birmingham	The Roosters Concert Party.
Glasgow	*Grey Ash.*

SATURDAY

London	Excerpts from *No No Nanette.*
Aberdeen	Choral Concert.
Belfast	The Band of the 1st Bn. Highland Light Infantry.
Cardiff	The Roosters Concert Party.

"THE NEON TUBE IN WIRELESS" (*continued from page 319*).

600-ohm iron-core chokes in series with one another and each pair bridged by a 2-microfarad reservoir condenser. If the chokes are of good design this arrangement will eliminate the "hum" of the most noisy mains, and the unit will provide a cheap source of high-tension supply. Before utilising the lamp for this purpose it is advisable to remove the little resistance bobbin to be found in the base cap. This generally consists of a piece of fibre or mica, wound with a number of turns of very fine resistance wire. If the unit is required to supply not more than three valves with current it may remain *in situ*, but should a large set be used the brass cap should be removed by holding the soldered tags over a Bunsen flame, and as soon as hot, grasping the cap firmly with a pair of pliers, giving a quick twist and pulling it from the glass. The bobbin may then be removed, after which fresh leads may be soldered between the lamp and the cap after the latter has been replaced.

The unit is made up on an ordinary switch block measuring 6 in. by 9 in., obtainable at any electrical stores or wireless dealers.

The photograph illustrates such a unit, the wires being on the under side of the block. When using the public-supply mains in this manner the earth lead should always be isolated by means of a reservoir condenser, as shown in the diagram.

Charging H.T. Accumulators

Another use to which the lamp may be put is that of charging low-capacity high-tension accumulators. The circuit diagram for this purpose is shown by Fig. 5. This is self-explanatory, except perhaps a word is necessary concerning the amperemeter. This is really a milliammeter of the moving-coil variety, which serves the two-fold purpose of showing the direction of current flow (that is, that the positive lead is joined to the positive lead of the accumulator), and at the same time that the lamp is connected the way round which allows the most current to pass. When using the lamp for this purpose the resistance should not be removed in order that the useful life of the lamp is prolonged. The use of the tube in this case is to regulate the current flow to suitable proportions.

A second and concluding article will deal with the Neon tube as rectifier and oscillator and also its uses in wavelength measurements and remote-control systems.

A. J. COOPER.

The Union Radio broadcasting station of Madrid, one of the most prosperous of the Spanish radio installations, has now acquired control of both the Cadiz and Seville stations.

The Karlsborg (Sweden) 5-kilowatt broadcasting station, which daily relays the Stockholm programmes, has increased its wavelength to 1,365 metres.

THE NEW

No. 7

RECUPERATING AGENT

IN THE

HELLESEN

DRY BATTERIES

To-day as at every period in the history of Dry Battery Construction, Hellesen Batteries are first in perfection of design and construction. A uniform and reliable H.T. supply is essential to perfect reception, and a H.T. battery which gives you the longest service must increase your satisfaction.

Hellesen Batteries with the New No. 7 Recuperating Agent, quadruple insulation and sealed cover, will ensure your complete satisfaction.

AT HUNT'S NEW PRICES, HELLESEN BATTERIES WILL COST YOU NO MORE, THEY ONLY GIVE YOU MORE.

60 volt WIRIN 12/6 99 volt WIRUP 21/- (Postage extra).

All types, voltages, etc., in Double and Treble Capacities, Dry Batteries for Low Tension, Hand and Pocket Lamps.

From all Radio, Electrical and general stores, Harrods', Selfridge's, Barker's, Whiteley's, etc., or direct from

A. H. HUNT LTD. (Dept. No. 7), CROYDON, SURREY.

Write for leaflet No. 155a.

REGISTERED HUNTS TRADE MARK

CAXTON 4-VALVE CABINET

Made for Sets, "As good as money can buy," "Harmony Four Receiver," "The Melody Three"

Special Cabinets made to Customer's measurements. Prices quoted.

Cash with Order. Fumed Oak ...	£1	5 0
Dark or Jacobean Oak	£1	10 0
Real Mahogany	£1	14 0

Detachable 7" deep Base Board to mount 21" by 7" panel to slide out of Cabinet front.

Also supplied at 10/- extra with two beaded front doors placed 2 ins. in front of the enclosed panel.

Ebonite or Radion Panels Supplied and perfectly Fitted at low extra cost.

All Polished with the new enamel that gives a glass hard surface that cannot be soiled or scratched. SENT FREE.—Catalogue of standard Wireless Cabinets in various sizes and woods.

Packed and delivered free in U.K. No. C3

CAXTON WOOD TURNERY CO., Market Harborough

Here are the N.P.L. figures

—now you can judge for yourself!

TABLE 1			TABLE 2			
Coil	Inductance in microhenries	Self-capacity in micro-microfarads	Coil	Parallel capacity in micro-microfarads	Wave-lengths in metres	Effective resistance in ohms
35	61	15	35	300	264	2.8
40	90	15	40	,,	318	2.9
50	150	9	50	,,	406	3.3
60	200	13	60	,,	472	4.4
75	295	12	75	,,	573	5.3
100	540	11	100	,,	774	6.6
150	1,410	12	150	,,	1,250	15.8
200	2,220	17	200	,,	1,580	19.7
250	3,070	17	250	,,	1,860	24.9
300	4,800	14	300	,,	2,320	28.2

IN the design of radio inductances it is a well-established fact that the smaller the R/L value for any circuit the greater is the selectivity and signal strength.

Because this fact predominated in the design of the LEWCOS Coil we can publish without fear the R/L values obtained in independent tests by the National Physical Laboratory.

Why the wave-length is given.

We would draw the attention of readers to the wave-length at which the measurements were made. This is a most important point which is often overlooked by amateurs and sometimes even by manufacturers when quoting the H.F. resistance figures for their coils. Resistance in high frequency varies with the frequency and to give a figure for H.F. resistance without the wave-length at which that resistance was measured is valueless.

Try this better coil yourself!

You will be delighted at the improvement in reception when you use Lewcos Coils. Besides being highly efficient they are strongly constructed and of good appearance. Try Lewcos Coils in your set—they make *all* the difference!

Your wireless dealer stocks or can obtain Lewcos Coils for you. Write for descriptive leaflet.

