

A PLATE-TUNED CRYSTAL SET

Amateur Wireless

And Electrics

Vol. VI. No. 150.

SATURDAY, APRIL 18, 1925

Price 3d

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COILS

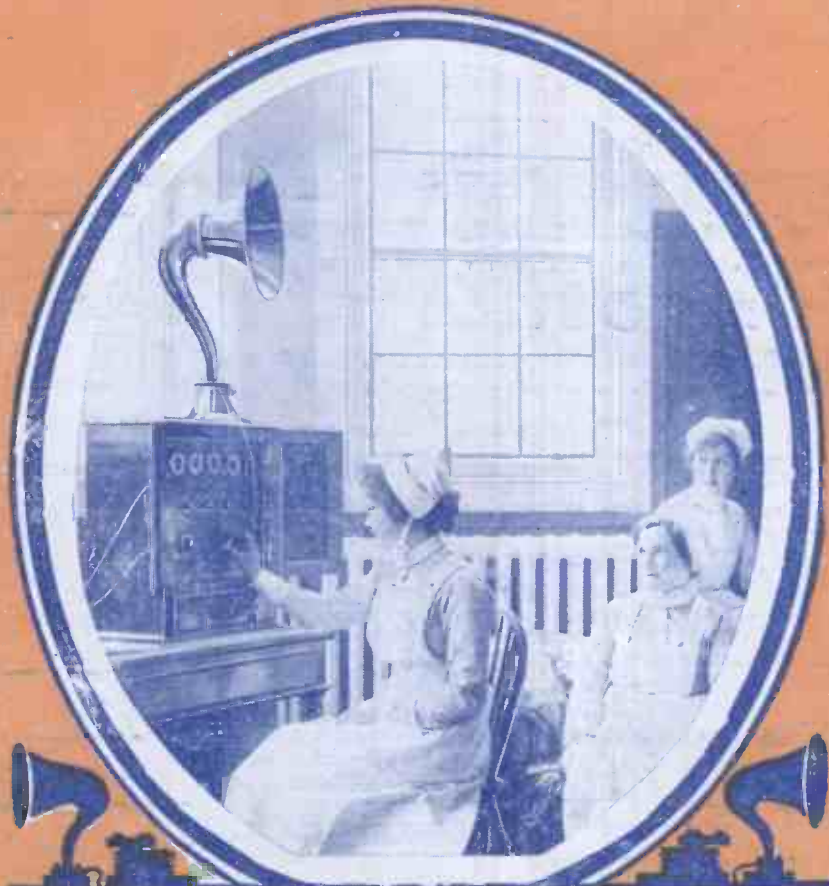
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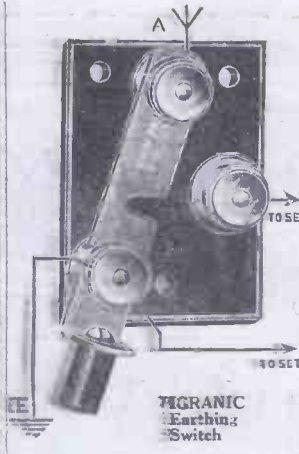
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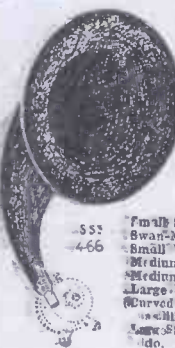
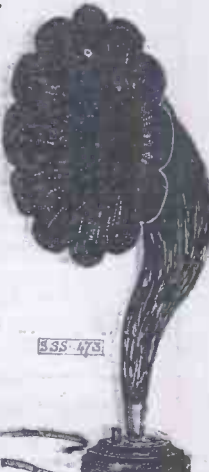
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Amateur Wireless

and Electrics

Vol. VI. No. 150

April 18, 1925

HINTS ON TESTING

AS the time will surely come when the performance of any set will fall below standard, every amateur should have some idea of how to test such components and accessories as are most likely to be at fault. When there has not been a complete breakdown, indicated by a sudden cessation of signals, but a gradual falling off of volume, increasing difficulty in approaching the oscillation point and loss of "pep" generally, the first thing that should be suspected is the H.T. battery.

The H.T. Battery

The obvious way to test this item is to connect a voltmeter across its terminals; but there are pitfalls here, as the following instance will show. I knew a man who decided that his set was not working as it once had done, and, as he had recently purchased some new 15-volt H.T. units, he disconnected these from the set and tested them with a voltmeter.

Finding that they all gave readings considerably below their rated value, he slipped the meter into his pocket and took the batteries back to the dealer, demanding that they should be exchanged. The dealer tested the batteries before my friend, using for the purpose a voltmeter of high repute, and obtained readings closely approximating to the nominal rating of the batteries. My friend now produced his instrument, a cheap one of unknown make, but which he had always regarded as being fairly accurate, and obtained the same low readings as before. With the object of showing my friend that his meter was hopelessly inaccurate, the dealer then connected both instruments in parallel across the batteries, but, to his discomfiture, both meters now gave identical readings, *very low indeed*, and my friend got his new batteries.

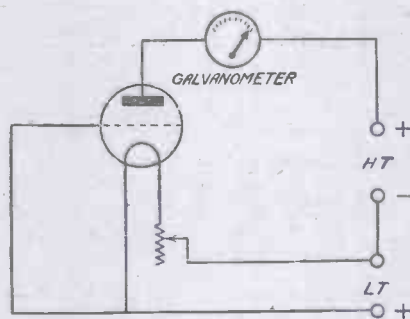
A Simple Explanation

The above seems very mysterious, but the explanation is really quite simple. The batteries were partly run down. My friend's voltmeter had a very low resistance, and, consequently, took a very much larger current than the batteries had been designed to supply, causing the voltage to drop rapidly to a very low value. The dealer's instrument, on the other hand, had a very high resistance, and so took

an almost negligible current, giving a reading practically the same as that of the battery on open circuit.

Now none of the tests described above were fair, nor did they give a true indication of the state of the batteries. These should always be tested with a high-resistance voltmeter *when on load*; that is, when a current of the magnitude that they are required to supply under working conditions is being drawn from them. Obviously the simplest way of doing this is to test the batteries when they are in use on the set.

When dull-emitters are used in a set,



Method of Checking Anode Current.

symptoms very similar to those caused by an exhausted H.T. battery may really be due to a falling off of the filament emission. The effect in both cases is to reduce the anode current, so that if the suspected battery comes through the voltmeter test successfully, attention should next be directed to the valves.

Plate Current

To check the anode current a milliammeter is, of course, highly desirable, but by no means essential. Sufficiently sensitive ex-Government galvanometers can often be obtained at a very much lower price than is usually asked for a milliammeter, and they are very useful for testing purposes generally. Of course, these cannot be used to measure the anode current directly, unless they are calibrated, but will indicate whether the emission remains constant.

When a new dull-emitter, of reputable make, is bought it is usually safe to assume that it is in good order. Immediately upon-

purchase it should be placed in a set and the galvanometer connected in series with the plate circuit; the grid should be connected to the positive terminal of the accumulator and a careful note taken of the H.T. voltage and the deflection of the galvanometer needle. It can then be checked periodically in the same manner, and as long as the same deflection is obtained all is well. The object of putting a positive potential on the grid is to obtain a larger deflection, which is easier to check. The connections are shown in the diagram. Of course, if a milliammeter is available, a complete curve should be taken.

Phone Tests

After buying a new pair of phones or a loud-speaker, it is interesting to find out how far the true resistance approximates to the 2,000 ohms or 4,000 ohms at which the windings are rated. Few amateurs have access to a Wheatstone bridge, but the useful milliammeter can again be pressed into service.

Connect the meter, in series with the phones or loud-speaker, across the accumulator terminals and the resistance can be found by Ohm's law that resistance equals voltage divided by current. If the E.M.F. of the accumulator is 4 volts and the milliammeter shows that 1 milliamperes is passing, then 4 divided by .001 equals 4,000, the resistance of the windings in ohms. Similarly, if the milliammeter reads 2 milliamperes, then the windings are of 2,000 ohms resistance.

Accumulators

When testing the accumulator upon its return from the charging station, first test the specific gravity with a hydrometer (they are not at all costly and every accumulator-user should possess one), then put the battery on load for a few minutes before taking the voltage. I have often heard it repeated like a proverb with regard to accumulators that "the voltage is no test, but the hydrometer is certain." I have known people go along to collect their accumulator with a hydrometer in their pocket, supremely confident that a high reading was proof positive that their accumulator had been properly charged; but it should be remembered that it is the

(Concluded in third column of next page)

AN AMATEUR'S TEN-VALVE RECEIVER

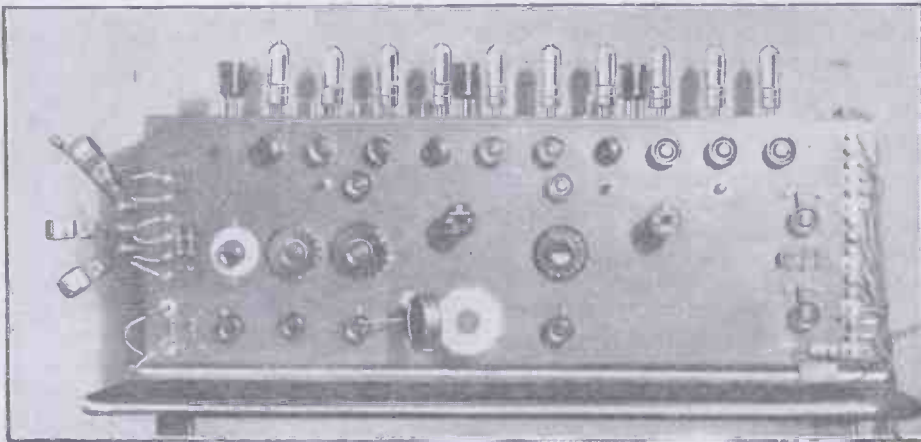
A TEN-VALVE receiver is not to be found in every wireless amateur's den, and for this reason the ten-valve supersonic heterodyne receiver constructed

primary, secondary and reaction coils are shown on the extreme left of the cabinet. Reaction, it should be noted, is never used in the supersonic heterodyne circuit.

The second photograph shows a general view of the receiver, frame aerial and loud-speaker.

The results obtained are truly gratifying. All the B.B.C. main and relay stations have been received at good loud-speaker strength on the frame aerial. American and Canadian broadcasting stations, working on a power of only 250 watts, from as far distant as California and Alberta, have been received on the outdoor aerial.

It has been possible to receive some of the more powerful American stations as early as 11 p.m. when atmospheric conditions were favourable. Many of these excellent results have been obtained using only seven of the valves in the supersonic circuit.



Mr. Benn's 10-valve Supersonic Heterodyne Receiver

by Mr. H. L. Benn, of Chester, is of special interest.

The photographs show two views of the receiver, and it will be seen that the panel has a very neat layout. The knobs of the filament-controlling rheostats are placed each under its respective valve, and the various condensers controlling separate H.F. circuits are kept well spaced.

The receiver, which has been designed and constructed by Mr. H. L. Benn, works on the Armstrong supersonic principle, the valves being coupled by means of H.F. transformers. The first two of the valves constitute an ordinary short-wave high-frequency amplifier and detector unit, the tuned-anode method of coupling being employed. The eighth valve is the short-wave oscillator, which is loosely coupled to the tuned-anode coil of the first valve.

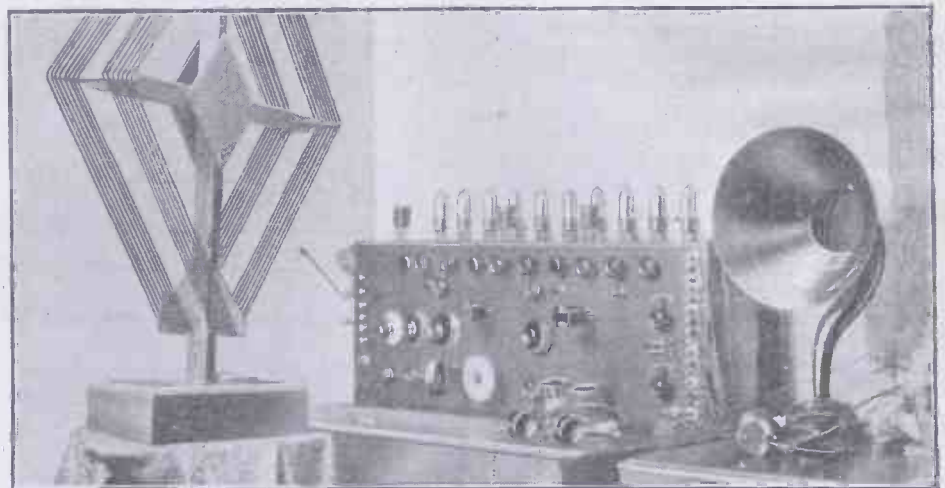
The detector is followed by four stages of long-wave high-frequency amplification, coupled by means of matched plug-in transformers. The long-wave detector and two stages of low-frequency amplification complete the circuit.

By means of a simple system of switching, a "straight" circuit employing from two to eight valves, and the supersonic circuit employing from four to ten valves, may be used.

The tuning condensers from left to right are those of the primary, secondary, anode and heterodyne circuits. The

The anode and heterodyne coils can be seen near the centre of the panel.

Several points are of special interest in connection with this receiver. It has been



Another View of the Receiver with the Frame Aerial.

found necessary to employ vernier tuning devices for each condenser, as tuning is critical for best results. The filaments of the four long-wave amplifiers may be separately controlled by means of the rheostats as shown, but it has been found quite satisfactory to use one master rheostat for all four valves. Ediswan .06 dull-emitter valves are used throughout the set.

and, as a rule, it may safely be left to the discretion of the discerning amateur as to whom he entrusts the charging of his L.T. battery.

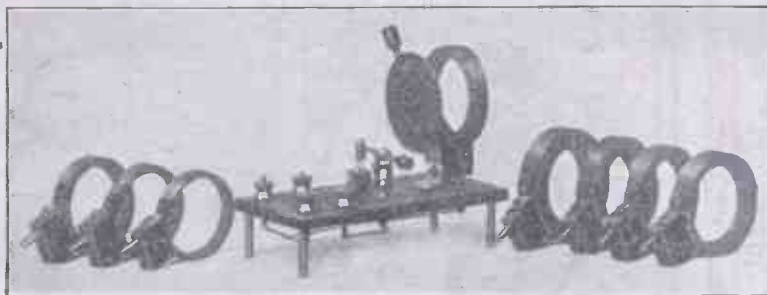
W. F. JOHNSTON.

Wireless enthusiasts of Bautzen, in Germany, are jubilant over a recent decision which gives them the right to erect aerials whether landlords object or not.

Our next issue will be a **SPECIAL SUPER-HETERODYNE NUMBER** and will contain complete constructional details of super-heterodyne receivers and oscillators.

A DAMPING-TUNED CRYSTAL SET

A VERY simple way of tuning is that known as the damping method. By this is meant that a coil having a fixed inductance is plugged into the receiver and the required alteration in inductance is effected by altering the position of a metal plate in relation to the magnetic field produced by the high-frequency currents in the coil. When using this method it is only possible to tune to wavelengths which



from the end. The damping disc is made from ferro-type plate (used by photographers), and to this is soldered a screw carrying an ebonite knob at the top and a piece of brass strip through which the

type, which enables the crystal to be approached from all angles, although, of course, any detector would serve.

The first photograph shows a general view of the receiver, with a set of coils used on it, and the second is an under side view showing the permanent wiring. In use a suitable coil is plugged into the holder, and after adjustment of the detector tuning is carried out by moving the disc. H.