LEWCOS

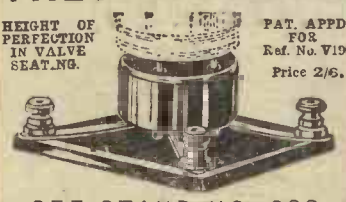
Inductance Coil

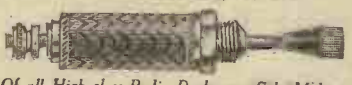
No.	25	35	40	50	60	75	100	150	200	250	300
Price .	4/6	4/6	4/6	5/-	5/6	5/6	6/9	7/6	8/6	9/-	10/-

THE LONDON ELECTRIC WIRE COMPANY & SMITHS, LTD.

Phone: Clerkenwell 1388] Playhouse Yard, Golden Lane, London, E.C.1 [Telegrams: Electric, London

JUDD.

TRIUMPH
CUSHION
ANTI-MICROPHONIC
VALVE-HOLDER
HEIGHT OF PERFECTION IN VALVE SEAT NG.
PAT. APPD. FOR Ref. No. V190
Price 2/6.

SEE STAND NO. 238
NATIONAL RADIO EXHIBITION
Ask your dealer for full list of the TRIUMPH GUARANTEED COMPONENTS & SETS or send P.C. mentioning "Amateur Wireless" to:
A. H. CLACKSON, LTD., WHITE HART WORKS, LONDON, N.22

TRADE MARK
RED DIAMOND
REGISTERED
FINEST QUALITY
RADIO COMPONENTS
EVERY COMPONENT IS PERFECT.
R.D.40 Perm. Detector, 2/- each.

Of all High-class Radio Dealers or Sole Makers.
JEWEL PEN CO., LTD., Radio Dept. 45, 21/2, Gt. Sutton St., E.C.1.

BUILD YOUR OWN LOUDSPEAKER
With the LISSENOLA, BROWN A, or an adjustable Earpiece, and our perfectly made highly finished Specialities, you can easily construct a handsome Hornless Paper diaphragm-type Loudspeaker, or any other approved type. You will obtain volume with unsurpassed tonal quality.
Prices, Particulars and Diagrams for stamp.
GOODMAN'S, 27, Farringdon Street, E.C.4.
Also obtainable from Spencers Stores, 4/5, Masons Ave., E.C.2.

THE
"ALLWOODORN"
Polished Aluminium casting and Oak or Mahogany horn. Takes all gramophone attachments.
Send for lists of others. Dealers supplied.

Price 27/-
The finest combination of wood and metal on the market.
Manufacturer:
H. MADDISON,
2a Ronalds Road,
N.5.

BROADCAST TELEPHONY

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

GREAT BRITAIN

The times given are according to British Summer Time.

The wavelengths given below are the new allocations which come into operation as from September 15.

London (2LO), 361.4 m. 1-2 p.m., con.; 3.15-4 p.m., transmission to schools; 3.30-5.45, con. (Sun.); 4.15 p.m., con.; 5.15-5.55, children; 6 p.m., dance music; 7-8 p.m., time sig., news, music, talk; 8-10 p.m., music; 9.0, news (Sun.); 9.30 p.m., time sig., news, talk; 10 p.m., special feature (Mon., Wed., Fri.). Dance music on Thurs. and Sat. until midnight.

Aberdeen (2BD), 491.8 m. **Belfast** (2BE), 328.1 m. **Birmingham** (5IT), 491.8 m. **Bournemouth** (6BM), 306.1 m. **Cardiff** (5WA), 353 m. **Glasgow** (5SC), 405.4 m. **Manchester** (2ZY), 384.6 m. **Newcastle** (5NO), 312.5 m. Much the same as London times.

Bradford (2LS), 294.1 m. **Dundee** (2DE).* **Edinburgh** (2EH).* **Hull** (6KH).* **Leeds** (2LS), 297 m. **Liverpool** (6LV).* **Nottingham** (5NG).* **Plymouth** (5PY).* **Sheffield** (6FL).* **Stoke-on-Trent** (6ST).* **Swansea** (5SX).* *All these are on 288.5 m. **Daventry** (25 kw.), high-power station, 1,600 m. Special weather report 10.30 a.m. and 10.25 p.m. (weekdays), 9.10 p.m. (Sun.); 11.0 a.m., light music (exc. Sat. and Sun.); relays 2LO from 4 p.m. onwards, own con. on Mon. Dance music daily (exc. Sun. and Tues.) till midnight; on first Friday in each month until 2 a.m.

IRISH FREE STATE.

Dublin (2RN), 319.1 m. Daily, 7.30 p.m. Sundays, 8.30 p.m. until 10.30 p.m.

CONTINENT

The Times are according to the Continental system; for example, 16.30 is 4.30 p.m., and 08.00 is 8 a.m. B.S.T.

AUSTRIA.

Vienna (Radio Wien), 588.2 m. and 517.2 m. (5 kw.). 11.00, con. (almost daily); 15.30 con.; 19.25, news, weather, time sig., con.; 22.00, dance (Wed., Sat.).

Graz, 365.8 m. (750 w.). Relay from Vienna. Also own con. (Tues., Wed., Fri.), 20.10.

BELGIUM.

Brussels, 265.5 m. (1.5 kw.). 17.00, orch. (Tues., Thurs., Sat. only), news; 20.00, lec., con., news. Relay: Antwerp, 508.5 m. (100 w.).

Liege (Radio Club), 294.1 m. (100 w.). Con., 20.30.

CZECHO-SLOVAKIA.

Prague, 348.9 m. (5 kw.). Con., 20.00-23.00, daily.

Brunn (OKB), 441.2 m. (3 kw.). 19.00, con. (daily).

Koszice, 400 m. (2 kw.).

DENMARK.

Bratislava, 300 m. (500 w.).

***Copenhagen** (Radioraadet), 337 m. (700 w.). Sundays: 10.00, sacred service; 16.00, con.; 20.00, dance. Weekdays: 20.00, lec., con., news; dance to 24.00 (Thurs., Sat.).

Ryvang, 1,150 m. (1 kw.). Sundays: 09.00, sacred service.

*Relayed by Odense (810 m.), Sorö (1,150 m.).

ESTHONIA.

Reval (Tallinn), 285.7 m. (500 w.).

FINLAND.

Helsingfors (Skyddskar), 500 m. (500 w.).
Helsingfors, 240 m. (500 w.).
***Tampere**, 400 m. (250 w.).
***Jyvaskyla**, 297 m. (100 w.).
***Pori**, 254.2 m. (100 w.).
***Oulu**, 250 m. (100 w.).
* Relay Helsingfors.

GRAND DUCHY OF LUXEMBURG.

Radio Luxemburg (LOAA), 217.4 m. Con.: 14.00 (Sun.), 21.00 (Thurs.).

FRANCE.

Eiffel Tower, 2,650 m. (5 kw.). 06.40, weather (exc. Sun.); 07.15, 08.00, physical exercises; 11.00, markets (exc. Sun. and Mon.); 11.20, time sig., weather; 15.00, 16.45, Stock Ex. (exc. Sun. and Mon.); 18.00, talk, con., news; 19.00 and 23.10, weather; 21.00, con. (daily). Relays PTT, Paris: 07.15, 08.00 (daily).

Radio-Paris (CFR), 1,760 m. (about 3 kw.). Sundays: 12.45, con., news; 16.30, Stock Ex., con.; 20.15, news, con. or dance. Weekdays: 10.40, news; 12.30, con., markets, weather, news; 16.30, markets, con.; 20.15, news, con. or dance.

L'Ecole Sup. des Postes et Télégraphes (PTT), Paris, 447.8 m. (800 w.). 07.15, 08.00, physical exercises (except (Sun.); 20.30, lec. (almost daily); 21.00, con. (daily).

Le Petit Parisien, 340.9 m. (500 w.). 21.15, con. (Tues., Thurs., Sat., Sun.).

Radio L.L. (Paris), 350 m. (250 w.). Con. (Mon., Wed., Thurs.), 20.30.

Radio-Toulouse, 389.6 m. (2 kw.). 17.30, news (exc. Sun.); 20.45, con.; 21.25, dance (daily).

Radio-Lyon, 291.3 m. (1.5 kw.). 20.20, con. (daily). Temporarily closed.

Strassburg, 222.2 m. (100 w.). 21.15, con. (Tues., Thurs.).

Radio Agen, 297 m. (250 w.). 12.40, weather, Stock Ex.; 20.00, weather, Stock Ex.; 20.30, con. (Tues., Fri.).

***Lyon-la-Doua**, 476.2 m. (1 kw.). Own con., 20.00 (Mon., Wed., Sat.).

***Marseilles**, 309.3 m. (500 w.).

***Toulouse**, 245.9 m. (500 w.).

***Bordeaux**, 411 m.

***Grenoble**, 588.2 m. (500 w.).
* Relays of PTT Paris.

Montpelier, 252.1 m. (200 w.). 20.45 (weekdays only).

Angers (Radio Anjou), 275.2 m. (250 w.). Daily: 20.30, news, lec., con.

Bordeaux (Radio Sud-Ouest), 238.1 m. Con., 21.00 (Mon., Fri.).

Mont de Marsan, 400 m. (300 w.). Con. (weekdays only), 20.30.

Algiers (N. Afr.) (PTT), 310 m. (100 w.). 22.00, con. (Mon., Thurs.).

Ste. Etienne (Radio Forez), 220 m. (100 w.). Testing.

Casablanca (Morocco), 305 m. (600 w.). 19.00, con.

GERMANY.

Berlin, on both 483.9 m. (4 kw.) and 566 m. (1.5 kw.). 06.30, con., physical exercises (Sun.); 09.00, sacred con. (Sun.); 12.55, time sig., news, weather; 18.30, orch.; 20.30, con., weather, news, time sig., dance music until 24.00 (Sat., Sun., Thurs.). Relayed on 1,300 m. by Königswusterhausen (1,300 m.) and Stettin (252.1 m.).

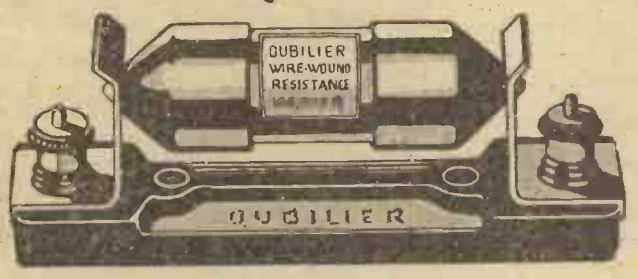
Königswusterhausen (LP), 1,300 m. (8 kw.). 11.30-12.50, con. (Sun.); 15.00, lec. (daily); 20.30, relay of Berlin (Vox Haus) con. (daily). 2,525 m. (5 kw.), Wolff's Buro Press Service: 06.45-20.10. 2,880 m., Telegraphen Union: 08.30-19.45, news. 4,000 m. (10 kw.), 07.00-21.00, news.

Breslau, 357.1 m. (4 kw.). 12.00, con. (daily), Divine service (Sun.); 17.00, con.; 19.00, lec.; 20.30, con., weather, time sig., news, dance (relays Berlin). Relay: Gleiwitz, 250 m.

Frankfort-on-Main, 394.7 m. (4 kw.). 08.00,

(*Concluded on page* 342)

A New Dubilier Product



The Dubilier wire-wound resistance

No new Dubilier Product is placed on the market until it has undergone prolonged tests under working conditions.

In this manner you can always be assured of the perfect reliability of any product bearing the Dubilier name.

The new Dubilier Wire-Wound Anode Resistances will be found to be ideal for resistance capacity circuits.

Self induction and self capacity effects are virtually non-existent, and the resistance values remain constant throughout all variations of climatic conditions.

Be sure to inspect this and other new Dubilier Products at Stand 154 Olympia.

20, 30, 40, 50, 60, 70, 80, 90 and 100 thousand ohms	5/- each.
200 thousand ohms	8/- each.
HOLDERS (as shown, extra)	1/6 each.