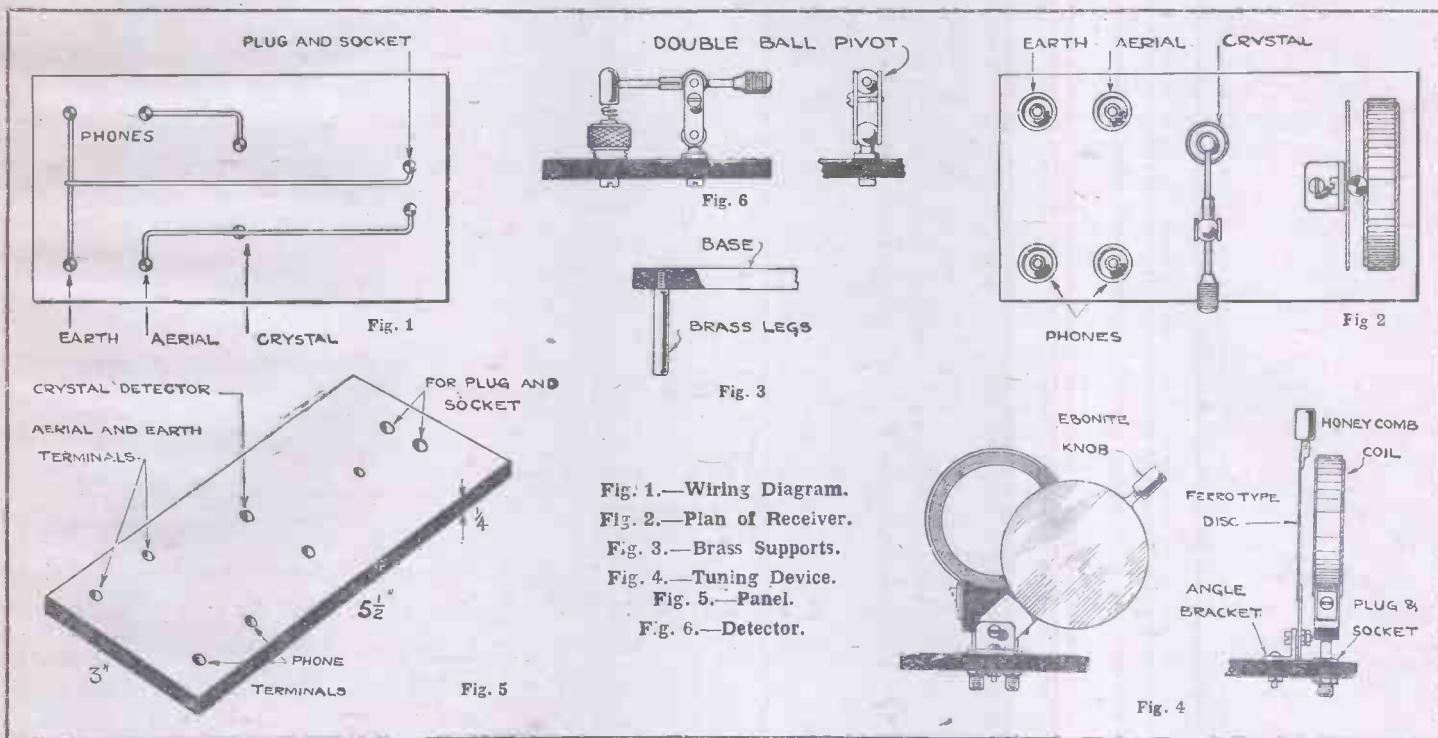


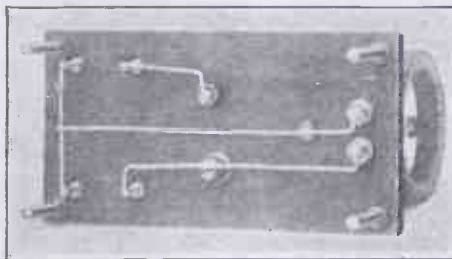
Fig. 1.—Wiring Diagram.
 Fig. 2.—Plan of Receiver.
 Fig. 3.—Brass Supports.
 Fig. 4.—Tuning Device.
 Fig. 5.—Panel.
 Fig. 6.—Detector.

are lower than the natural wavelength of the fixed coil in the particular aerial and earth system. A receiver embodying this principle is shown by the photographs, and although plug-in coils are used in this instance, basket coils are equally suitable.

No comment is needed regarding the circuit, as it is one which can be followed from the wiring diagram shown by Fig. 1.

Fig. 2 is a plan of the receiver. It consists of a base of ebonite $\frac{1}{4}$ in. thick supported on four brass legs (shown in detail in Fig. 3), upon which are mounted the aerial and earth terminals, the phone terminals, crystal detector, inductance coil and damping disc. The most interesting part, of course, is the tuning arrangement shown by Fig. 4. A plug and socket to receive the coil are mounted on the base at the usual centres ($\frac{1}{8}$ in.) about $\frac{1}{2}$ in.

axis screw passes at the bottom. The complete tuning plate is supported by a suitable angle bracket screwed to the



Under Side of Receiver.

panel. Fig. 5 shows the panel ready drilled to receive the components. Fig. 6 shows the crystal detector. It will be seen that this is of the double ball pivot

CLEANING CONDENSERS

AN excellent method of freeing a variable condenser from dust is by means of a cycle pump.

The pump connector is screwed on in the ordinary way, the bottom end of the pump and a part of the connector being held firmly in the hand and directed to any part of the condenser vanes, pumping at the same time.

Dust can be easily blown out from any other part of the receiver in this way.

A somewhat remarkable controversy has arisen by reason of the supposed aversion of many listeners-in to the broadcasting of sermons. It is alleged that deliberate oscillation is taking place in certain districts in order to prevent sermons being received.

PLIOTRON'S PROGRESS

An Original Drawing by C. EVERARD



INSPIRATION



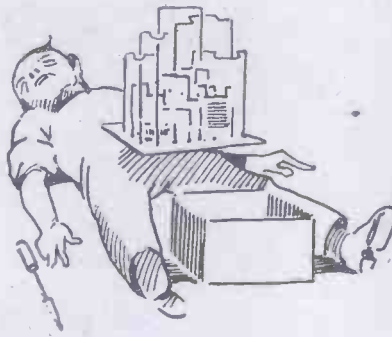
CONSULTATION



RECOMMENDATION



RECREATION



EXHAUSTION



RESUMPTION



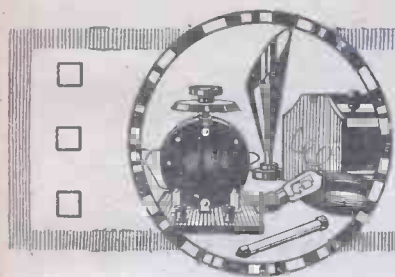
RECTIFICATION



DAMNATION !!

C. Everard

PRACTICAL ODDS AND ENDS



Grid Bias

DISTORTION in low-frequency amplifiers, howling in reflex circuits and oscillation in high-frequency amplifiers are all due to the fact that the valves are working on the wrong part of their characteristic curves. This can easily be remedied by the introduction of grid bias—that is, a few dry cells are included in the grid circuit to impress the correct potential on the grid. It is advisable to use a battery of about 15 volts, tapped so that the correct voltage can easily be obtained.

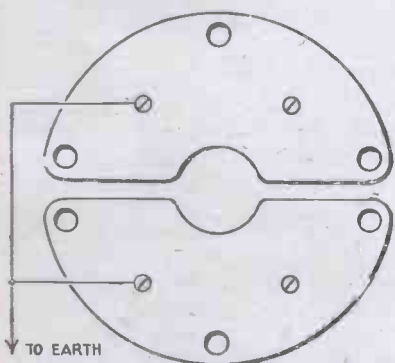
Old H.T. batteries may be used for this purpose if carefully taken apart, but new cells will probably be more reliable. X.

Anti-capacity Device

WHEN extension handles are not used on condensers it is often found that capacity effects are noticeable, and the set is inclined to howl when the hand is moved over the knob.

If there is not much space available for the components, and it is not found convenient to put on an extension handle, these troublesome hand-capacity effects may be greatly reduced in the following manner.

Two ordinary fixed condenser vanes are placed on top of the panel, surrounding the shaft and the moving vanes, and screwed into position as shown. The two



Anti-capacity Device.

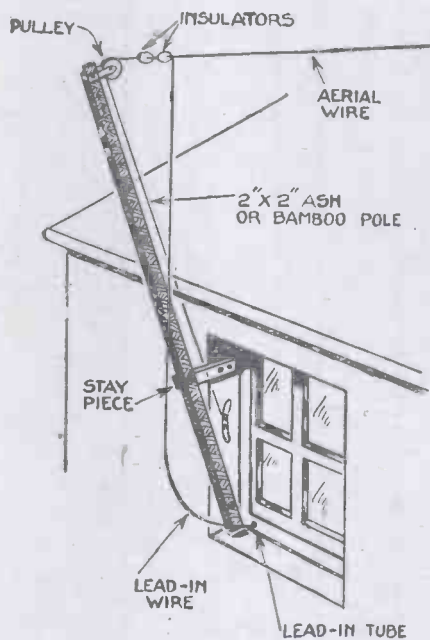
plates are connected together, and a wire from them is then taken to earth.

By this means it is possible to minimise capacity effects and searching for distant stations will be made easy.

The appearance of the polished aluminium disc underneath the ebonite scale, top, is very pleasing. On ordinary receivers the moving condenser vanes should be connected on the earth side. G. F.

An Aerial Tip

IT is sometimes desirable to bring the lead-in from an aerial to one of the front rooms of a house although the aerial itself is supported from one of the windows at the rear.



Novel Arrangement of Aerial.

The diagram shows a simple method of accomplishing this without introducing any losses into the aerial system.

The aerial is continued over the roof and is fastened to a light bamboo or ash pole projecting from the window-ledge. The lead-in can then be brought straight down to the insulator at the window. The length of aerial passing over the roof will be only a few feet from an earthed body, and it is not likely that an increase in strength will be noticed as a result of this addition. L. B.

Electric-light Aerial

IT is well known that the electric lighting system can be used as an aerial if an adaptor plug containing certain fixed condensers is used. It is not generally known, however, that the lighting mains can be used quite successfully even when such a plug is not available.

If the aerial lead to the set be twisted two or three times round the flex leading to the ceiling rose, the capacity of such a twist will be sufficient to by-pass signals. It will probably be found that

greater strength is obtainable when the switch is "on," but no current is being used by the device.

An earth of the usual type is necessary. B.

Non-corrosive Flux

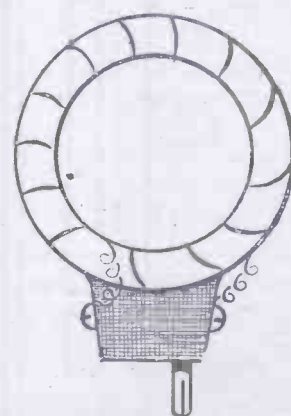
THE following recipe gives a soldering flux, non-corrosive and most suitable for use on copper and brass.

Obtain quantities of resin and tallow (the latter should be of good quality), crush the resin to the size of fine sugar grains, melt the tallow, and while hot add double the quantity of powdered resin. Remove from the source of heat and stir until cool. This will also be found an excellent flux. C. W.

Mounting Coils

THE following tip may prove useful to amateurs who wind their own coils, whether basket or honeycomb. It is usually found that with hard usage the connections are apt to break at the point where the ends of the wire are twisted under the screw heads on the holder, possibly through being cut when the screws are tightened.

This makes it necessary partly to unwind the coil to obtain sufficient wire to make the connection.



Method of Connecting Coils.

To avoid this trouble, leave the ends of the coil longer than is needed to reach the screw, and twist the surplus wire into small spirals as shown. If a break should occur it is only necessary to undo one coil of the spiral and reconnect as before. Care of course must be taken not to damage the short spirals of wire when the coil is handled. K. C.

CHART YOUR SET

IMMEDIATELY one begins to talk about charts, the novice thinks that charting requires expert knowledge. It apparently is the reduction of a hobby to a science, and as such immediately loses some of that practical interest which the handling of a set naturally holds. This is an entirely erroneous conclusion, because the charting of a set is not quite as difficult as one might at first-thought imagine.

All of us must have experienced the thrill which comes to the amateur when he tunes in a new station, particularly if that station has in the past been elusive. Tuning-in is a task which requires an infinity of patience.

The Reasons

It was because of two reasons, of which this inability to pick up stations at will was one, that there arose the advisability of reducing the tuning, if possible, to a formula. The second reason was that, having found it possible to pick up nine or ten of the Continental stations, it was impossible, owing to ignorance of the languages and inability to catch intelligibly the station call, to identify them.

Perhaps the average amateur will have noticed the variability of condenser readings for the same station.

It has been very emphatically pointed out that there is a definite relationship between the condensers which are used. If on one condenser you increase the capacity and on the other reduce it, there is some fault in the tuning even though one is able to obtain results—that is, if you start with a definite known wavelength and from that work out another.

The Best Method

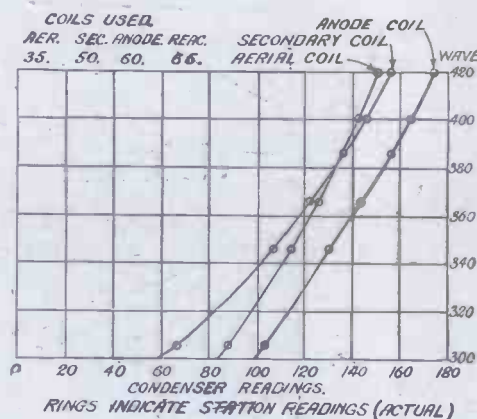
Having decided to chart the set, the question arose as to how best to do it. Being right on top of a relay station, there was considerable interference from the local station when attempting to pick up wavelengths within a certain radius. While it was not impossible to pick up the station required, there was always some interference on the part of the local station.

It was necessary in the first case to ensure that the set was picking up definitely-known wavelengths. It was therefore decided to pick up a station working somewhere near 300 metres, to pick up one about 350 metres, and a third in the neighbourhood of 400 metres.

Therefore, when it was known that the local station was not working and that other stations were working, the writer set out to make three or four definite readings. The set (unfortunately from a record standpoint) has four condensers—primary, secondary, anode and reaction—

and it was soon discovered how very finetuning is called for in this respect. Ultimately it was possible definitely to identify a set station, and the four condenser readings were logged. By careful and yet very interesting and patient fishing, one was able definitely to pick up and receive the call from a second station on a wavelength which could be relied upon. Ultimately a third was logged.

Having now two extreme points and an intermediate one, and bearing in mind that wavelengths are records on curves,



Method of Plotting Graph

it was possible to associate the topmost point with the middle and bottom ones, this giving a fairly even curve (see diagram). In the same manner the secondary and anode condensers were logged. The only one to give any trouble from the curve standpoint was the reaction, but the reaction condenser is not quite so important as the others.

Critical Adjustment

Now came the most interesting part of the experiment. Having made the curves, it was decided to pick up a definite station, using the readings on the chart. A station was picked upon which had presented a difficulty in the past in tuning in without interference from the local station. The local station was in an almost direct line between the receiver and the station chosen. The set was switched off and the condensers carefully turned to the required readings, and then switched on and the station wanted came in perfectly clearly, although some slight tuning was required to give the fullest results; what was most satisfactory was the fact that there was not the slightest trace of interference from the local station. It was found, however, that if one of the condensers was turned even minutely away from the adjustment point, the local station immediately made itself heard.

Having found this station, another was

taken, with similar results, again without local interference.

A third was taken and, owing to the fact that the curves had not been correctly turned, missed; but, keeping on the headphones, that particular station was tuned in with very little difficulty and the chart rectified.

The whole experiment proved to be very interesting. Of course during the whole series one set of coils had to be used, and each set of coils required a different chart. So interesting was the experiment that it is proposed to chart every series of coils used. To those sufficiently interested in the question of knowing exactly what their sets are capable of, charting a set is an exciting and interesting pastime.

N. W. H.

HOW ETHER WAVES GIRDLE THE EARTH

WHAT may be described as a criticism of the "Heaviside layer" hypothesis appears in the *Philosophical Magazine* from the pen of Sir Joseph Larmor, F.R.S. That renowned physicist begins by showing that the bending of light round small obstacles known as "diffraction" does not account for the fact that wireless waves sent out from England can bend round the earth and arrive at the Antipodes. Diffracted waves would not get round one-tenth of the distance.

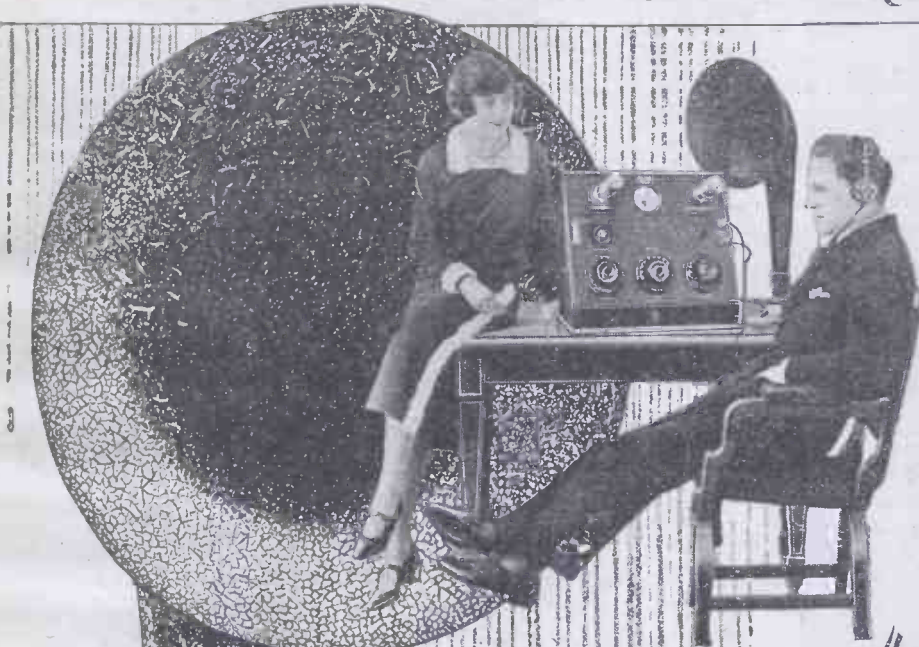
A conducting layer of the atmosphere, as postulated by Oliver Heaviside, would not solve the problem. Such a layer would not bend the waves, it would only absorb them. What is wanted is a layer in which the electrons or other charged particles contained in the air have a large amount of free swing in obedience to the electric force of the wave. The more free swing there is, the faster will the wave travel. This, as we know, also applies to ordinary light.

Now the aurora borealis is known to play in the atmosphere some fifty miles above ground. At that level the ions of the atmosphere have a free path of several centimetres. This makes the upper wave front bend forward, like the crest of a wave on the sea-shore, and so the necessary bending takes place. F. D. A.

The Council of the Institution of Electrical Engineers have addressed a letter to the Postmaster-General pointing out that some of the provisions of the Wireless Telegraphy and Signalling Bill are of far-reaching importance, and unless modified, will prove a hindrance to electrical and physical research and to the progress of electrical science generally.