Specify Dubilier

REGISTERED DUBILIER TRADE MARK

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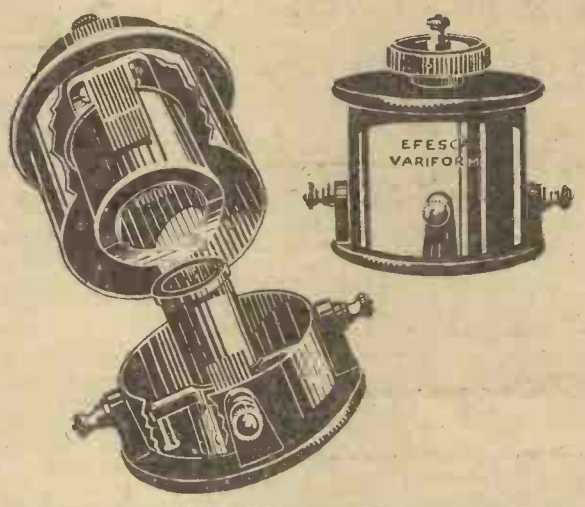

VARIFORM
PATENT

An epoch making departure in low frequency transformer design.

THE wide variety of valves has inspired the production of the EFESCA "VARIFORM" LOW FREQUENCY TRANSFORMER, the primary impedance of which can be altered to suit different types of valves. This is achieved by winding the primary on a separate bobbin which is detachable and interchangeable with others of different impedance values.

A series of five primary windings is available, giving ratios of 2 to 1, 3 to 1, 4 to 1, 5 to 1, and 6 to 1, enabling the transformer to be adjusted to any type of valve or circuit. The interchange is effected without disturbing the permanent transformer connections.

An incidental advantage is the ability to replace a burnt-out primary—the vulnerable part of all transformers—for a few shillings, instead of scrapping the lot.

With one primary bobbin (Specify Ratio required) Price, each **30/-**

Or with complete set of 5 interchangeable primary bobbins **40/-**

Spare interchangeable bobbins, 3/6 each.

Ask your Wireless Dealer for EFESCA COMPONENTS, or write for Catalogue No. 573/5.

Wholesale only :—

FALK, STADELMANN & Co., Ltd.

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NATIONAL RADIO EXHIBITION OLYMPIA LONDON *Stand 114.*

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

A Puravox Loud Speaker for purity & Volume

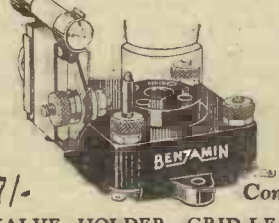
An idea!

GRID-LEAK and Condenser mounted out of the way on a BENJAMIN Anti-Microphonic Valve Holder. Space saved, wiring and mounting simplified. Troubles arising from faulty connections and spacing avoided. Cost of Grid-Leak clips and mounting screws saved.

Remember also, that the BENJAMIN Anti-Microphonic Valve Holder is not only infinitely superior to all its imitators in design and finish, but in actual performance too.

5/3 Complete

VALVE HOLDER & GRID-LEAK
A Dubilier Dumetohm 2 meg. Grid-Leak is fixed on to a rigid insulating bar by means of nickel-plated copper clips.



7/- Complete

VALVE HOLDER, GRID-LEAK & CONDENSER
Nickel-plated copper clips carry a Dubilier fixed Condenser (.0003) in addition to the Grid-Leak. Series or parallel.

BENJAMIN VALVE HOLDER
without Leak or Condenser. Price 2/9

From all good Dealers

BENJAMIN
BRITISH MADE
Clearer-Tone, Anti-Microphonic
VALVE HOLDER

THE BENJAMIN ELECTRIC LIMITED
Tottenham, Loncon, N.17.

STAND 105, RADIO EXHIBITION

"BROADCAST TELEPHONY" (*cont. from page* 340)

sacred con. (Sun.); 16.00, con. (Sun.); 16.30, con.; 20.00, lec., con., weather. Dance: relays Berlin. Relay: Cassel, 272.7 m.

Hamburg, 428.6 m. (4 kw.). Relayed by Bremen (400 m.), Hanover (297 m.), Kiel (254.2 m.). Sundays: 07.25, time sig., weather, news, lec.; 09.15, sacred con.; 13.15, con.; 18.00, con.; 19.15, sports, weather, con. or opera, dance. Weekdays: 05.45, time sig., weather; 07.00 and 07.30, news, weather; 12.55, Nauen time sig., news; 14.00, weather, con.; 16.15, con.; 18.00, relays Berlin; 19.00, lec.; 19.55, weather and con.; 22.00, dance (Sun., Thurs., Sat.).

Königsberg, 241.9 m. (4 kw.). 09.00, sacred con. (Sun.); 16.30, con.; 17.00, con. (Sun.); 19.30, lec.; 20.00, con. or opera, weather, news, dance (irr.).

Leipzig, 322.6 m. (4 kw.). Relayed by Dresden (294 m.). 08.30, sacred con. (Sun.); 20.15, con. or opera, weather, news, cabaret or dance (not daily).

Munich, 535.7 m. (4 kw.). Relayed by Nuremberg (329.7 m.). 11.30, lec., con. (Sun.); 16.00, orch. (Sun.); 16.30, con. (weekdays); 18.30, con. (weekdays); 19.15, lec., con. (Sun.).

Muenster, 303 m. (1.5 kw.). Relayed by Elberfeld (468.8 m., 750 w.), Dortmund (283 m.). 11.45, radio talk, Divine service; 12.00, news (Sun.); 19.40, news, weather, time sig., lec., con.

Norddeich (KAV), 1,800 m. 24.00 and 04.00, weather and news.

Stuttgart, 379.7 m. (4 kw.). 11.30, con. (Sun.); 16.30, con. (weekdays); 17.00, con. (Sun.); 18.30, time sig., news, lec., con. (daily); 21.15, time sig., late con. or cabaret.

HOLLAND.

Amsterdam (PCFF), 2,125 m. (1 kw.). Daily: 06.35-15.30 (exc. Mon. and Sat., when 12.30-13.30), news, Stock Ex.

Hilversum (HDO), 1,060 m. (5 kw.). 09.00, sacred service (Sun.); 19.10, con.; 21.00, news, con.

Bloemendael, 566 m.

HUNGARY.

Buda-Pesth (Csepel), 555.6 m. (2 kw.). 17.00, dance music; 20.00, con. or opera; dance nightly.

ICELAND.

Reykjavik, 333.3 m. (700 w.). Con., 20.30.

ITALY.

Rome (IRO), 422.6 m. (3 kw.). 10.30, sacred con.; 17.30, relay of orch. from Hotel di Russia; 17.55, news, Stock Ex., jazz band; 20.30, news, weather, con.; 22.15, late news.