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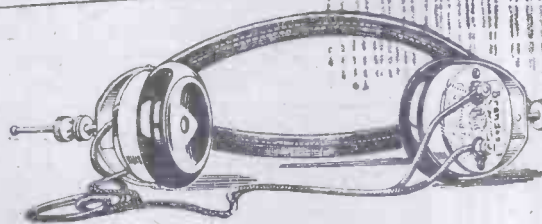
Amaryllis says

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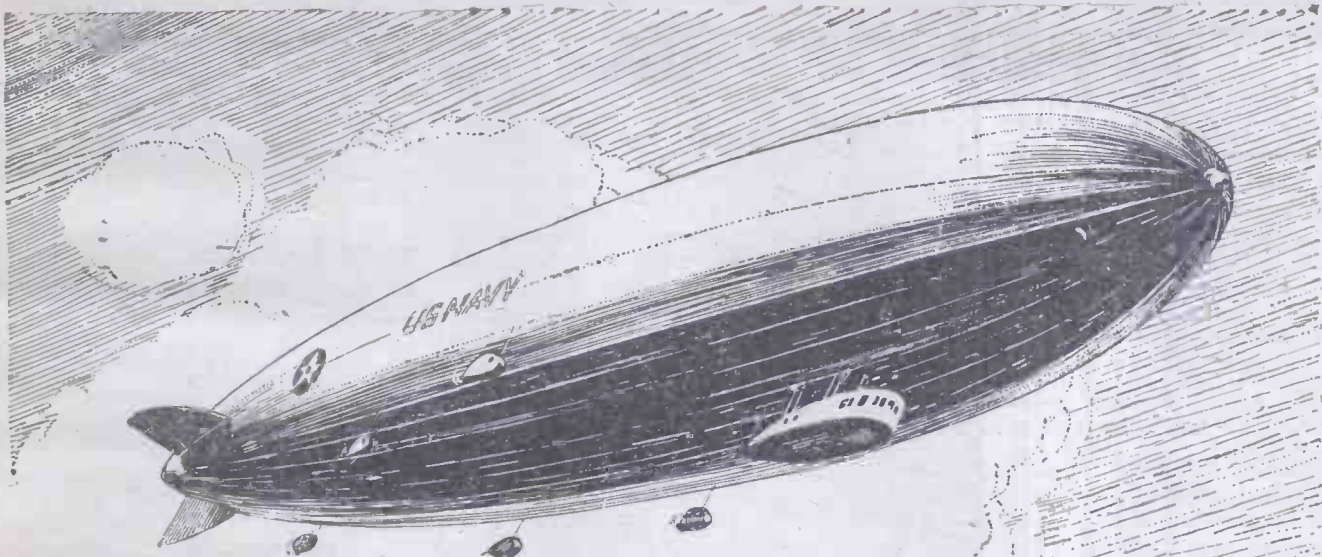
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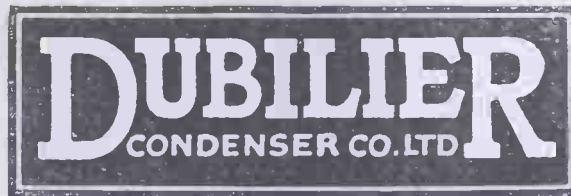
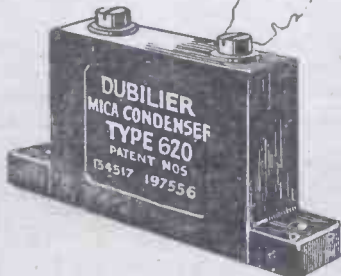
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16

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On Your Wavelength!

Short-wave Work

SHORT-WAVE work is proceeding apace. Almost every wireless periodical is devoting much valuable space to sets and circuits for this type of reception. Even short-wave transmitters are receiving amateur attention, though as yet perhaps not their fair share. Let me repeat my previous warning to those interested in short-wave work. Be quick and get on with it, for things are liable to happen at any moment that may make work on short wavelengths difficult. A high-power transmitter may start operating; the band may be closed to telephony and reserved for Morse communication; amateurs may be prohibited the range.

At the moment it is strange to note how serious is the tendency to construct sets especially for fifty-metre reception. It is not necessary at all. Almost any set, if properly designed, will reach down as far as fifty metres, while still working with efficiency on the higher ranges. It is undoubtedly not necessary to use special circuits until ranges below fifty are being explored. An ordinary two-valve H.F. set with tuned-transformer coupling and potentiometer control will bring in KDKA's short-wave transmission nightly if an efficient aerial is used in conjunction with reaction. Low-capacity valves are, of course, a *sine qua non*. The chief reason why many of the bought sets have such a high minimum wave range is probably due to their variable condensers. When shall we have a really good square-law variable condenser with a minimum of hysteresis loss? The article may be purchased in America to-day. As KDKA is the only station working as low as this and an ordinary set may be constructed to bring it in, there is really no need for freak circuits where broadcast listeners as distinct from experimenters are concerned.

Distortion

It is a pity that KDKA's short-wave transmission is still so blurred by distortion. It is really a curious fact that the shorter the wave the more difficult it is to eliminate distortion in the transmitter. I am inclined to think that some difficulty is being experienced with the super-frequency carrier that is used. If we accept the question of volume and distance traversed, KDKA's short-wave transmission is far from the best received from the States. WBZ still holds the field for purity, and on many occasions WGY can be received quite as loudly as KDKA. Other stations also, so far as musical excellence is concerned, are better than KDKA. There is still considerable

experimenting to be done with short-wave transmitters before anything like perfection is attained.

Special experiments are being carried out in the States in order to establish the feasibility of erecting super-power broadcasting stations. Five stations have been selected to work on higher power. The result of the experiments in progress will govern the attitude of the Government regarding high-power broadcasting. Station WEA F, of New York, has been using a power of 2,000 watts since last December.

Further Outlook Unsettled

Our old friend the weather report is to be shifted. Instead of coming at the close of a more or less imperfect day, we shall be obliged to breakfast in ear-phones to catch the familiar quotation between 9 and 10 a.m., and I can see domestic trouble looming large before me. Besides, who wants to be told that the "further outlook is unsettled" when the rain is already coming down in sheets. Perhaps, however, the B.B.C. will add the cheering news that it "may clear up at tube-time."

Tone and Taste

It is strange what a variety of tastes can be found amongst "listeners-in" as regards the quality or tone desirable in loud-speakers. Some prefer a thin light tone, as given by a loud-speaker with a wooden or ebonite trumpet, and some prefer a rounder quality, as given by a spun aluminium trumpet. Others prefer the more natural quality obtained from a paper-diaphragm loud-speaker, and some like the unnameable quality generally associated with umpteen stages of low-frequency amplification and full reaction on the aerial.

It is perhaps not generally appreciated that the transformer used in the first L.F. stage has a governing effect on the quality issuing from the loud-speaker, and that although each transformer produces its own peculiar quality, any bad points of the design are not very apparent unless a multiple number of stages of amplification are used. Another thing is that although it is consistently advocated that a 4 or 5 to 1 ratio should be used in this first stage, this does not always follow, as the valve which is used in connection with it may vary in its characteristic, and this characteristic may be such as to necessitate the use of a 2 or 3 to 1 transformer.

It will generally be found, however, that a low-ratio transformer produces a thin quality and that a high-ratio design produces a rounder tone. It will also be found that the judicious use of grid bias

will often result in louder and clearer signals than may be obtained under ordinary conditions.

Can You Search?

A friend who has built a four-valve set with one high-frequency stage, tuned-anode coupled, and two note magnifiers came to see me the other day wearing a very worried look. He was not at all satisfied with the performances of his set, for he told me that though he could get London very loudly, he had never been able to pick up any other transmission whilst that station was working. Even when 2LO was silent he had been able to find only two or three other stations, and these at rare intervals. The set, he complained, was not selective, and it was nothing like as sensitive as it should be. Would I go round to have a look at it?

I went round the other evening at a time when our own stations were in full swing. I had not the least difficulty in getting Manchester, Bournemouth, Newcastle, Birmingham, Aberdeen and Madrid all at excellent strength on the loud-speaker in a space of the half-hour that I spent at the controls. The set actually was very sensitive, and tuning was so critical that a beginner might very easily miss certain stations by turning past them without hearing anything at all.

The great difficulty about searching with a multi-valve set is that there are such a number of controls which ought really to be moved simultaneously when you are going up or down the scale. In this particular set there were four—A.T.C., C.C.C., anode-tuning condenser, and the coupling between primary and secondary coils. As there was no tune-stand-by switch one could not cut out the secondary.

The Blind Spot that Wasn't

It is curious to notice how certain places obtain that perfectly undeserved reputation as being bad for wireless reception. Here is an example of what I mean. A brother of mine lives in the west country at a place which is between sixty and seventy miles from the nearest broadcasting station. Until about six months ago he did not possess a wireless set, and when I asked him why he told me that it was of very little use to rig one up since reception was so poor in that locality. Eventually I made up a set for him and took it down for trial. In view of the appalling conditions described by him and other inhabitants of the place with whom I met I rigged up five valves in the hope that something would come in faintly on the telephones.

Having erected a really good aerial and

:: :: *On Your Wavelength! (continued)* :: ::

buried a fine fat earth plate, we connected up and tuned in. The first station we tried was Bournemouth, seventy miles away, which came in with much greater strength than I can get 2LO down here. Though general-purpose and not power valves were used for the note magnifiers, every word of a topical talk was audible at a measured distance of one hundred and fifty yards when the loud-speaker was placed in front of an open window. During the evening we received every main station at full loud-speaker strength—such strength, in fact, that it was too much of a good thing, and we had to lop off one of the note magnifiers. In that "blind spot" the set will bring in W G Y on at least four evenings out of the seven, usually at quite big loud-speaker strength. I only wished that I lived in a blind spot of that kind. It got its reputation apparently from the fact that when broadcast first started one or two people rigged up crystal sets with inefficient aeri-als, and, getting nothing, reported far and wide that reception was next to impossible in the locality. I expect that there are many other places which have been unjustly slandered in the same kind of way.

Getting the Distance

Some readers may wonder what kind of equipment is required for picking up the far-away stations. So long as your aerial and earth are good you ought to be able to get a good many of them on a single valve. Nearly all the B.B.C. stations can be heard quite well with two valves, preferably one H.F. and a rectifier, and with four the majority of them will give loud-speaker strength. I am very badly situated myself, as I have told you before, since I live in the folds of a valley and cannot obtain aerial height. For this reason I generally use five valves, two high-frequency, a rectifier and two note magnifiers, though if I take the set to the house of a friend who lives on higher ground and has a good aerial, we obtain even better results with only one high-frequency amplifier in action. It is difficult sometimes to pick up a weak signal without bringing the set to the oscillation point, so that the carrier wave is heard as a whistle. If you are forced to do this, please remember that everyone else who is trying round on the same wavelength is cussing you, and if you cannot resolve the carrier *quickly*, leave it alone and go on to something else. Do not keep on fiddling about with your controls in an endeavour to tune in a signal which is just outside your range though you can hear its carrier wave. You may be pretty sure that if by superhuman efforts you do manage to get hold of speech or music the set will be so near the oscillating point that it will come in distorted beyond

all recognition. In wireless, as in everything else, it is as well to recognise one's limitations.

A Calumny Revived

I referred some time ago to the fact that when a district was suffering from howling, people usually told each other that the interference was due to somebody using a very powerful valve set. In his technical talk recently Captain Eckersley mentioned that many of those who complained that their reception with crystal sets was weakened by radiation from neighbouring aeri-als stated that all their troubles were due to the use by other people of multi-valve receivers.

There is quite a general idea that the more valves you use the bigger is the howl that you are likely to produce. This is an entirely erroneous idea, for unless, as is highly improbable to say the least of it, the valves are arranged in parallel, the biggest multi-valve set will not radiate more powerfully than a single valver. Further, it is much less likely to do so since the man with what Captain Eckersley calls a big factor of safety, whose set, that is, does not need to be pressed in order to bring in signals at good strength, does not need to work anywhere near the oscillating point to obtain results. Another point is that unless it is the first valve of the set—that is, the one nearest the aerial—that is oscillating there will be little or no radiation. Do not forget, too, that the multi-valve set generally makes use of a double-circuit tuner, which again reduces the likelihood of causing interference.

The Worst Offender

As a matter of absolute fact, by far the worst offender in the way of howling is the user of the single-valve set who has to use a good deal of reaction in order to bring signals up to what he regards as desirable strength. I have seen and operated dozens and dozens of home-made single-valve sets, and I have come across very few which did not howl badly when searching was being carried out.

With the big set there is no need to try round for a carrier wave and then to resolve it, except possibly in the case of American transmissions. With the single-valve set you simply must work in this way if you are after signals which are almost outside the range of your set. Single-valvers should bear these facts in mind, and they should remember, too, that if they are for ever trying to make the signals of their near-by station just a little bit louder they are causing the greatest possible annoyance to other listeners within a very wide radius. Do not imagine that because the squeaks which you are making sound quite small ones to you, they cannot be heard by

others. They will be very much louder to anyone near you who is using one or more stages of note amplification. If you must pick up carrier waves be as quick as you can over your tuning, and leave things alone once you have got the station that you want.

Some New Stations

When trying round on a recent Sunday before our own broadcasting stations opened up, I picked up two stations, German apparently, which I have not heard before and which do not seem to appear in any of the published lists of Continental transmissions. The first of these was broadcasting on 280 metres, and came in at excellent strength. The programme consisted of long operatic scenes—the last one was from Humperdinck's *Hansel und Gretel*. At the end of each item the number of minutes interval that followed was announced, as is done by other German stations, by the strokes of a bell. These intervals were always of ten minutes or more, and the name of the station was probably given at the beginning and not at the end of each item.

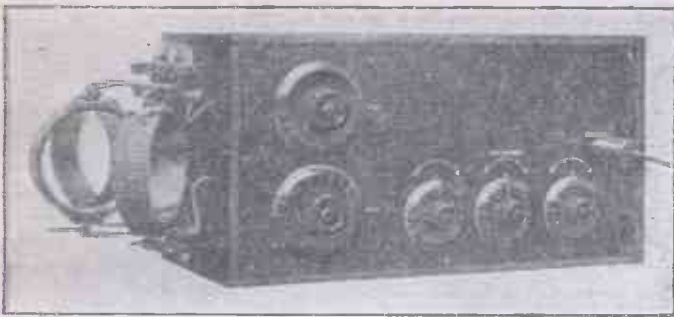
Somehow I never managed to remember to go back to this station at the right moment after an interval, and so did not hear its name. Going a little lower down the scale I found Brussels coming in very well indeed, then I went up a bit. On 335 metres I picked up another station at which a talk in German was in progress. Here again I did not manage to hear the call sign given. The only stations shown as working on anything like these wavelengths in Germany are relays.

Elgar in Excelsis

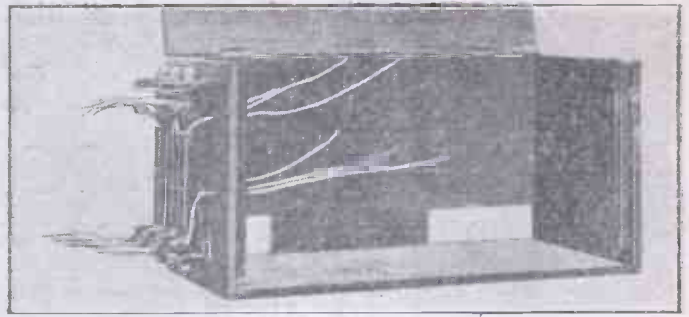
For those who like the work of Sir Edward Elgar, the S.B. programme of a couple of weeks ago must have been very satisfying, for it included some of the heaviest works of the composer, amongst them the "Enigma" variations, supposed to represent in music all the composer's friends. The redeeming feature to my mind was the singing of Miss Astra Desmond, who, being English, sang her native tongue in its own language, which, judging from some of the singers heard recently, is not as easy as it looks.

Lovers of Italian singing heard probably for the first time the famous Stracciari. This singer should have a particular interest for wireless music lovers, as it was only by accident of chance that he did not devote himself entirely to becoming an electrical and wireless expert; he worked alongside Signore Marconi for eight years in his early youth and saw many of his early wireless experiments. His rendering last week of the famous "Largo al Factotum" from *The Barber of Seville* was a triumph of dramatic art.

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View of Case.

A PUSH-PULL FOUR-VALVER

The second and concluding article on a four-valve receiver with push-pull system of amplification.

It is important that the relative positions of the valve-holders, with regard to one another, be carefully noted, as they have been arranged in order to obtain leads both direct and short. In each instance the grid terminal is towards the right-hand corner of the base as seen from the back of the set. The fourth valve-holder (20) is screwed to the side of the third (17) so that both grid terminals lie close together.

Battery (25, 26, 27) and aerial (29) and earth (28) terminals are mounted on strips of ebonite screwed to the back edge of the base as shown in the photographs. All external leads to the set, with the exception of the telephones, are thus taken to rear of the set, so that no loose wires will be in evidence from the front. The battery terminals are secured to a strip measuring 4 in. by 1 in., fixed to the left-hand side of the sub-base, while aerial and earth terminals of a similar type are borne upon another strip at the right, measuring 3 in. by 1 in. Fig. 2 clearly shows these details. Terminal (25) is L.T. and H.T. negative, (26) L.T. positive and (27) H.T. positive.