Milan, 315.8 m. (1 kw.). 20.00-23.00, con., jazz band.

JUGO-SLAVIA.

Belgrade (Rakovitza) (HFF), 1,650 m. (2 kw.). 17.00, news (daily), con. (Tues., Thurs., Sat.).

Agram (Zagreb), 275.2 m. (500 w.).

LATVIA.

Riga, 526.3 m. (1.2 kw.). Con. daily, 21.00-22.00.

NORWAY.

Oslo, 370.4 m. (1.5 kw.). 19.15, news, time, lec. con.; 22.00, time, weather, news, dance relayed from Hotel Bristol, Oslo (22.30-24.00, Sun., Wed., Sat.).

Bergen, 461.5 m. (1 kw.). 19.30, news, con., etc.

*Riukan, 445 m. (50 w.).

*Porsgrund, 405 m. (100 w.).

* Relays Oslo.

POLAND.

Warsaw, 400 m. (2 kw.). Daily: con., 11.00-13.00; 15.00-23.00, daily.

RUSSIA.

Moscow (RDW), 1,450 m. (12 kw.). 17.55, news and con.; 23.00, chimes from Kremlin.

(Popoff Station), 1,010 m. (2 kw.). 19.00, con. (Tues., Thurs., Fri.).

Radio Peredacha, 410 m. (6 kw.).

Trades Union Council Station, 450 m. (2 kw.). 18.00, con. (Mon., Wed.).

Leningrad, 223.9 m. and 434.8 m. (2 kw.). Weekdays: 16.00.

Nijni Novgorod, 860 m. (1.2 kw.). 17.00 (Tues., Fri., Sun.), con.

Astrakhan, 650 m. (1 kw.).

Kieff, 211.9 m. (1 kw.). 18.00, con. (daily).

SPAIN.

Madrid (EAJ6), 577 m. (1 kw.). Daily: con

Madrid (EAJ7), 375 m. (1.5 kw.). Con. daily.

Madrid (EAJ4), 275.2 m. (1 kw.). 16.00, con.

The Madrid stations are again working to a rota, varying time of transmissions daily.

Barcelona (EAJ1), 280.4 m. (1 kw.). 17.00-21.00, news, lec., con. (Sun.); 18.00-23.00 (daily).

Barcelona (Radio Catalana) (EAJ13), 277.8 m. (1 kw.). 19.00-23.00, con., weather, news.

Bilbao (EAJ9), 434.8 m. (500 w.). 19.00, news, weather, con. Close down 22.00.

Bilbao (Radio Vizcaya) (EAJ11), 294.1 m. (500 w.). 22.00-24.00, con. (daily).

Cadiz (EAJ3), 400 m. (550 w.). 19.00-21.00, con., news. Tests daily (exc. Sun.), 01.00.

Cartagena (EAJ15), 297 m. (500 w.). 20.30-22.00, con. (daily).

Seville (EAJ5), 344.8 m. (500 w.). 21.00, con., news, weather. Close down 23.00.

Seville (EAJ17), 277.8 m. (500 w.). 19.00-22.00, con. (daily).

San Sebastian (EAJ8), 272.7 m. (1.5 kw.). 17.00-19.00, 21.00-23.00 (daily).

Salamanca (EAJ22), 405 m. (1 kw.). 17.00 and 21.00, con. (daily). Closes down 23.00.

Saragossa, about 566 m. Testing.

SWEDEN.

Stockholm (SASA), 416.7 m. (1½ kw.). 11.00, sacred service (Sun.); 18.00, sacred service; 19.00, lec.; 21.15, news, con., weather. Dance (Sat., Sun.), 21.45.

Relays.—Boden (SASE), 454.5 m.; Eskilstuna, 275.2 m.; Falun (SMZK), 400 m.; Gothenburg (SASB), 260.9 m.; Gefle, 204.1 m.; Joenkoeping (SMZD), 577 m.; Karlsborg (SAJ), 1,365 m.; Karlscrona (SMSM), 201.3 m.; Kristinehamm (SMTY), 202.7 m.; Karlstadt (SMXG), 500 m.; Linkoeping, 588.2 m.; Malmo (SASC), 229 m.; Norrkoeping (SMVV), 272.7 m.; Orebro, 566 m.; Ostersund, 720 m.; Sundsvall (SASD), 545.6 m. (1 kw.); Trollhattan (SMXQ), 294.1 m.; Umea, 252.1 m.

SWITZERLAND.

Lausanne (HB2), 850 m. (1½ kw.) (temp.). 20.00, lec., con. (daily).

Zurich (Hongg), 500 m. (500 w.). 11.00, con. (Sun.); 17.00, con. (exc. Sun.); 20.15, lec., con., dance (Fri.).

Geneva (HB1), 760 m. (2 kw.). 20.15, con. (daily).

Berne, 411 m. (1.5 kw.). 10.30, organ music (exc. Sat.); 16.00, 20.30, con.

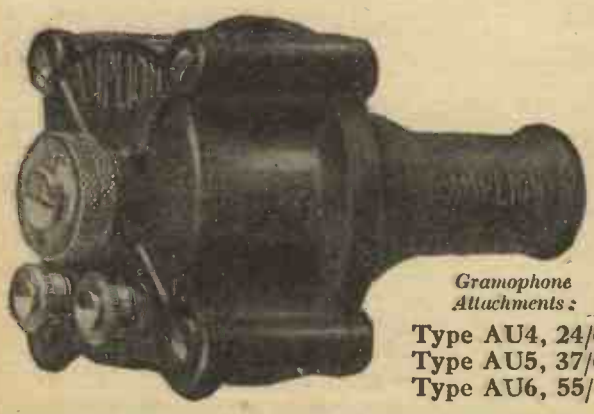
Basle, 1,000 m. (1½ kw.). Con. daily, 20.30.

TELEVISION AT THE EXHIBITION

IN view of the great interest taken in the recent television experimental transmissions, visitors to the exhibition will be gratified to hear that a model of the original Baird apparatus is on view at the Osram stand, which is a happy association in view of the fact that the progress made by Mr. Baird, the inventor of the Televisor, is largely attributed by him to the true and distortionless performance given by Osram valves, which have been exclusively employed by him in all his experiments.