Terminal Board

An important point in the construction is the attachment of the terminal board carrying the terminals which fix the ends of the flexible leads going to the coil-holders. The board itself is a piece of 1/4-in. ebonite, 3 3/4 in. long and 7/8 in. wide. Six equally-spaced holes are drilled in it to take the terminals, and a small brass angle bracket is fixed under terminal (7). The other end of the bracket is clamped below the nut on the end of the top pillar which supports the fixed plates of the variable condenser (1), a construction which is clearly shown in Fig. 2. Thus one wire connection is dispensed with, though for the sake of clarity it is shown connected by a wire conductor in the diagrams.

A similar method is used for supporting and connecting the grid condenser (2) of the rectifier. A brass strip is held under

terminal (4) at one end, while the other is sweated to one lug of the condenser (2). Fig. 2 shows this clearly.

Wiring

The whole of the wiring with the exception of the flexible leads is carried out in "glazite." The covering on this wire is readily removed by cutting round with a penknife and then pulling the unwanted insulation off. A perfectly clean wire is then exposed, which, being tinned, renders subsequent soldering an easy matter. Wiring will be a simple matter if the exact connections shown in the projected view (Fig. 2) are followed. Further details are given in the photographs. The clips attached to the grid battery are ordinary shop-window ticket clips with their hooks removed. They make perfect contact and allow quick changing of the battery.

Cabinet

The dimensions of the cabinet are given in Fig. 4, while a photograph of the finished article is shown above. No difficulty should be found in making this,

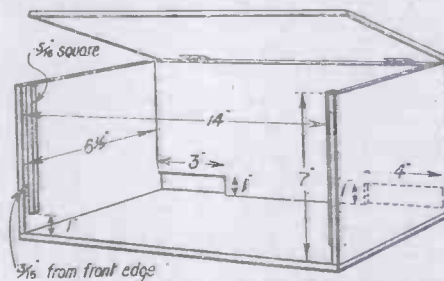


Fig. 4.—Construct'onal Details of Case.

for it is a simple straightforward job in which butt joints, glued and screwed only, are involved. The Igranic Gimholder is attached by four nuts and screws to the left-hand end, the brackets supplied with the coil-holder being reversed on account of the long overall height. It is important to note the positions of the slots in the rear of the cabinet through which the ter-

minals project. The panel is held to the case by two short brass screws passed through the edges, near the top (see the photograph). The fillets screwed to the side members of the case, which may be seen in Fig. 4, give the panel the necessary support.

The set is tuned in precisely the same manner as any other employing a similar tuning system. The gimbal coils will probably make the tuning much sharper, however. On an ordinary aerial, coils of 30, 35 and 40 turns will be found suitable for aerial, secondary and reaction respectively.

R. B. H.

CYLINDRICAL COIL FORMERS

ONCE again the lack of reliable data in certain branches of wireless work is brought to notice in connection with the new form of coil invented by Lorenz. (Such a coil was used in a crystal set described in "A.W." No. 142.)

The coil can best be described as a cylindrical coil with a "basket" formation, adjacent turns being separated from one another by the familiar basket weave. To the experimenter who wants the best results the thought occurs: "What ratio of diameter to length, if any, will make the most efficient coil?" It is here that the lack of reliable data becomes evident.

In the Admiralty Handbook of Wireless Telegraphy it is stated that the maximum inductance for a given length of wire is obtained when the diameter of the coil is .605 of the winding length. Against this, however, must be weighed the statement of that great American wireless engineer, Morecroft, who says that the diameter should be 2.45 of the length.

It would be interesting to know what the best ratio is, but in face of the evidence one is inclined to wonder if there really is a best.

G. W.

THE LOUD-SPEAKER HORN

CAN IT BE IMPROVED?



THIS article is the outcome of a very long experience in the construction of sound amplifiers and sound ducts, and is intended to indicate and suggest lines of experiment for the improvement of the conventional type of horn used for loud-speakers.

The Evolution of the Horn

From the earliest days of the phonograph and gramophone, improvement of tone was gradually effected by a number of experimenters working independently of one another, and for the most part in ignorance of each other's progress. It is only after a lapse of years that one is able to realise how very closely these individual workers' findings agree in the aggregate. Some of the private investigators of the past bear great names in the scientific world, as, for example, the Hon. C. A. Parsons, Professor McKendrick, Mr.

being focused directly upon the disc, as shown by Fig. 1.

In talking-machine practice the imperfections of the simple, directly-focused amplifier were realised many years since; its sound magnification in respect to volume was satisfactory, but much superfluous and disagreeable sound was emitted. It has been proved that harsh, toneless sounds, or rather noises (such as hissing, scraping and the like), are produced by confused groups of vibrations of extremely short wavelength and high frequency propagated simultaneously. Of course there can be no disentangling a dissonance so intricate, but owing to its short wavelength as a whole, it is possible to suppress it more or less by methods which might be broadly compared with filtration.

Length and Expansion

Both the length and the expansion angle of hollow amplifiers are observed greatly to influence the quality of disc-propagated sound, but even more remarkable is the refining effect of curvature in the duct. Fig. 2 shows an amplifier practically of identical length and form with Fig. 2, but curved to the extent of a right-angle.

The consensus of expert opinion was long since in agreement that the tone of Fig. 2 is distinctly less harsh than that of Fig. 1 without any perceptible loss of volume. In pursuance of this scheme additional curvatures were introduced into amplifiers having a uniform taper or expansion throughout. The results were encouraging, but owing probably to the high cost of production large multi-curved horns are seldom met with.

Refinements

The next step was the introduction of a greater or lesser length of parallel-bore tube between the sound source and the amplifier proper, such tubes being straight, curved or angulated (see Fig. 3). A fitting of the latter form was designed and commercially produced by Mr. Henry Seymour, of London, under the name of the Sound Analyser. Its effect was a noticeable refinement of tone. The Gramophone Company then introduced their swan-neck tone-arm (Fig. 4), which from the first was highly successful. In this case the sounds emitted by sound-box *sb* are compelled to traverse a duct having right-angle bends before entering the horn itself. In the curved arm *ca* the two first changes of the parallel ducts direction are numbered 1 and 2, and at the T-piece 3

sounds are directed into a short length of tapered arm *ta*.

In Fig. 5 a five-direction parallel-bore duct, between the loud-speaker *s* and the amplifier *a*, is shown by sketch *x*; the curved formation being retained in the contours of two half-loops, but there would seem no objection to producing the same result by means of one complete loop and a quarter.

Angular Bends

While multi-curved formations were being tested out, angular bends were experimented with with encouraging results. The present writer constructed two angular forms of tone-arm in substitution for the swan-neck (*ca*, Fig. 4), the curvature of which (in seamless copper tube) presented difficulty for the average amateur. The first form was built up of five short lengths of tube angle-jointed together at

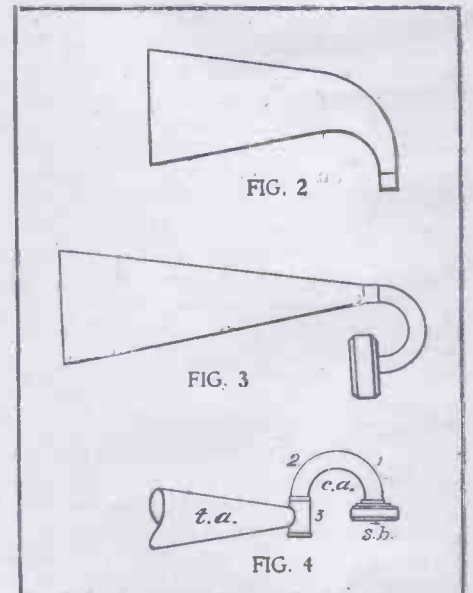
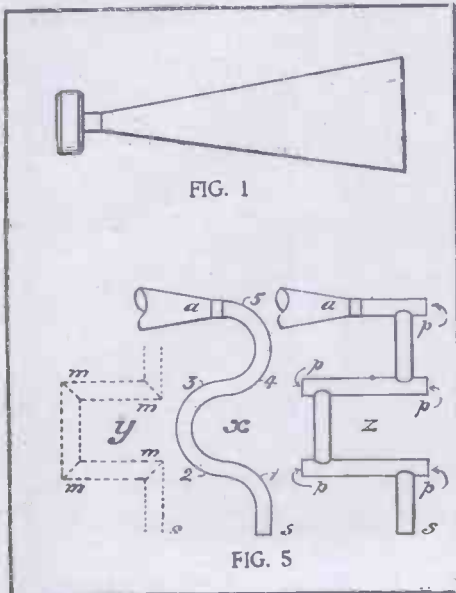


Fig. 1.—Primitive Type of Horn. Fig. 5.—Examples of Curved Ducts.

Fig. 2.—Simple Curved Horn. Fig. 3.—Horn with Neck.

De la Rue, etc. Progress necessarily was slow because it had to be made by trial and error, step by step. Data had laboriously to be built up out of material tests, because previously science had gathered no experience of so peculiar a sound-source as the rim-locked diaphragm. At first the most obvious means for amplifying the relatively small sound emitted by a diaphragm in vibration was the hollow cone of trumpet-like expansion, its apex

45 degrees and hard-soldered, producing, of course, five sides of an octagonal figure. The tonal effect was indistinguishable from that of the curved arm. Subsequently the simpler rectangular form seen at *y* (Fig. 5), with 90-degree mitered corners *m*, was found to be even better, though with some loss of volume. Eventually the form *x* (Fig. 5) was evolved; an extreme development of the right-angular
(Concluded in third column of page 633)

Advertisement of A. C. Cossor, Ltd.

SUGGESTIONS FOR D.X. WORK

NO longer can we complain of the lack of variety of the Broadcasting programmes available for us. If those being transmitted from near-by Stations are not to our liking we can readily take a trip to some of the nearer Continental Stations such as Brussels or Paris. Transmissions from these Stations are so good and usually so free from interference that they can be relied upon for a programme that is a welcome change.

Numbers of people would take an interest in Continental transmissions but for the fact that they are handicapped by unsuitable apparatus. Although in the hands of an expert a single valve receiver can be made to give astounding results, yet it is generally recognised that a stage of high-frequency amplification is necessary to make reception a certainty.



A Typical Cossor Valve.

If yours is a single valve set why not convert it at once for long distance work by adding a stage of high frequency — diagrams and instructions are constantly appearing in all the Wireless Magazines. Until you are in a position to enjoy long distance reception you have not experienced one of the great thrills of Wireless.

If your Receiver is supposed to be capable of receiving over several hundred miles and does not do so in your hands it is very probably because you are using the wrong kind of Valves. No one is foolish enough to put a racehorse between the shafts of a farm cart or to enter a cart horse in a race. Each animal—through generations of breeding—has been reared for its own particular job. And it is the same with wireless valves.

The Right Type of Valve Essential

The valve for long-distance reception must be so sensitive as to pick up signals constantly impinging on the aerial that are much too weak to be rectified by the Detector Valve. And if these oscillating currents are not rectified any number of low-frequency valves will not make the slightest difference.

That is exactly why the Cossor P.1 and the Cossor P.2 are two entirely different valves. The first can only commence to function on signals that are sufficiently strong as to be capable of rectification. It is the purpose of the P.2 (the valve with the red top) to build up the signals so that the P.1 Valve can easily rectify them.

Valves Should Work in Harmony

Working in perfect harmony it is only natural that the Cossor P.1 and the P.2 should be capable of producing exceptional results. Indeed, in the two short years that they have been on the market they have enjoyed a measure of appreciation which has been accorded to no other Valves.

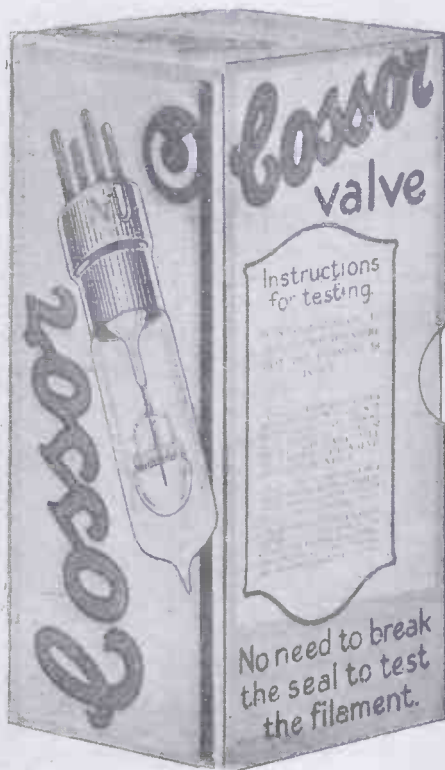
Experimenters first, then the general Wireless public afterwards, were quick to realise that the hood-shaped Grid and Anode in conjunction with the arched filament were responsible for a more efficient use being made of the electron stream.

It is obvious that the ordinary valve with its long straight filament and tubular Anode is most wasteful and permits a serious escape of electrons from each end of the Anode. It has not been difficult to convince a man that if reducing the filament current decreases the electron stream—and consequently the signal strength—then any proportion of the electron stream not being used will have much the same effect.

The Importance of a Rigid Grid

In the same way those enthusiasts who have been keen to obtain pure loud-speaker reception readily appreciate that the ordinary spiral grid is far from rigid. Its weakness permits microphonic noises and distortion which can only be entirely eliminated by a design similar to the Cossor. Here we see a grid that is a magnificent piece of engineering work. Built up on a stout metal grid band, each wire is anchored no less than three times—thus making a network which is wonderfully rigid.

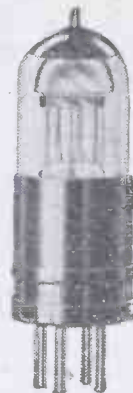
Undoubtedly—as satisfied users seem to be never tired of telling their friends—the P.1 and the P.2 are remarkable valves. If you are in any way dissatisfied with your present Set—if you cannot get far beyond your local stations you should fit Cossor Valves, recognised as the country's most popular Valves.



A New Method of Valve Packing

It should be noted that all Cossor Valves are now sold in patented sealed cartons—the only valve in the world than can come direct from factory to user without being used for demonstration or other purposes.

This safeguard is being greatly appreciated by the wireless public, who now know that they can be assured of a full life for every Valve. Distribution arrangements having been completed, every Dealer is now in possession of an adequate stock of Cossor Valves in these new cartons.



The New Wuncell Valve (with Resistance in base)

A Dull Emitter for Long Distance Work

One of the chief complaints against Dull Emitters as a class is that up to the present they can hardly be said to match up to their corresponding bright prototypes. Most Dull Emitters possess characteristics of their own which are quite different to any Bright emitter Valves. It is interesting to note, therefore, that the new Wuncell Valve recently released for issue by A. C. Cossor, Limited, is an exact counterpart of the well-known P. series.

D.X. enthusiasts will be glad to know, for instance, that after a Station has been tuned in, the P.2 Valve can be removed from its socket and a W.R.2 inserted and little—if any—correction in tuning will be necessary. This, by the way, is one of the hardest tests to give any Valve, and when successful is definite evidence that the two Valves possess identical characteristics.

The Wuncell Valve is at present available in two types—the W.1 and the W.2 (the latter with its customary red top). Both of these Valves correspond to the P.1 and the P.2 mentioned above.

For the convenience of the man with a multi-valve Receiver who does not want to invest in a complete set of Dull Emitters at once a model (W.R.1 and W.R.2) is available with a resistance inbuilt with the base. This will enable anyone to use a Wuncell (normally operating on 2 volts) with a 6-volt accumulator. When all the Valves in the Set have been substituted by Wuncell Valves, these resistances can be short-circuited and the accumulator converted to 2 volts—thereby trebling its amperage.

Owing to the tremendous demand for these new Wuncell Valves supplies have previously been somewhat difficult to obtain, but every Dealer is now in a position to supply either of these two types of Valves from stock. The price of the W.1 and W.2 Wuncells has been fixed at 18s. each, and the W.R.1 and W.R.2 Wuncells with resistances in base are 20s. each.

ADDS CHARM AND EFFICIENCY TO ALL RECEIVING SETS.

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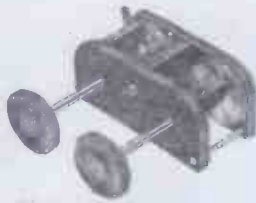


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Testimonial

Many thanks for the Square Law Condenser, which I received last night. I fixed it in my set; result was 50 per cent better reception; it cut out all mush. It is a well-made condenser and goes far above my expectations; speaks clearly through, also music, a lot clearer than before.
L. C. Brown.

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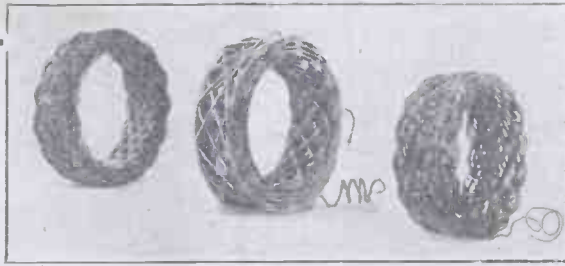
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HOME-MADE TUNING COILS

HOME-MADE coils can be constructed very cheaply and, if a little care is taken, can be made quite efficient.

Unless it is required to wind only the simple solenoid or pancake coils (both now considered rather out of date), some kind of spoked former will be necessary to guide the windings. Previously the home constructor has been rather hampered in his choice of formers,



position are suitable for winding honeycomb coils.

The three coils shown in the photograph

Methods of winding honeycomb, duolateral and Burndept coils are shown in the diagrams. Fig. 1 illustrates the method of winding honeycomb coils, the sets of pegs in the discs being placed opposite each other. To facilitate counting the number of turns, each time the commencing peg is reached it will be found that eight complete turns have been wound on.