'Senior' Dragon
Type AR 65.
65/-
In pleasing Chocolate finish

SEE THESE NEW
AMPLION
MODELS
at Olympia



Gramophone Attachments:
Type AU4, 24/6.
Type AU5, 37/6.
Type AU6, 55/-.

Announcement of Alfred Graham & Co. (M. Graham), 25, Savile Row, London, W.1

Half a million Amateurs
have gained easier and more *selective* tuning with the Polar S.L.F. Condenser—

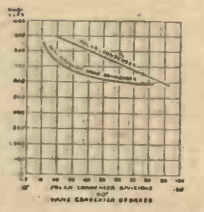


Chart of the straight line frequency curve of the Polar Condenser, showing how relatively more stations can be tuned in from zero to maximum capacity than with Condensers of other types.

7/- only will bring these two vital benefits to you!

If you require up-to-date condensers of high quality at *a reasonable price,* you will find the Polar Straight Line Frequency Condenser meets exactly with your needs. *Over* half a million constructors have already proved their remarkable efficiency.
Much easier tuning and greatly increased selectivity are the immediate results of incorporating in your set Polar S.L.F. Condensers.
The Polar Straight Line Frequency Condenser gives *wider* dial spacing on the crowded lower wavelengths, resulting in sharper tuning—and also in the reception of stations previously unable to be tuned in—with ease, accuracy and precision.

Polar S.L.F. Condenser is of variable air-gap type, with low minimum capacity. It occupies very small space—3" x 3" x 1"; is completely shrouded and absolutely dust-proof. No hand capacity effects are present. Each Condenser carries a twelve months guarantee. Five capacities are available, all occupying the same space; .001, .0005, .0003, .00025, .0002 mfd. Each model costs the same phenomenally low price. Each 7/-

Polar Components for Sound Design

VISIT STAND 149
Main Hall
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OLYMPIA
Sept. 4 — 18

Ask for the "Polar" Component folder. This contains invaluable information on variable condensers and other components, and can be had from any Polar Service Agent or reliable Radio Dealer. If out of stock locally write direct to nearest address below.

Radio Communication Co., Ltd.

125 Hope St., Glasgow | Barnes, London, S.W.13 | 66 Oxford Rd., Manchester

TRADE BREVITIES

AN interesting and informative 64-page booklet dealing with the construction of the Tungstone accumulator is issued by the Tungstone Accumulator Co., Ltd., of St. Bride's House, Salisbury Square, London, E.C.4.

Contained in publication 6232, issued by Igranic Electric Co., Ltd., of 149, Queen Victoria Street, London, is a full catalogue of 56 pages, dealing with The Radio Devices and Essentials sold by this firm.

Another publication, No. 6241, dealing with short-wave reception, which makes interesting reading, is issued by the same firm.

A window-show novelty, which can be obtained by all wireless traders, deals with the McMichael Dimic coils, and will be sent on request to L. McMichael, Ltd., of Wexham Road, Slough, Bucks.

Several interesting leaflets dealing with Gil-Ray crystals, coil holders, spring aerials, and other products, including a special low-loss coil former, are issued by the Gil-Ray Trading Corporation, Ltd., of Sicilian House, Sicilian Avenue, London, W.C.1.

The Ashley Wireless Telephone Co. (1925), Ltd., of Finch Place, Liverpool, have sent us an illustrated leaflet, which deals with their new model plugs and jacks, which incorporate several improvements in technical design.

Exide Week, a seven days' scheme to sell more Exide batteries, forms the subject of Folder 26/1 issued by The Chloride Electrical Storage Co., Ltd., of Clifton Junction, near Manchester.

In addition to their range of broadcasting apparatus, Radio Instruments, Ltd., of 12, Hyde Street, New Oxford Street, W.C.1, are exhibiting at the National Radio Exhibition a heterodyne unit receiver made to the order of the Sudan Government. This apparatus, which is shown by courtesy of the Sudan Government, demonstrates the kind of apparatus needed in the tropics. The instruments are insect and rot proof, being fitted in steel cases.

Eddystone valve receivers, which all have an extremely distinguished appearance owing to their glass instrument panels, are included in a well arranged catalogue sent to us by Stratton and Co., Ltd., of Balmoral Works, Birmingham.

Publication No. 7, issued by C. A. Vandervell and Co., Ltd., of Acton, W.3, contains eleven interesting leaflets dealing with the many and various products of this firm.

In the 72-page catalogue which has just been received from the Marconiphone Co., Ltd., of 210, 212, Tottenham Court Road, London, W.1, there is a comprehensive range of receivers and components which include the following: On page 44 the Stirling Type 33 loud-speaker is shown, and of special mention are the Marconiphone A.C. and D.C. high-tension supply units described on pages 64 and 65.

ANNIVERSARY OF FIRST TRANSATLANTIC MESSAGE

AS this year witnesses the twenty-fifth anniversary of the first wireless signal sent across the Atlantic, the Marconiphone Company are setting up at the National Radio Exhibition (September 4 to 18) a striking tableau of the scene in the low room of the old barracks on Signal Hill, Newfoundland.

Much of the original apparatus used for transmitting and receiving the signal will be on view. The receiving apparatus used on the historic occasion was of peculiar sensitiveness, and a telephone receiver, which was no part of the ordinary instrument, had been supplied so that the slightest clicking might be conveyed to the ear.

It was through this receiver that Mr. Kemp, who had accompanied Marconi to Newfoundland for the event, heard the three dots of the morse telegraphic "S," transmitted from Poldhu, Cornwall, which announced that wireless had conquered the Atlantic. This was on December 12, 1901.

Mr. Kemp himself will be present at Olympia.

Lo-Loss

Super

Fin-Ston

The choice of coils

for your set can only be decided by you. We offer you two designs, each good value and both reliable.

FINSTON LO-LOSS COILS

are designed to give maximum air spacing.
Special thumb grips on base enable coils to be plugged-in or removed without fear of damage to the windings.

Efficient in action, Strong in construction.

Prices:—No. 25, 1/3; 35, 1/6; 50, 1/9; 75, 2/–; 100, 2/6; 150, 2/9; 175, 3/3; 200, 3/6; 250, 3/9; 300, 4/–.

FINSTON SUPER COILS

have been so constructed that the centres are always in alignment when two or more are used, thereby securing maximum results from their magnetic field. All connections are soldered, so as to give constant electrical continuity throughout.
A loose plug is provided so that the winding of the coils can be reversed if so desired.
They are totally enclosed in moulded Bakelite cases, giving great mechanical strength without impairing their efficiency.