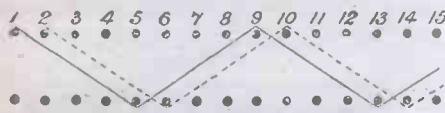


Fig. 1.—Honeycomb Coil Winding.



Fig. 3.—Burndept Coil Winding.

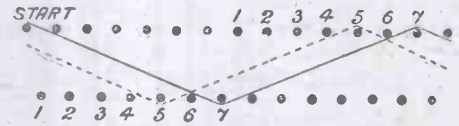
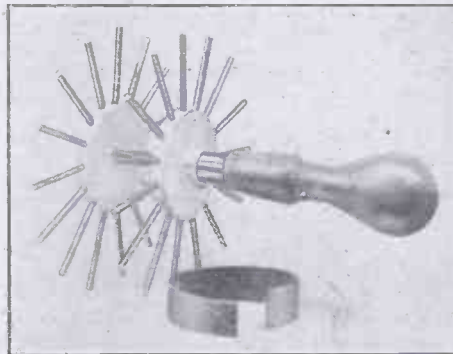


Fig. 2.—Duolateral Coil Winding.

and for this reason it has not been possible to make a very wide range of coils.

A rather novel type of coil winder, supplied by Watson, Jones and Co., of 6, St. Stephen's House, Victoria Embankment, London, S.W.1, overcomes any difficulty that may previously have been encountered in the hand-winding of coils.

From the photograph of the winder it will be seen that a coil of any width may be wound merely by adjusting the distance between each disc of pegs. In addition, one disc may be adjusted so that the pegs are staggered with regard to the other disc of pegs. This is a great convenience in the winding of duolateral coils. On the other hand, the sets of pegs may be placed opposite to each other, and in this



The Westminster Adjustable Coil Winder.

are only a few of the designs which may suggest themselves to the reader.

Details of winding duolateral coils are given in Fig. 2, the opposing sets of pegs being staggered for this type of coil.

The Burndept winding is shown in Fig. 3, where it will be seen that each alternate layer is wound in the solenoid fashion, the turns being spaced with a single wave-wound layer.

For the construction of all these coils it is necessary to employ a split band of fibre or cardboard inserted between the discs to facilitate removal of the coil after the winding has been completed.

If a little care is taken in the selection of the wire many neat and varied types of coil may be produced by means of this handy winder, some of which are shown in the photograph. L. C.

TELEPHONY AND RAILWAY TRAINS

NOTWITHSTANDING the fact that very satisfactory results were obtained in recent tests made in telephonic communication with and between moving railway trains in Germany, the Reichspost has declared itself unable to undertake the installation of the plant for the establishment of such a service. It has fallen to the lot of a new company formed in Berlin to work the concessions granted to Dr. Erich Huth, the inventor of this particular system. The Berlin-Hamburg and Berlin-Munich main lines will be provided with the necessary facilities at an early date.

The method combines wireless telephony with wired-wireless, and allows two-way communication between a telephone subscriber and any passenger on a train equipped in this manner. At each end of each main line on which these trains are running a train transfer station will be erected. Should a town subscriber wish to speak to a passenger, all he need do is to

ring up his local exchange in the ordinary way and get connected with the "trunk line" by which he is switched through to the transfer-exchange. On mentioning the number or starting time of the train desired he is put in communication with its telephone operator who then calls the traveller to the box. In the same manner passengers on two different trains may get into telephonic communication with each other or with their own private homes. J. G. A

When adjusting the set, the H.T. voltage should be fixed at the highest value recommended by the makers of the particular valves used.

**“Wireless Telegraphy
and Telephony”**

The most Practical Handbook for the Amateur. The price is 1/6 net.

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“THE LOUD-SPEAKER HORN” (Continued from page 630)

scheme based on close observation of the several tonal influences effected by (a) the flowing curve, (b) the half right-angle, and (c) the full right-angle; with, alternatively, the L-corner produced by mitred construction, as at y, or the T-corner of the butt-jointed tubes at z.

The findings were as follows: Curvature of the parallel-bore duct effected a refinement of tone with negligible loss of sound volume. The part-ogtogonal form produced similar results. The L-mitred right-angle bend mitigated harshness, but reduced volume; the T-junctions went still further in both respects.

Fibre, hardwood and metallic tubing of various thicknesses and cross sections were compared, but on the whole the best results were had from soft-annealed seamless copper tube of heavy gauge, internally lined with a coating of cork granules glued on. The closing of the T-extensions with cork plugs (e, Fig. 5) proved to be a further improvement.

B. CLEMENTS-HENRY.



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, lay-outs, diagrams, etc., on separate sheets containing your name and address. Always send stamped, addressed envelope and attach Coupon (p. 656).

Faulty H.F. Amplifier

Q.—I am enclosing a circuit diagram of my two-valve set (one H.F. and detector), which is coupled by means of a resistance and condenser, as in the diagram (not shown). I can hear nothing unless the H.T. supply to the high-frequency valve is switched off, when signals come in very faintly. It does not seem to matter whether the H.F. valve is alight or not. Can you tell me what is wrong, as only the best components are used in the set and the wiring seems quite all right?—V. L. (Birmingham).

A.—From the diagram enclosed it would seem that you have connected the grid leak of the detector across the grid condenser. In an amplifier of this sort the grid leak should be connected between the grid and the positive or negative of the filament battery. As the set is at present, when the H.T. is switched on a positive bias of about 20 volts is impressed on the grid (through the H.T. and grid leak) so that no signals can be received. When the H.T. is switched off the internal capacity of the H.F. valve prob-

and a panel wiring diagram of a resistance-capacity coupled L.F. amplifier unit? I should like the connections to be clearly marked so that there will be no difficulty in adding the unit.—V. P. (Southend).

A.—Both the circuit diagram and panel wiring diagram are shown. Terminals and cross wires (shown dotted) are placed so that the addition of the unit will present no difficulty or necessitate any outside wiring (except, of course, the usual short connecting bars). The resistances, although shown close together, are not coupled in any way, but are connected as shown by a large fixed condenser having a capacity of .005 to .01 microfarad. A valve having a large amplification factor and a high value of H.T. voltage should be employed.—U.

Basket Coils

Q.—Is there any advantage to be gained by missing two segments instead of one when winding basket coils? I have heard it said that the method of winding produces a more efficient coil.—P. T. (Herne Hill, S.E. 24).

the earpiece until a click is heard, this indicating that the reed has dropped on to the stop. Now turn the knob in a clockwise direction until a louder click is heard. This position will be found to give the best results for general use. A slight movement of the knob either way may be necessary later on in order to strengthen or clarify reception.—U.

Tuned-choke or Resistance Coupling

Q.—Can you give me the connections of a switch for changing from the tuned-anode to the resistance method of H.F. coupling, so that I need not use the tuned coils for long wavelengths?—D. F. (Blackpool).

A.—A single-pole double-throw switch, preferably of the anti-capacity type, is all that is necessary to change from one system to the other. One lead is taken from the tuned-anode coil to the resistance and then to the plate of the H.F. valve. The free ends of the resistance and coil are then connected to the two contacts of the switch, and a lead is taken from the switch arm to the H.T. The usual connection through a fixed condenser is made between the plate of the H.F. valve and the grid of the detector, and a grid leak is placed between the grid and the negative of the low-tension battery. Provision must be made for increasing the voltage of the H.T. battery (by means of the tapings) when changing over from tuned-anode to resistance-capacity coupling.—U.

DX and the Frame Aerial

Q.—I am very unfortunately situated in that it is impossible for me to erect an outdoor aerial. I have, however, erected a small indoor aerial, and have listened on a crystal set to the programmes from 2 L.O. I now wish to build a large valve set and listen to all the B.B.C. stations. The use of a frame aerial is desirable, as the two-wire indoor aerial is unsightly. Can you advise me as to the best circuit to employ?—P. K. (E.10).

A.—A receiver that will give satisfactory reception on a frame-aerial of long-distance signals must, of necessity, be complicated. Two or three sensitive high-frequency amplifiers will be necessary, and the problem of tuning-in will be no easy task. It would seem that the use of a super-heterodyne receiver is to be strongly recommended. With this type of set many stages of H.F. amplification can be used, and yet there is no need to have more than three controls. It is, however, a large step to make from a crystal set to a super-heterodyne employing six or seven valves, and you would be well advised to study descriptions of such receivers which are described from time to time in *AMATEUR WIRELESS* and the *WIRELESS MAGAZINE*.—U.

Accumulator Separators

Q.—I intend to build a battery of small accumulators for high-tension supply and should like to know a suitable wood to use for separators in the cells.—T. Y. (Llanely).

A.—The following woods are used in commercial practice, after suitable treatment to remove various organic acids: poplar, bass wood, white cedar, Douglas fir and California redwood.—U.

ably by-passes enough energy for faint signals to be heard. If the valve is taken out of its socket, these signals will vanish, unless it is merely the capacity of the valve holder that is causing the leakage. A valve suitable for use in H.F. amplifiers, and the alteration of the grid leak connection should cure the trouble.—U.

Resistance-coupled L.F. Unit

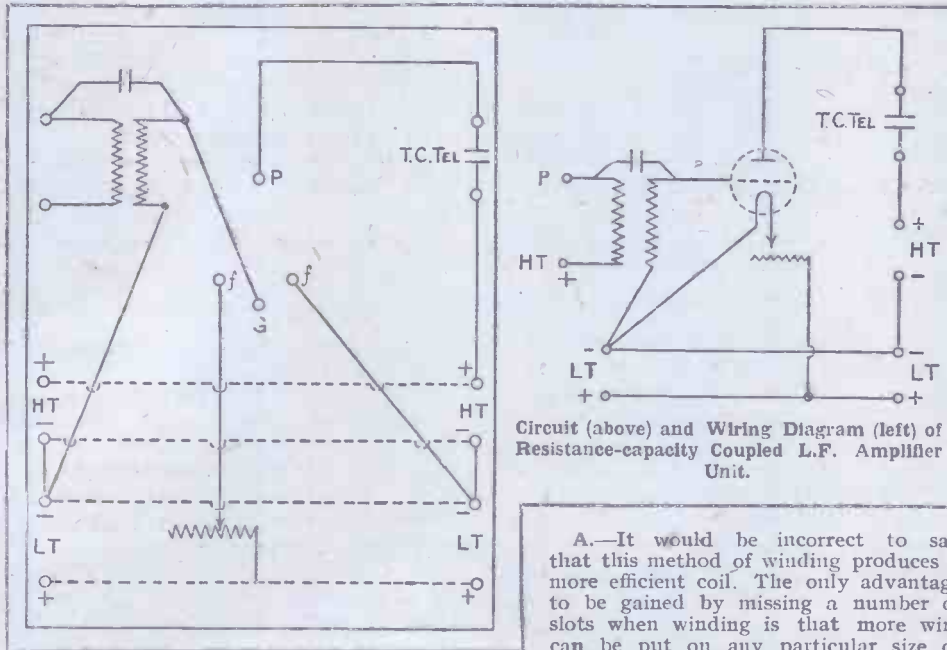
Q.—I have constructed a three-valve set (H.F., detector, L.F.), on the unit system, each unit having a valve holder, the necessary resistances, coils, and terminals are arranged so that the same batteries may be used for all the units. Could you give a circuit diagram

duces a bulky coil as far as thickness is concerned. There is no reason to suppose that greater efficiency is obtainable or that the self-capacity of the coil is reduced by this method.—U.

Adjusting Phones

Q.—I have purchased a pair of Brown's A-type phones, but no details or instructions are given for adjusting. Could you tell me how to adjust the phones for the best results? It is possible to hear clicks in the phones as the knobs are turned, but at some positions speech and music seem very distorted.—B. N. (Aberdeen).

A.—Turn the milled knob on the back of



Circuit (above) and Wiring Diagram (left) of Resistance-capacity Coupled L.F. Amplifier Unit.

A "FELIX" SET FOR THE KIDDIES



Back View of Receiver.



The "Felix" Receiver.

a small brass clip as shown in Fig. 4 and the first photograph, the clip being secured by a small screw at one end. The clip is pivoted so that the crystal may be changed when necessary. Four pieces of No. 30 copper wire twisted together at one end serve as the whiskers, the twisted end being passed through the hole and secured by solder to a pin at the back. One of the whiskers is bent round, as can be seen in the photograph of the front view, to make contact with the crystal "eye"; the others stick straight out and will serve as spares.

For the two basket coils, two card formers, as shown by Fig. 5, should be cut out, and each former should be wound with 40 turns of No. 30 cotton-covered wire, missing every alternate slot. One of the coils is secured to the back of the cat by means of a pin through the centre, and the other is attached to the tail, taking care that the direction of winding when the two coils are mounted is the same. Fig. 6 shows the details of the tail pivot and the coil connections. The wire loop at the end should be twisted with a pair of pliers until the tail will stop wherever it is placed without slipping.

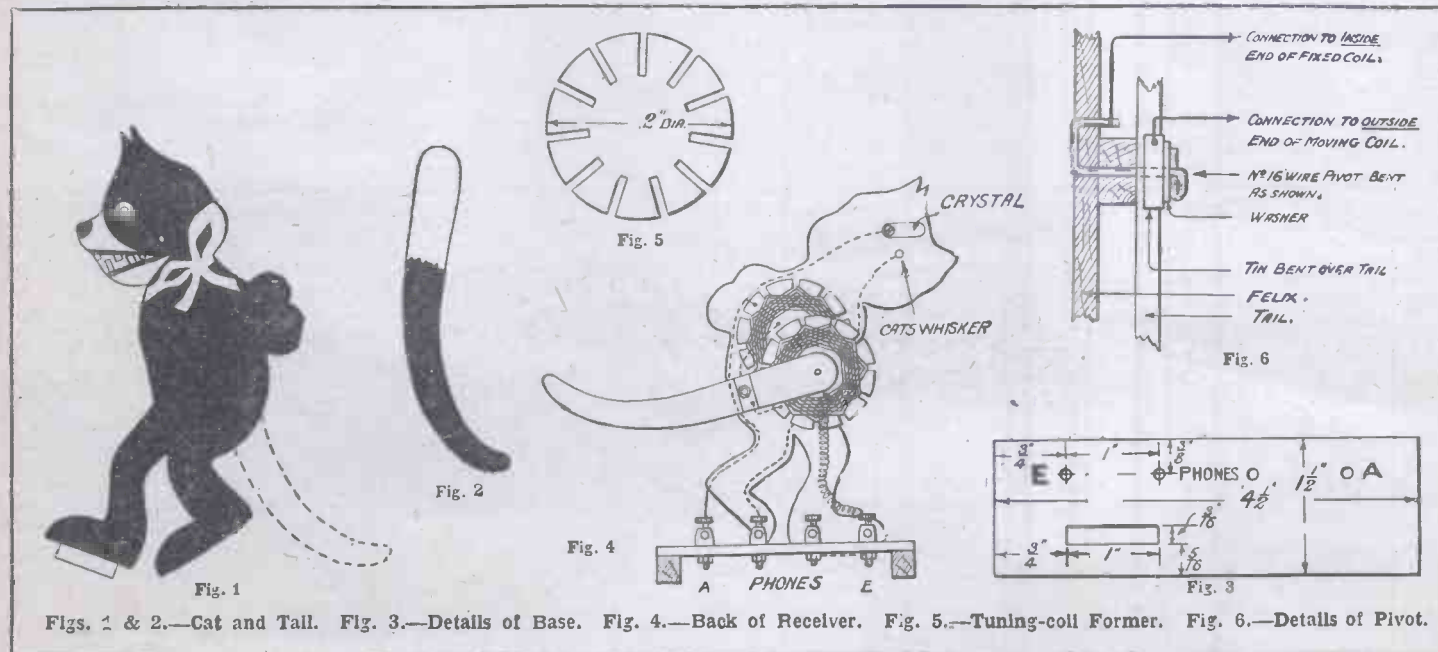
The wiring will be quite clear from the sketch. Starting at the aerial terminal,

a wire is taken to the brass clip holding the crystal, with a tapping to the outside end of the fixed coil. From the cat-whiskers a wire goes to the phone terminal nearest to the aerial terminal. The earth terminal is connected to the other phone terminal and a flexible wire is soldered to the inside end of the moving coil. The inside end of the fixed coil is soldered to the bent back portion of the tail pivot. The outside end of the moving coil is joined to a little tin plate bent over the tail where the pivot comes through.