Prices:—25, 35, 40, 2/6 each; 50, 60, 3/– each; 75, 100, 150, 3/6 each; 175, 200, 4/– each; 250, 300, 4/6 each.

Write for complete list of all Finston Components.

VISIT STAND No. 206 OLYMPIA.

Finston Manufacturing Co. Ltd.,
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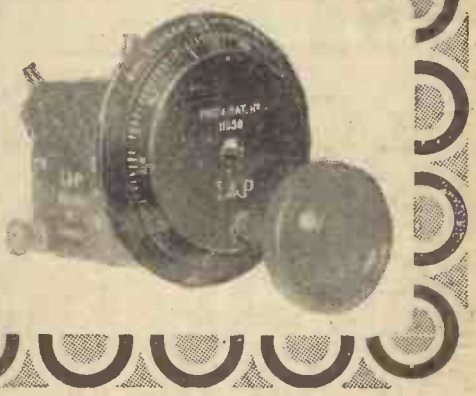

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See **STAND 6** at the
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LONDON & PROVINCIAL RADIO CO., LTD.
'Phone: 94. Colne, Lancs. 'Grams: "Reception."

"A TWO-VALVE LOUD-SPEAKER SET WITH REINARTZ-TYPE REACTION"—(*continued from page* 326.)

from moving about freely inside the cabinet itself.

The batteries are then connected to their respective terminals, as shown in Figs. 3 and 5, rubber-covered stranded-copper wire being used for the purpose. In connecting the wires to the high-tension battery, care should be taken to tap the battery for the detector valve at a suitable point, which can be determined by experiment. H.T.+2, which goes to the second valve, should be connected to the last positive terminal.

Tuning

Fig. 2 shows the panel, T being the tuning condenser knob and R the knob for reaction adjustment. S is the switch for controlling the L.T. supply to the valve filaments, which are regulated by the rheostat F.

Connect the aerial to the terminal A2, and after having connected the earth-lead to the receiver, light the valve filaments by pressing in the switch S, regulating them afterwards by the rheostat. Tuning is accomplished by rotating the dial of the tuning condenser slowly until faint signals are received. The reaction knob, which is previously set at its minimum position, is then slowly turned until the signals become sufficiently strong; on no account should it be brought too near the oscillating point. A finer adjustment of the tuning condenser completes the tuning.

If it is not possible to tune in a station with the reaction condenser set at zero, it should be moved a few degrees at a time, followed every time by a complete turn of the dial of the tuning condenser. In case the receiver refuses to oscillate, a different value of high-tension voltage for the detector valve should be tried, or in some cases the aerial lead when connected to the terminal A1 will effect a cure.

At approximately four miles from 2LO this station is received on the loud-speaker with ample volume and great purity; it is possible to cut it out completely by moving the condenser dial about six degrees, thus allowing other B.B.C. and Continental stations to be tuned in.

M. J. C.

LOOSE TERMINALS

AN annoying occurrence to many amateurs who assemble their own sets and solder all connections is the fact that the majority of the terminals are found to be loose on the completion of the soldering. This is caused by the heat from the soldering-iron, and can easily be overcome if, instead of drilling a hole in the panel large enough for the bolt of the terminal to slip through, a hole is drilled a fraction smaller than the bolt itself.

It is then an easy matter, with the aid of a pair of pliers, to screw the bolt into the hole, and when right home screw on the nut and washer. The terminals will then be found quite tight after the soldering is finished.

G. A. H.

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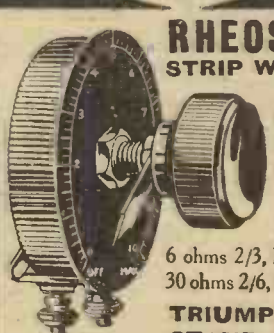

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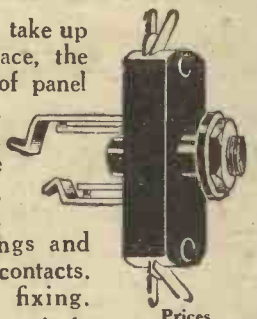
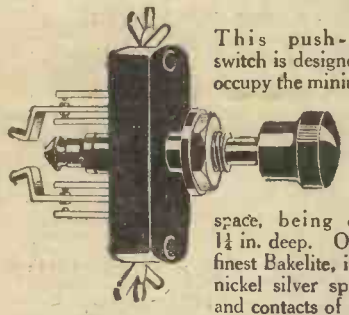
Designed to take up the least space, the depth back of panel being 1¼ in. Made from best Bakelite mouldings, with nickel silver springs and pure silver contacts. One-hole fixing. Soldering contacts can be brought into any position.



Prices No. 3, as illustrated 2/6 others from 2/- to 3/-

The "LOTUS" JACK SWITCHES



This push-pull switch is designed to occupy the minimum space, being only 1¼ in. deep. Of the finest Bakelite, it has nickel silver springs and contacts of pure silver. Soldering contacts can be made to suit any wiring.

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LOTUS WORKS
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An Uncommon Fault

SIR,—I recently wired up a three-valver, detector and two stages of L.F. On testing, I obtained excellent results with two valves, but on switching on the second L.F., reception would fade suddenly and then a continuous cracking be heard. After rewiring the set to four different circuits with the same result, I decided to test the various components as far as I could. As the two-valve results were exceptionally good, it only left the second stage L.F. to be dealt with. I even went as far as wiring up a temporary two-valve circuit to test the second transformer, using it as first stage; the results were very good indeed. Ultimately I decided to ask the makers to test this transformer, with the result that it was found to be faulty; although functioning perfectly as a first stage L.F., it would not stand the extra load when used in conjunction with a power valve, although it was a second-stage transformer of reputable make.

It has now been repaired and the results obtained are splendid. As this is rather a unique experience I hand you the information as it will probably help some of your readers to solve a "mystery."—E. G. S. (Bedford Park).

Interferences from Tramways

SIR,—With reference to V. F. J.'s letter in No. 219, I should like to draw the writer's attention to the set on page 209 (Fig. 1) of that issue, constructed by Mr. Emmons, of Southampton, for the International Set Competition.

I should think the constructor had in mind the large amount of electric traction in America, the place to which the set is going for the competition, when he designed it. If V. F. J. is troubled with interference from trams, I should think it would be a good idea to adopt an arrangement similar to Mr. Emmons and to try the effect of a counterpoise earth. Loose-coupled tuning coils will also help to lessen this kind of interference, and a variable condenser placed in the earth lead of a single-circuit tuner will help.—E. S. (Stafford).

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What Killed the Earwig?

SIR,—Recently, whilst listening to the programme from 2 L O, the loud-speaker gave several violent grunts of music and then signals ceased entirely. A careful examination was made, but there appeared to be nothing obviously wrong.

The set is tuned by a .0005 S.L.F. variable condenser, and on increasing the wavelength to exactly 460 metres, 2 L O came in again at full strength. I naturally came to the conclusion that the transmitter had broken down and that the Marconi House stand-by was working on 460 metres. To make sure I tuned in Croydon, which was working on an apparent wavelength of nearly 1,000 metres.

Examination of the S.L.F. condenser brought to light the cause of the trouble. An earwig had found a suicide's grave between the plates of the condenser. I can understand the presence of the earwig causing a change in the capacity, but what I do want to know is *what killed the earwig?* The nature of the fade clearly indicated that it was alive at the time the trouble started, and examination of the corpse proved conclusively that it was not crushed between the plates when the condenser was adjusted. Did it meet with a violent atmospheric which was sufficient to put "paid" to its account?—A. C. (Ealing).

Quality of Transmission

SIR,—Having carefully read H. P.'s letter in No. 220, I think it necessary to submit a few remarks based upon my personal experiences. I quite agree with H. P.'s remarks that the Grand Hotel, Eastbourne, transmissions are excellent, so also are most of the transmissions given nightly from 2 L O.

I personally make use of *all* the best (English) components and valves on the market that money can buy, and the transmissions received six evenings out of seven are really excellent and enjoyable.—H. W. T. (London).

PROPOSED RADIO SOCIETY

WE have been informed that it is proposed to form a radio society covering the Southgate, Finchley, and Barnet districts. All interested readers should communicate with Mr. J. Clarricoats, of 107, Friern Barnet Road, London, N.11.

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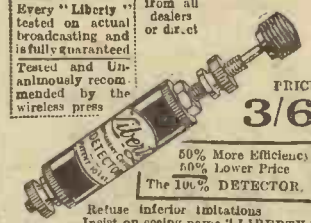

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"Can a Damp Wall be Cured?" is the title of an article appearing in the current issue of "The Amateur Mechanic and Work" (3d.), and should be of use to many readers. Other articles appearing in the same number are "Home-made Parquet Flooring," "Passe-partout Picture by a Simple Method," "Repairing Cut Golf-balls," "An Adjustable Seat for the Bath," "Making a 'Peal'-type Loud-speaker," "Leaded Lights," "The Many Uses of Building-board," "Lamp Tester for High-tension Batteries," "Artistic Inlaying for the Home-worker," "Simple H. T. Battery Connections."

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241. Amplion Magazine.
242. W. J. Henderson & Co., Ltd.
243. Darimont Electric Batteries, Ltd.
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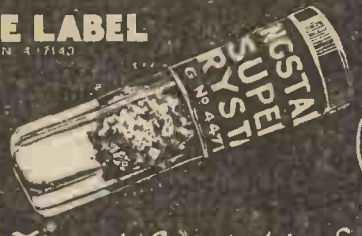

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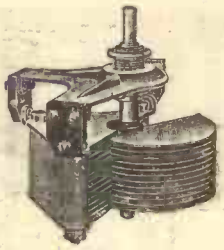

"Utility" Low Loss Condensers Vernier Pattern.

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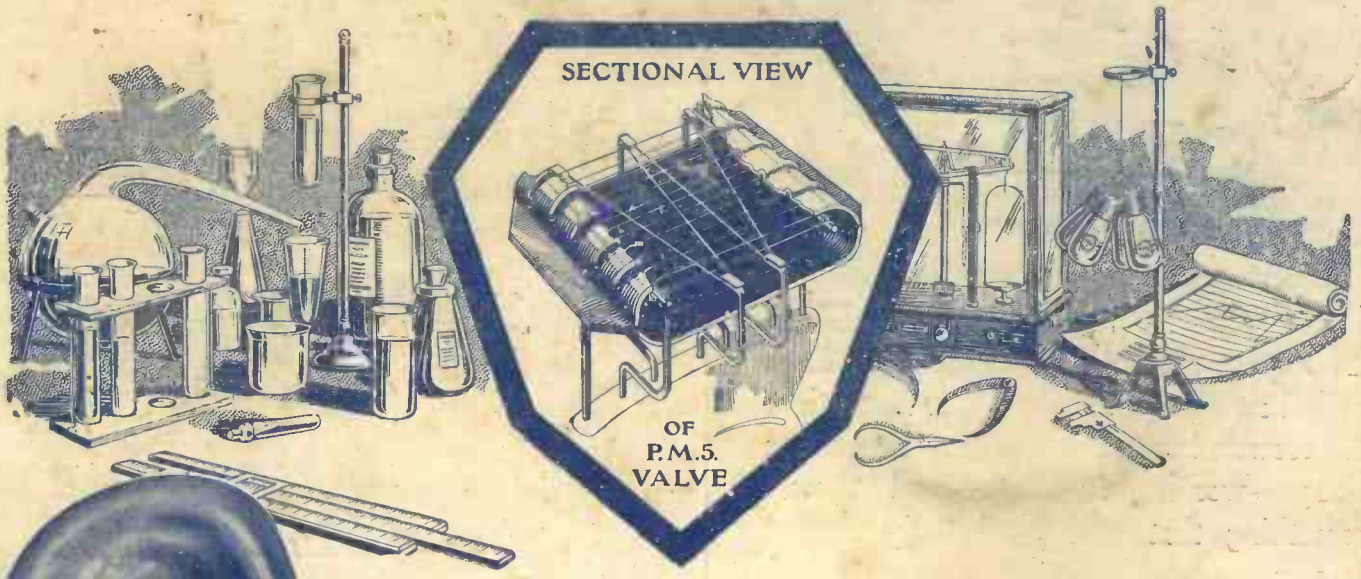

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