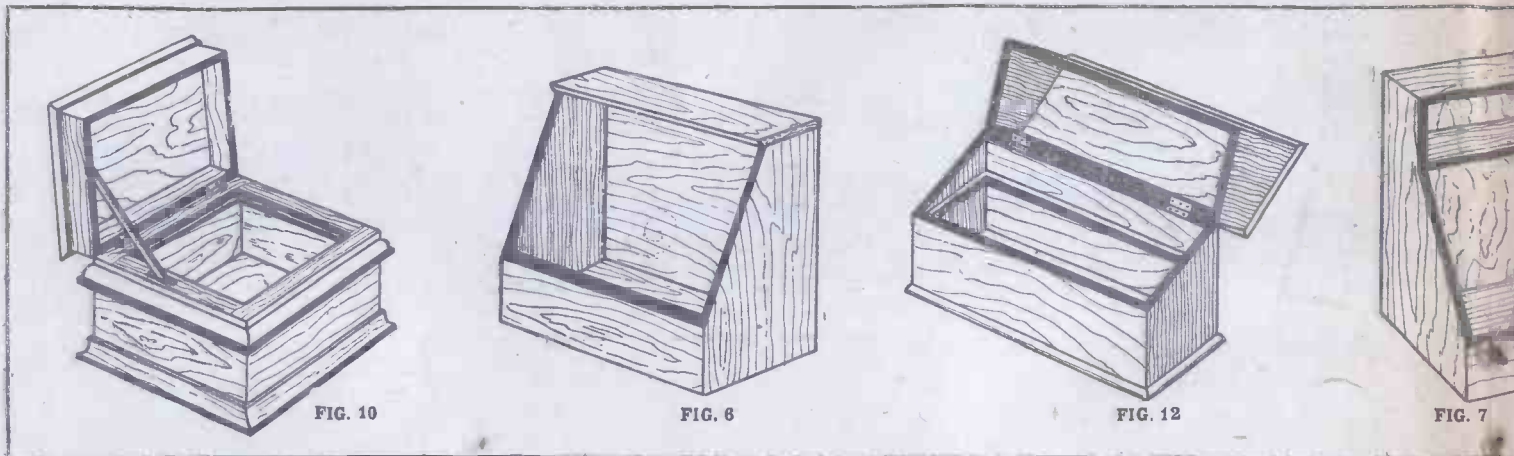
This little set is well worth making, as it works quite well. The number of turns given for the coils is suitable for 2 L O, and perhaps a few more or less might be found better for other stations. A little stain and varnish will greatly improve the appearance of the "Felix" set. G. H. L.

HERE is a novel little crystal set specially designed for the kiddies. It has the advantage of being quite efficient, and quite cheap to construct; in fact the cost will be practically nothing if a little scrap material is available. Felix is quite safe to handle and will not "howl" if his tail is pulled; he only sings when his whisker is in his eye.

The cat, his tail and the pattern for the baseboard (see Figs. 1, 2 and 3) should be drawn on a piece of good-quality three-ply wood, and then cut out carefully with a fretsaw. Holes should be drilled where indicated for the crystal, cat-whiskers, tail pivot and terminals. The hole in the eye is countersunk at the back and a piece of crystal is wedged in so that a portion projects through the front. Contact is made with the crystal by means of



Figs. 1 & 2.—Cat and Tail. Fig. 3.—Details of Base. Fig. 4.—Back of Receiver. Fig. 5.—Tuning-coil Former. Fig. 6.—Details of Pivot.



IN addition to the difficulty of choosing a circuit for a permanent receiver, there is that of selecting a suitable type of cabinet to house the set, and in this case, as with the circuit, the experimenter has a wide choice. In order to assist readers the following article is written, and although seventeen different types are shown in detail, they by no means exhaust the various shapes and patterns that might be used.

First Considerations

The first matter for consideration is whether it is desired to enclose the receiver as a whole or merely to support a panel carrying the components with the controls exposed. It may depend upon the type of valves; whether they possess vertical or horizontal filaments, or whether the cabinet is to be looked upon as an article of furniture. Finally, one's individual taste has to be taken into account.

The following designs are divided into two classes. Firstly, the open type (Figs. 1 to 7), that is, those where the components are housed but the controls exposed; and secondly, the closed type (Figs. 8 to 17), in which the whole outfit may be totally enclosed.

Fig. 1 shows the simplest form, which can be adopted for either the most elementary crystal set or a multi-valve receiver, the size, of course, varying accord-

THE CHOICE OF A CA

ingly. A case 4 in. by 4 in. by 2 in. deep will often suffice for the first-named, while one as large as 18 in. by 18 in. by 8 in. deep is very often needed for the second. This pattern enables the valves to be mounted vertically upon the panel, while transformers and other components are secured underneath. This really is the simplest form of cabinet, but one objection is that, due to the fact that the panel is horizontal and exposed, dust readily accumulates on the controls and valve sockets, which is not a desirable state of affairs.

Simple Vertical Type

Another very simple type is that shown in Fig. 2, which is intended for a vertical panel. This is a great favourite in America, and certainly has a very neat appearance. Providing that the panel arrangement is symmetrically designed and the woodwork is nicely finished, nothing could be neater as far as appearance is concerned, for the beauty of this type lies in its simplicity. The best way of mounting the valves is to support them on a right-angle bracket attached to the back of the panel, and windows can be

provided on the panel, so that the filaments may be seen.

Fig. 3 shows one of the same pattern

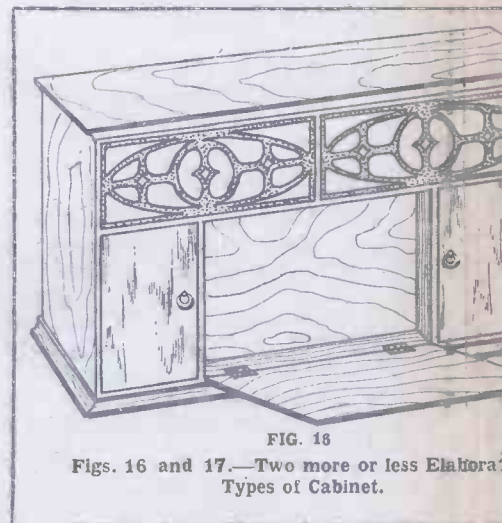
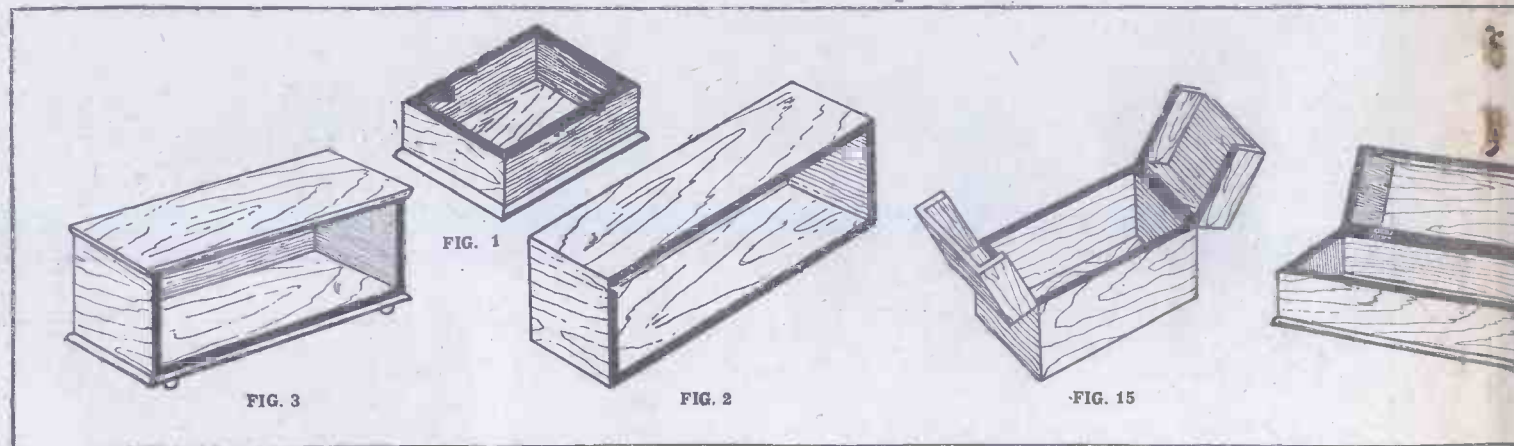
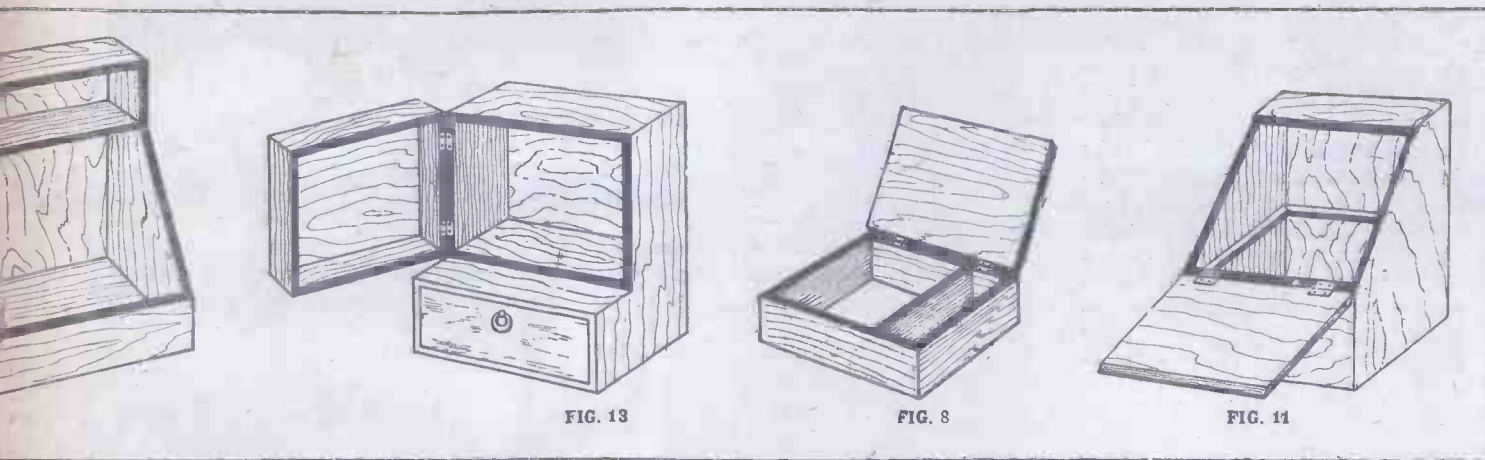


FIG. 16
Figs. 16 and 17.—Two more or less Elaborate Types of Cabinet.

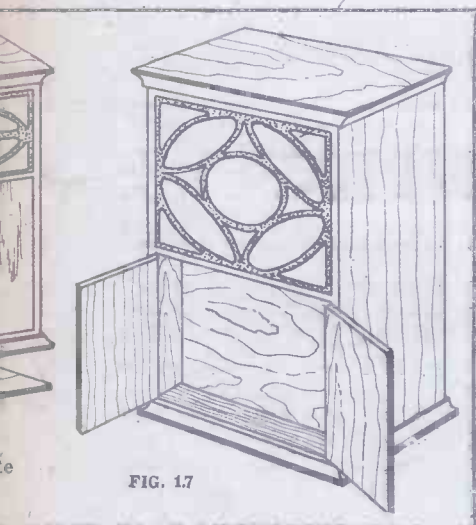
as Fig. 2. The woodwork of the top and bottom is shown projecting over the sides and front, and makes the cabinet a little





CABINET FOR YOUR SET

more elaborate. A simple beading might be added to such a design as Fig. 2, but this is not so effective as the method just



described. A further improvement is the fitting of four spherical feet about 1 in. in diameter, such as are shown in Fig. 3.

Space is often required for phones and perhaps batteries, which in the previous three instances have had to be away from the set. These are provided for in the design shown by Fig. 4. In this the cabinet is somewhat similar to Fig. 3, except that there are two compartments, one large one at the top to receive the set proper, and a smaller one at the bottom. The panel covers the top compartment only while the lower one is left open; the latter can be made large enough to receive a high-tension battery and a couple of dry cells if dull-emitter valves are used. It is not advisable to place accumulators in wireless cabinets.

Economy of Ebonite

If it is desired to effect an economy in the use of an ebonite panel the design shown by Fig. 5 is very effective. Only the essential controls are mounted on the panel, the remaining components, such as transformers, coil holder, valve holders and condensers, being suitably mounted on the inside of the cabinet. Because of this, the panel and components as one unit cannot be removed from the case, as in the

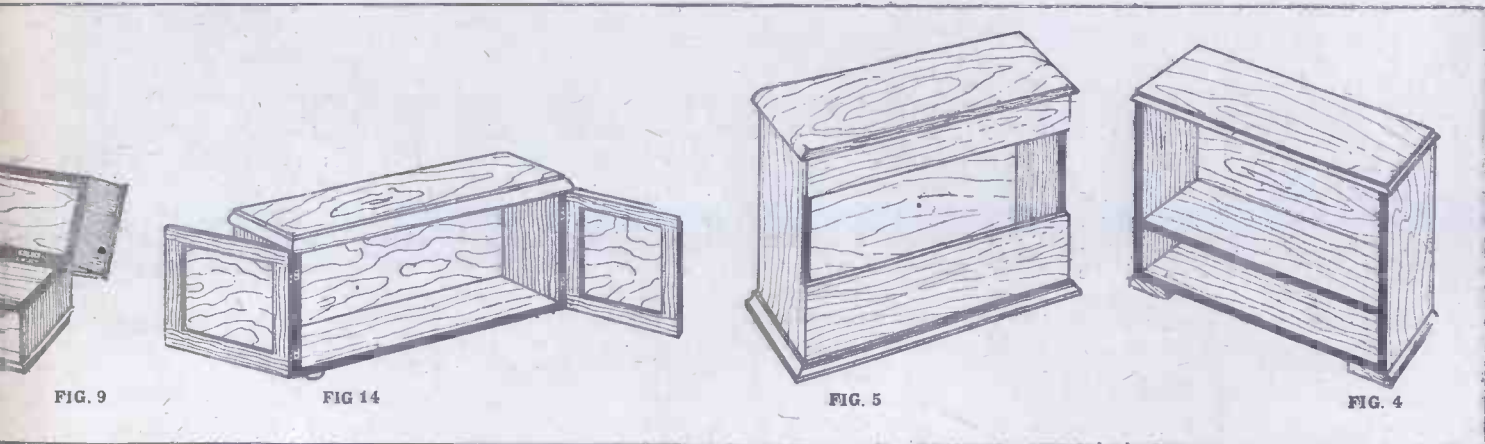
previous examples; this necessitates making the panel a fixture and providing a back which can be readily detached, thus affording easy access for assembly or alteration.

The sloping-panel type of cabinet shown by Fig. 6 is a popular one, and the impression one gets on seeing a receiver mounted in such a case is that the panel is inclined purposely to be exhibited, hence it is important to fit it up in the most imposing manner. Incidentally the sloping panel enables one of greater area to be used, other things being equal, of course, which is an advantage if the number of components is large in number.

All-in Type

As in Fig. 4, the type shown by Fig. 7 has a receptacle for phones, coils or batteries provided, only in this case it is built into the top of the cabinet, which otherwise is the same design as Fig. 6. Although the space is shown open it can be provided with a door with advantage, and if this is desired the most satisfactory method is to fix the hinge at the top and allow the door to open upwards.

Fig. 8 shows the first of the closed cabinets, which are certainly an advance on the open types, even if only for the fact that the panel is immune from dust. Fig. 8 is a simple housing essentially for a crystal set, the panel for which is sunk in



the right-hand side sufficiently for the top to clear the controls and detector; the larger space on the left is sufficient to hold a pair of phones. This type has a flat lid only, but a box lid may be provided, which would avoid having to sink the panel into the right-hand portion.

When a multi-valve set is required to be housed in a cabinet of substantial proportions and is to be dustproof, a design such as is shown by Fig. 9 should fulfil these requirements. The feature of this pattern is that it is long compared with the width, and caters for the valves being fitted all in one line upon the top of the panel. The lid, of course, is a considerable depth, as it is necessary that it should clear the tops of the valves. It is possible to suspend them from the under side of the panel, but it is not usual with such a design.

Flush Panel Type

Of the same type as Fig. 9, but a little more elaborate and using a square panel, is the one shown by Fig. 10. The panel is sunk flush with the woodwork, and looks very neat indeed. From the general appearance it is obvious that a gramophone cabinet could be used for this purpose, which, in fact, is a good recommendation, as they are usually well made, and much labour and time are saved if the amateur is not keen on making the cabinet himself.

Fig. 11 is also a totally-enclosed pattern, similar in shape externally to Fig. 6. The upper half of the cabinet is closed by a sloping door hinged along its bottom edge; this when down exposes the controls and valves, which are mounted on a horizontal panel. This panel is located on a beading just below the level of the top edge of the door, which enables the valves to be located at the back (where the internal height is a maximum) and the condenser knobs, etc., along the front, where not such a great height is required.

Valve Protection

The cabinet shown by Fig. 12 also caters for a horizontal panel, and may be compared with Fig. 9 as far as external appearance is concerned. A beading around the lower portion of the cabinet supports the panel, and the woodwork is sloped upwards around the panel from the front to the back, so that a tapered lid is required as shown. This design is an improvement on Fig. 9, as the lid is not so heavy, and the valves, when placed along the back of the panel, are permanently protected from damage by the back and sides of the cabinet, even when the lid is open.

Another cabinet providing space for phones and batteries is shown by Fig. 13. The receiver is housed in the upper portion upon a vertical panel, and can be closed in entirely by the box door. The lower receptacle can be provided with a door hinged along the lower edge or else with a drawer, according to one's requirements. Double doors hinged at the sides present quite a pleasing appearance.

A very pleasing cabinet can be made by

sinking the panel to a depth of $1\frac{1}{2}$ in. and fitting a pair of doors to the design shown by Fig. 3. The result is that shown by Fig. 14. One is well advised to provide such a pattern as this, as it makes up into a really handsome model, providing that there is good workmanship. Panelled doors are shown in the design, but may be replaced by solid plain doors if desired, although the former give quite a professional finish.

Fig. 15 is rather an unusual pattern, and in effect is merely the same as Fig. 2 with a pair of doors fitted. The doors of necessity are a peculiar shape, considering that the panel is flush with the edges of the case. If it is desired to use plain flush doors it will be necessary to sink the panel, as in the case of Fig. 14.

Elaborate Types

A much more ambitious type of cabinet is shown by Fig. 16. The feature of this type is that a loud-speaker is incorporated with the receiver, the two being suitably arranged within the cabinet. This example is of fairly large dimensions, and the panel is set back about 2 in. from the front in the middle. On each side is a cupboard, in which may be placed batteries, coils, phones, etc. Above these are two fretted panels, and they are so arranged that the two inner halves—that is, the right-hand

half of the left one and the left-hand half of the right one—form the aperture for the flare of the loud-speaker. As the back of the fretted panels are covered with silk (yellow or gold) the actual flare is not seen, and from the front the whole thing appears uniform. The best method of installing the loud-speaker is to purchase the diaphragm mechanism, such as a gramophone attachment, and then construct a wooden horn of similar design to those fitted in so-called hornless gramophones. The receiver components are then attached to the back of the panel and arranged on each side of the loud-speaker.

Fig. 17 shows the same principle applied to a smaller model, in which a loud-speaker of the orthodox type is built into the cabinet, the circular flare coinciding with the circular portion of the fret. In point of fact, it is really necessary to arrange the design of the cabinet to suit a particular loud-speaker, and then design the panel and arrangement of components in the space that is left. As a concrete example, the flare of the "Baby" Sterling loud-speaker is $10\frac{1}{2}$ in. in diameter and total height 19 in., which necessitates a cabinet 12 in. wide by 20 in. high. It is found that the space allowed for the panel is ample for the lay-out of a two-valve set, which is quite sufficient to work this loud-speaker at short distances. H.

MANSBRIDGE CONDENSERS

IF you were to ask ten amateurs how a Mansbridge condenser is made, nine would tell you "with strips of tinfoil and waxed paper," but they would be wrong. A Mansbridge condenser is not quite so simple as that. It should be noted that a Mansbridge condenser is a *type* of condenser (invented by a Post Office engineer named Mansbridge), and not a particular condenser made by any one firm.

The main feature of a Mansbridge condenser is that an insulating medium and a conductor are "amalgamated" into one strip—that is, one side is an insulator and the other a conductor. To be more exact, the strip comprises cellulose paper on one side and tin on the other. The strip is made by depositing a fine film of tin on one side of a piece of pure cellulose paper, which is very thin and tough, something like good cigarette paper. The result of this deposition is a single strip of cellulose paper and tin.

Some of the tin penetrates the pores of the paper and so spoils its properties as an insulator. It is eliminated from the strip by passing the latter between rollers that are kept at a high potential difference—say 2,000 volts.

A short-circuit occurs where the tin penetrates the paper, with the result that the film of metal is burnt away, leaving

small punctures that can be seen clearly when the strip is held up to the light. The effect of this process is to restore the insulating properties of the paper side of the strip.

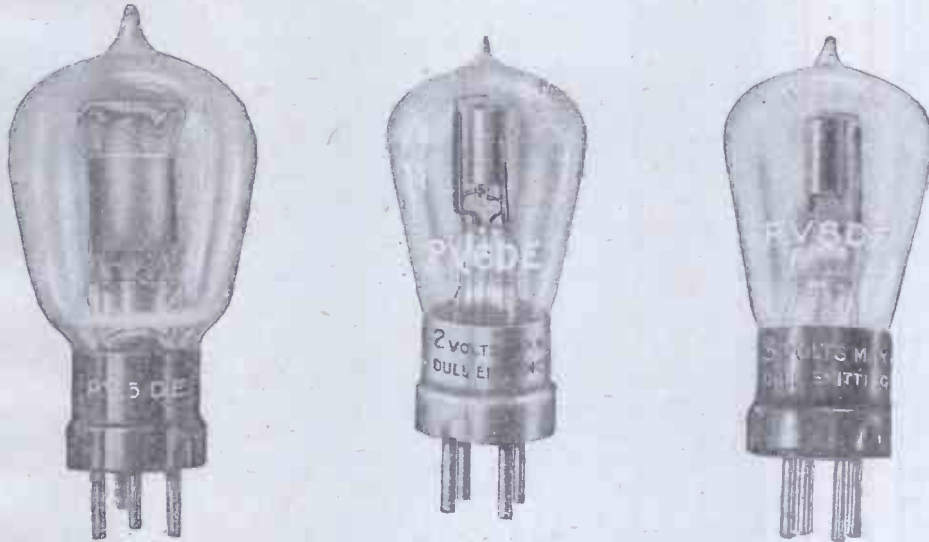
Each condenser is made up of two sheets of pure cellulose paper and two of the specially prepared strips. On a strip of paper is placed one of the special strips, then another strip of paper and the second special strip.

The required length of interleaved strips for any given capacity condenser is rolled up and afterwards pressed flat and embedded in insulating wax under pressure. Contact is made by slipping two long thin brass tags between the tin coating and the adjacent strip of cellulose paper.

One of the great advantages of Mansbridge condensers is that they seldom break down in use. If a short-circuit occurs the tin is burnt away at that point, leaving a small puncture, and the condenser retains its insulation resistance and can be kept in service. G. W.

When it was announced that the new station in Melbourne, Australia, had not engaged an announcer, more than 800 applications for the position were received.

NEW EDISWAN VALVES WORTHY ADDITIONS TO A FAMOUS SERIES



Volume without distortion

To secure volume free from distortion you must use the right valves in the L.F. stage. This new series of Ediswan Power Valves is the result of much experimental work resulting in the valves being perfect before being offered to the public.



TYPE ARDE
HF and LF

P.V.5 D.E.

Fil. volts, 5.
.. amps, 0.25
Plate volts, 50-150
Impedance, 8,500

Price **30/-**

P.V.6 D.E.

Fil. volts, 2.0
.. amps, 0.4
Plate volts, 60-120
Impedance, 12,500

Price **22/6**

P.V.8 D.E.

Fil. volts, 3.
.. amps, 0.12
Plate volts, 60-120
Impedance, 12,000

Price **30/-**

Valves for H.F. and L.F. Ediswan Dull Emitter Valves, types ARDE and AR.06 are now especially made for H.F. and L.F. work. They are distinguished by Red (H.F.) and Green (L.F.) lines. Prices, ARDE 18/-, AR.06 21/-.



TYPE AR.06
HF and LF

THE EDISON SWAN ELECTRIC CO., LTD.,
123-5, Queen Victoria Street, E.C.4.

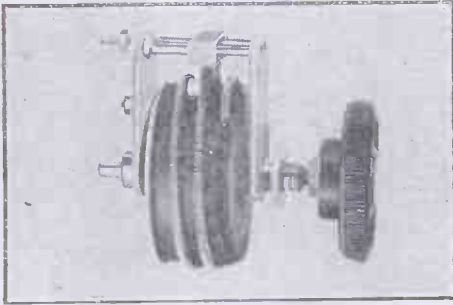
If your dealer does not yet stock EDISWAN POWER VALVES or VALVES for HF and LF—write to us for full particulars and name of nearest agent

AROUND THE SHOWROOMS

Vernier Reostat

I CONSIDER it almost essential to use a vernier filament rheostat for the detector valve, particularly when searching for long-distance stations.

The Vernistat consists of a spirally grooved ebonite drum wound helically with finely-coiled Eureka resistance



The Vernistat.

wire, contact being made with this resistance coil by means of a shoe and spring tongue riding over the coil. The latter therefore guides the traveller upon which the shoe is set along the coil. The length of the coil is three times as long as that of an ordinary rheostat and three turns are necessary to bring the whole five ohms in or out of circuit.

The instrument is finished in nickel, and its general appearance testifies to the thought and care expended in its manu-

facture. The makers of the Efesca Vernistat are Messrs. Falk, Stadelmann and Co., Ltd., of 87, Farringdon Road, London, E.C.1.

The Fulstop Condenser

NOWADAYS nearly every experimenter prefers to use a variable condenser, which is a sound engineering job rather than a condenser made to sell at a low price.

The Fulstop condenser, made by J. H. Naylor, Ltd., of Wigan, is certainly worthy of classification as an instrument of precision, and includes many novel features.

In addition to being a square-law condenser, which simplifies searching for distant stations, the Fulstop condenser is so made that the whole of the circumference of the dial is graduated, and being geared at two to one in relation to the moving plates it allows twice the degree of accuracy to be found in ordinary condenser design.

A neat metal shield is supplied with each condenser, and the elimination of hand-capacity effects is guaranteed.

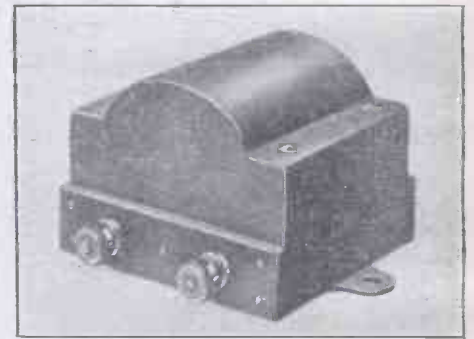
The Fulstop condenser is stocked by most wireless dealers, and there should be no difficulty in obtaining supplies.

C.A.V. Transformer

I HAVE just tested the C.A.V. shrouded low-frequency transformer, a component of great interest.

On test the makers' claims were found

to be fully justified. A crystal set followed by two note magnifiers was used, the valves being coupled by means of two C.A.V. transformers spaced 3 in. apart. No trace of interaction was noticeable (thus proving the efficiency of the iron shrouding), and a large volume of un-



C.A.V. Transformer.

distorted sound was produced. The method of construction, in which the primary and secondary windings are on separate bobbins placed side by side, ensures a very high degree of insulation and an extremely low value of self-capacity.

The transformer, which is available both in high- and low-ratio types for various stages of amplification, is manufactured by C. A. Vandervell and Co., Ltd., of Warple Way, Acton, W.3.

PROGRESS AND INVENTION

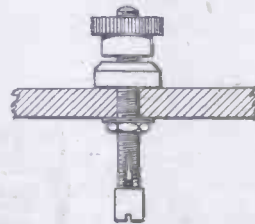
Novel Terminal

AN improved type of electric terminal, designed to eliminate much of the soldering in the connecting of wireless circuits, is the subject of provisional Patent No. 30,659/24 (F. Howarth Grove, West Derby, Liverpool).

There is certainly a great demand for a terminal which will make good electric and mechanical contact with the connecting wires and yet will allow the connections to be instantly interchanged for purposes of experiment.

The method of accomplishing this is shown in the diagram of the terminal. The terminal top, which may be fitted with nuts for the connection of leads above the panel, is of the ordinary form, but the shank of the terminal is split, as shown, to hold the wires below the panel. A small screwed cap fits over the split portion so that when the desired number of wires have been inserted the cap can be screwed up tight to ensure firm contact.

Contact studs, valve sockets and pins, and in fact nearly all types of small connecting terminal can be fitted with this device.



Novel Terminal (No. 30,659/24).

It is claimed for this system of wiring that there is no possibility of the wires breaking away from the terminal, as sometimes happens when solder is used, and that any gauge of wire can be used. There is, of course, no chance of the cap working loose through vibration, as the pressure of the wire on the sides of the slot expands the two halves of the terminal into the cap.

Battery Holder

POCKET flashlamp batteries may be conveniently used as a source of high-tension for a valve set, but some difficulty may be experienced in connecting them up when a large number of cells are in use.

The object of Patent No. 229,413/23 (Claude Benjamin Smith, of Edgbaston, Birmingham) is to provide a means of connecting up the battery strips.

The batteries are placed in rows in a frame, and a lid with inserted metal contact pins is fixed in position at the top, so that the contacts of the batteries are connected one to another.

The novelty of the invention is in the fact that the long strips of the batteries are folded over to touch the short strips, and the connecting pins in the lid of the box maintain electrical and mechanical contact between them. With this arrangement it is possible to remove any cell when required without disturbing the rest.

Louden Valves



THE Louden Dull-Emitter at 13/6 combines the undoubted economical upkeep of the Dull-Emitter, the low initial cost of the ordinary "bright" valve, and the Silver Clear qualities common to all Loudens.

Its current consumption is only 0.1 amps, which is 1/7th of the consumption of the ordinary type of valve or 1/4th of that of the standard Loudens. This reduces your accumulator bills correspondingly, so that the small extra first cost is rapidly repaid.

Your accumulators will run very much longer without recharging so you save trouble as well as money. The life of your accumulators also is greatly increased, as they discharge at a much slower rate when these valves are used.

No alterations need be made to your set to install these Valves, as they work off a 6-volt accumulator. Their use, therefore, does not involve disposing of an expensive battery.

The price of 13/6 brings a first-class Dull-Emitter within the reach of everybody. 13/6 is very little more than you have to pay for an ordinary "bright" valve.

It also has the Silver Clear qualities for which Loudens have justly become famous. Perfectly clear and distortionless reproduction are not the least of its good points.

Ask your nearest retailer for one, as its use is not only a revelation in clear reception but also a revelation in valve economy.

Should your local retailer for any reason be unable to supply you, write direct to us and your order will receive prompt attention.

Louden Dull - Emitter
Type F.E.R.1 for detection
and L.F. Amplification.

Type F.E.R.2 for H.F.
Amplification.

Filament Volts 5—6
Filament Amps 0.1

Price 13/6



Advt. of the Fellows Magneto Co., Ltd., Park Royal, London, N.W.10.



A GIANT loud-speaker is to be installed in the Potsdamer-Platz, the "Piccadilly Circus" of Berlin. Experiments in the broadcasting of the Vox Haus concerts are to be made this month. Should these prove successful, it is hoped to erect loud-speakers in all the principal squares of the capital.

Many people in south and south-east London report bad reception from the new 2LO, while in Lewisham, New Cross, Peckham and East Ham totally "blind" spots have been discovered.

Listeners who, in the ordinary way, depend on their crystal set to receive the programmes from the local station, always welcome an opportunity to hear through the medium of a "Round the Stations" programme music from some of the more distant stations of the B.B.C. On April 17 all stations will provide something towards the programme, London giving "Quips," thirteenth talk in his "World in Anecdote" series, the title being "Orators' Outbursts."

Sir Landon Ronald will conduct a symphony concert on April 24, the artiste being Miss Daisy Kennedy, violinist. The programme contains Beethoven's Fifth Symphony and Sir Landon's own symphony arrangement of Bizet's *L'Arlesienne* suite; also Schubert's ever-welcome Unfinished Symphony and the overture to Wagner's *The Mastersingers*.

At one of the B.B.C. stations a novel step has been taken in connection with the production of realistic noises and effects. In future the sounds made in the studio will be kept at a constant strength, and it will be left to the engineers at the controls to give the necessary light and shade to the transmission. Tests along these lines are said to have been most encouraging. It has been found, by the way, that peas in a barrel give a better impression of running water than the recognised method of using lead-shot.

Music from the Land of the Midnight Sun constitutes the programme between 8 p.m. and 10 p.m. on April 29. All the composers are of Norway, Sweden or Finland. Miss Rose Myrtil (mezzo soprano) will sing, the popular Grieg piano Concerto in A minor will be played by Mr. L. Stanton-Jefferies with the orchestra conducted by Mr. Godfrey, and Mr. David Wise (solo violinist) will play Svendsen's "Romance."

The Finance Commission of the Portuguese Chamber has approved the alterations which the Government intends to

make in the contract with the Marconi Wireless Telegraph Company, requiring the company to incorporate a subsidiary company in Lisbon with a capital of £300,000.

The miscellaneous popular programme for April 25 contains items by Callender's Band, songs by Miss Mayis Bennett (soprano), Mr. Keighley Dunn (tenor), and entertainment by Mr. Hector Gordon, ("The Canny Scot"), and Mr. Wilson James and Mr. David Jenkins ("The Wranglers").

The new stations which are being installed in Dortmund and Elberfeld will relay their programmes from the Munster broadcasting centre, and for this purpose it is proposed to increase the latter's power to 5 kilowatts.

Thirty-seven per cent. of the matter broadcast from American stations is jazz music; lectures and talks come next with 18 per cent.; weather, crop and market reports follow with 9 per cent.; and the rest of the programmes is made up of bedtime stories, gymnasium clubs, instruction, etc.

From 8 p.m. to 10 p.m. on April 28 a concert provided by the National Association of Radio Manufacturers will be given. The Savoy bands will be heard from 10.30 p.m. to 11.30 p.m.

The Geneva station (HBI), which has been closed for the past few weeks for the purpose of reconstruction, will start operations again shortly under the auspices of the Radio-Geneve Broadcasting Company. A new studio has been placed at the disposal of the company by the State of Geneva.

Mr. James Agate, the dramatic critic, has undertaken a series of talks on "British drama" for the B.B.C. These will take place fortnightly, and will consist of six popular descriptions of matters of general interest as affecting the theatre.

"Phono-Flights," the new type of programme inaugurated at Glasgow, in which various parts of the Empire are visited in turn and the life of the colonist clearly depicted, are proving very popular. The first of the series brought appreciation from all parts of the country.

If any further proof were needed that wireless had thoroughly established itself in the modern home it is to be found in the enterprise of a Sheffield builder, who is offering for sale bungalows and villas specially fitted for listening-in. The houses

are fitted with a fixed lead-in and a central distribution board to which is wired a connection in every room in the house. Even the kitchen has its wireless plug. The wires are hidden away in the walls.

Major Kenyon Secretan, a wireless amateur of Barnes, has established the fact that transmission made on 18.5 metres cannot be heard at any distance short of 400 miles, while beyond that they can be read with ease and get stronger as distance increases until at 4,000 miles they reach the maximum intensity.

The fact that there are now more than 1,300,000 wireless licence holders was made known in the Commons recently by the Postmaster-General.

The *Cape Times* strongly comments on the fact that three weeks ago the Union Government sent an official cable to London regarding the statement of the Postmaster-General that the site for South Africa's beam wireless station had not yet been determined upon, and that the Imperial Government up to the present has not replied.

Mr. Baldwin recently stated that, having regard to the fact that the Government intend to review the whole position of broadcasting next winter, he has, in consultation with the leaders of the other parties, decided to postpone the question of broadcasting parliament until the general question is examined.

Koenigswusterhausen (LP), is now transmitting its Sunday morning concert on 1,500 metres. Both the Eiffel Tower and the German station now broadcast concerts on the same wavelength.

The Austrian Radio Company proposes to set up broadcasting stations in all provincial capitals of the republic.

The development of a wireless system whereby trains may be operated, switches thrown, passengers talked to directly, all from one central control office, was described in an address before the New York Railroad Club.

The modulation of the station at Agen, which has again started testing at 11.40 a.m. and 8.30 p.m. daily on a wavelength of 318 metres, is now approaching perfection.

Private individuals are to be permitted to operate broadcasting stations under the supervision of the Polish Government if a scheme drawn up by the Polish Minister of Commerce is accepted.

Efforts are being made to secure a wireless installation for the benefit of the patients in the tubercular block at the Stroud Isolation Hospital.

The Radio Society of Great Britain, which has been giving close attention to the provisions of the Wireless Telegraphy and Signalling Bill, has now written to the Postmaster-General stating that it desires to submit a memorandum to him on the Bill.

WIRELESS IN PARLIAMENT



From Our Own Correspondent.

LORD WOLMER, the Assistant Postmaster-General, informed Sir H. Brittain that a site near Bodmin for the sending station for the beam service with Canada had been placed at the disposal of the Marconi Co., and it was anticipated that a site near Bridgwater for the corresponding receiving station would be available in the course of a few days. The same sites would be used for the stations for communication with South Africa, and an order for these stations would be given as soon as official information was received concerning the erection of corresponding stations in South Africa.

The Prime Minister, in the House of Commons, stated, in reply to Mr. Alexander, that he regretted that he was not in a position to name a date for the second reading of the Wireless Telegraphy Bill.

Lord Wolmer, the Assistant Postmaster-General, informed Mr. Alexander that the total receipts during the year ended Dec. 31, 1924, on account of wireless receiving licences were £613,309, of which £472,102 was payable to the British Broadcasting Company by monthly instalments in arrear.

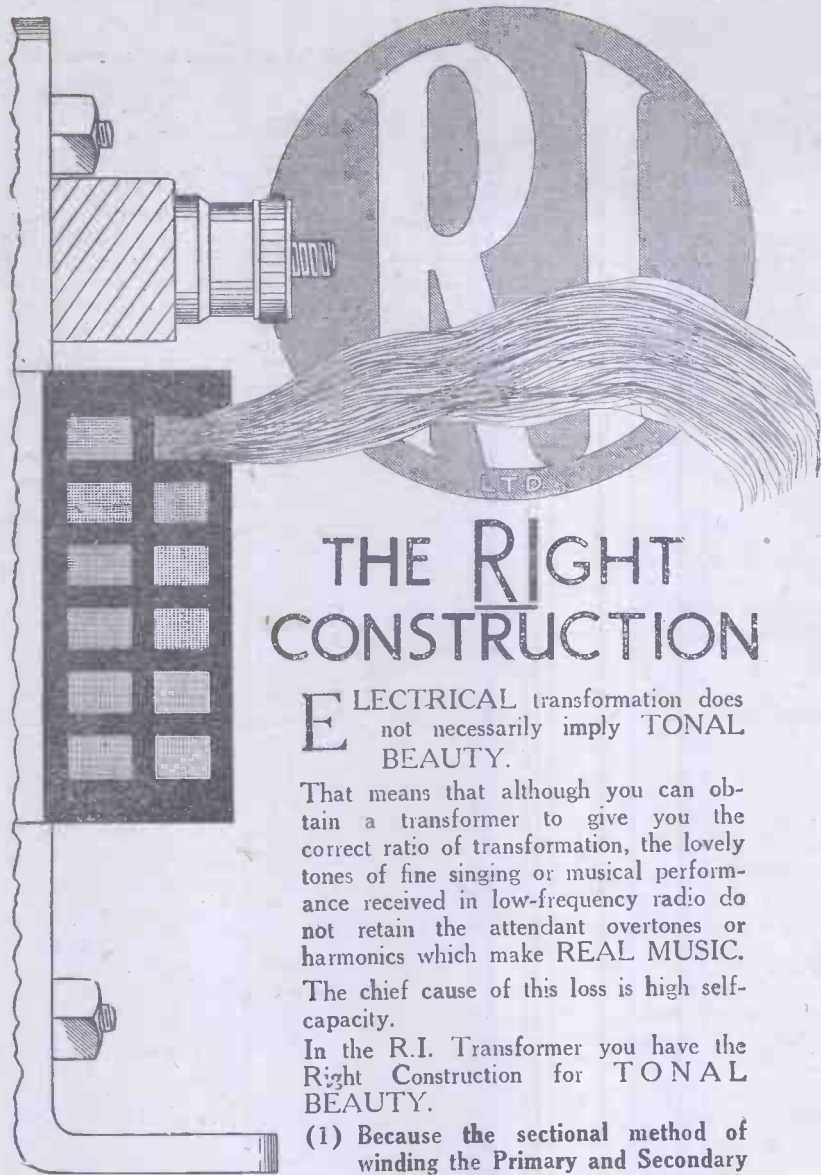
Lieut.-Commder. Kenworthy asked the Prime Minister when it was proposed to set up the Committee of both Houses to examine into the question of broadcasting the proceedings of Parliament, and what would be the terms of reference?

Mr. Baldwin replied that, having regard to the fact that the Government intended to review the whole position of broadcasting next winter, he had, in consultation with the leaders of the other parties, decided to postpone the special question referred to until the general question was examined.

A further question was put last week as to what steps the Government proposed to take with regard to the complaints made of the destruction of pigeons and other birds by aerial wires. Mr. T. Thomson asked the Postmaster-General whether he was aware that the B.B.C. had stated that they had no objection to the placing of corks on aerial wires?

Sir Wm. Mitchell-Thomson replied that there were now more than 1,300,000 wireless licence-holders, and he did not think it would be reasonable or practicable to require them, as a condition of their licences, to affix corks to their aerials. He had been in communication with the National Homing Union and had suggested to them that they should invite the co-operation of the B.B.C. in giving publicity to appeals on the subject.

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



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ELECTRICAL transformation does not necessarily imply TONAL BEAUTY.

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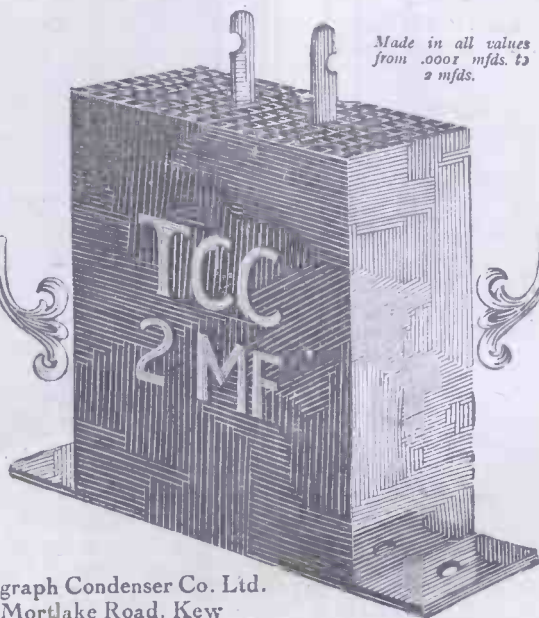


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"BROADCAST TELEPHONY" (cont. from page 644)
NORWAY.

Oslo, 380 m. (500 w.). Testing, daily, about 20.30.

POLAND.

Warsaw (Radiopol), 385 m. (1/2 kw.). 18.00, tests.

RUSSIA.

Moscow (Central Wireless Station), 1,450 m. Sundays: 13.45, lec.; 16.30, news and con. Weekdays: 14.00, markets; 16.30, news or con.

(Sokolniki Station), 1,010 m. Sundays: 15.30, con.; 18.00, lec. and con. (Tues., Thurs., Fri.).

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

Reval, 350 m. Testing.

SPAIN.

Madrid (R1), 392 m. (3 kw.). Sundays: 19.00, time sig., con., lec. Weekdays: 13.30, news, lec.; 19.00, *La Libertad* con. (Tues., Thurs., Sat.); 23.00-01.00, Radio-Madrid con., time sig., lec. (Mon., Wed., Fri.).

Barcelona (EAJ1), 325 m. (600 w.). 18.30, lec., markets, Stock Ex., con.

Bilbao (Radio Vizcaya), 415 m. 19.00, con., news.

Seville (EAJ5), 350 m. (1 kw.). 19.30, con., news, weather.

SWEDEN.

Stockholm (SASA), 427 m. (500 w.). Sundays: 10.55, sacred service; 17.00, children; 18.00, sacred service; 20.00, con.; 21.00, news, con., weather. Weekdays: 12.30, weather, Stock Ex., time sig. (12.55); 20.00, lec. (irr.), then same as Sun.; 22.00, dance (Wed., Sat.).

Gothenburg (SASB), 290 m. (500 w.). 10.55, sacred con. (Sun.). From 12.30 onwards S.B. from Stockholm.

Malmoe (SASC), 270 m. (500 w.). As Gothenburg.

Sundsvall* (SASD), 545 m. (500 w.). As Gothenburg.

Boden* (SASE), 2,500 m. (500 w.). As Gothenburg.

Falun (SMZK), 370 m. (250 w.). 20.00, S.B. from Stockholm thrice weekly.

Joenkeoping (SMZD), 265 m. (250 w.). See Falun.

* Local programmes are also broadcast at times.

SWITZERLAND.

Lausanne (HB2), 850 m. (500 w.). 08.05, weather; 13.30, weather, markets, time sig., news; 17.00, children (Wed.); 18.55, weather, news; 21.15, con. (exc. Wed.), dance (Thurs. and Sat.).

Zurich (Höngg), 515 m. (500 w.). 12.00, weather; 12.55, time sig., weather, news, Stock Ex.; 16.00, con. (exc. Sun.); 18.15, children (Mon., Wed., Thurs., Sat.); 19.00, weather, news (exc. Sun.); 20.15, lec., con., dance (Fri.); 21.45, news.

Geneva (HB1), 1,100 m. (temp.). New station shortly testing.

Basle (500 w.). New station under construction.

A group of Russian engineers have been searching the mountains of Russia in hopes of finding deposits which could be used as crystals in receiving sets. Up to the present time they have been unsuccessful.

On the Monday after his broadcast performance Mr. Paderewski received a telegram from Warsaw and two others from remote villages in Poland thanking him for the great pleasure the senders had got from his performance on the previous evening.

CHIEF EVENTS OF THE WEEK

SUNDAY, April 19

London	3.0	Ballad Concert.
London	8.45	<i>Hymn of Praise</i> (Mendelssohn).
Birmingham	9.0	Chamber Music Programme.

MONDAY

Birmingham	8.0	"Old Memories."
Bournemouth	8.0	"The Seasons."
Glasgow	8.0	Band of 1st Bn. Royal Scots Fusiliers.

TUESDAY

5XX and London Concert arranged by *The News of the World*.

WEDNESDAY

London	7.30	Barclays Bank Concert.
Birmingham	8.0	<i>The Taming of the Shrew</i>
Cardiff	8.0	<i>To the King's Navvy.</i>
Newcastle	8.0	"Wagner."
Belfast	7.30	<i>The Dream of Gerontius</i>

THURSDAY

London	8.0	"St. George's Day."
Birmingham	8.0	St. George's Day Programme.
Manchester	8.0	Chamber Music.
Glasgow	8.0	"St. George's Day."

FRIDAY

London	8.0	Symphony Concert.
Manchester	8.0	<i>The Chinese Puzzle.</i>
Newcastle	8.0	Ballads—Glees—Madrigals.
Glasgow	8.0	Popular Night.

SATURDAY

London	8.0	Popular Programme.
Bournemouth	8.0	"Samples of Humour."
Cardiff	8.0	<i>Lohengrin.</i>
Glasgow	8.0	Listeners' Programme.

When the liner *Leviathan* makes her first trip from New York, after her winter rest, she will broadcast music and talks by various personages on board. The transmission will be on a wavelength of 317 metres.



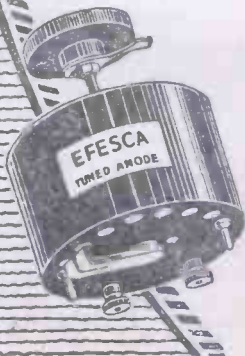
TAPPED COILS

The making of a tapped coil is a difficult task for the most enthusiastic amateur, and it is well to purchase complete units such as Efesca series of tapped coils. In these the ideal has been attained in every respect—the winding is particularly accurate, each tapping is soldered up to its corresponding stud, and the whole unit is arranged for the Standard Efesca One-Hole Mounting to the panel. The unit incorporates a switch as an integral part and the tappings are so arranged that there are no dead ends.

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An alternative method to H.F. Transformer Coupling. Must be used in conjunction with a variable condenser of .0003 to .0005 mfd. Wave-length range, 150 to 2,000 metres. Complete with self-contained split switch, knob pointed and scale, one-hole fixing. 2/1/- each.



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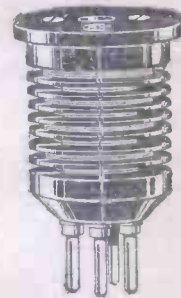
The success of your reception of distant signals depends entirely on the H.F. Amplification units employed. It is a well-known fact that M.H. H.F. Transformers are the foremost essential, and their incorporation is your primary guarantee of good results.

Supplied in six ranges of wave-lengths covering from 80 to 7,000 metres, all 10/- each.

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is a fair example. Made with strong Bakelite casings and inserts. The carefully selected copper foil and mica sheets are held under firm pressure by countersunk brass screws and nuts. Not only is the condenser of the actual capacity named, but the capacity is kept absolutely constant. Strong soldering tags are attached, and all the metal parts are heavily nickel-plated.



Each condenser is tested to 1,000 volts prior to dispatch.

.0001 to .0005	2/-	each.
.001 to .002	2/3	"
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.005 to .007	3/-	"

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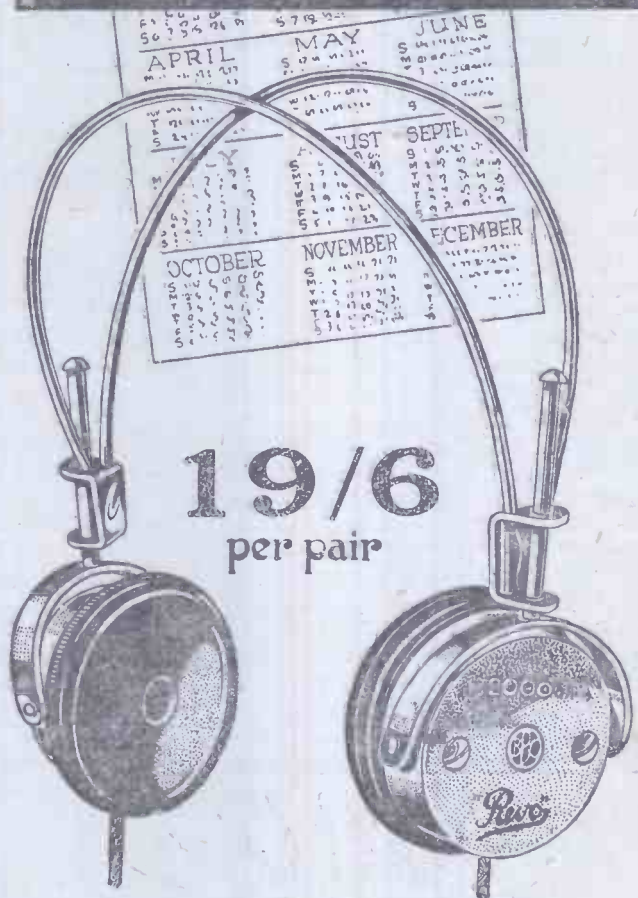
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Swedish Stations

SIR,—I see in THERMION'S notes in No. 147 that he has been unsuccessfully attempting to receive the Swedish transmissions. I can pick them up faintly on one valve, but really loud on three valves (1-d-1) from about 6.30 onwards. The easiest to hear are Gothenburg on 284 metres as near as I can calibrate him, and Malmoe on 270 metres. Both stations, as a general rule, transmit Stockholm (429-431 metres), and so the announcement is "Hullo, Hullo, hier ist Stockholm Radio." Boden I have only heard once on the old 2,500-metre wavelength. I have often of late heard Oslo and calibrated him as 378 metres. He transmits dance music late on Sunday night.—G. L. B. (Hale).

SIR,—With reference to THERMION'S remarks re the difficulty in receiving Stockholm and the Swedish stations, has he tried Malmoe on 270 metres? This comes in exceedingly well and is, of course, the relay from Stockholm.

With reference to the reception of KDKA on a crystal set, may I suggest a probable solution based on my experience of Saturday, March 21. Just after 11 p.m. I tuned in a very powerful transmission on about 410/420 metres roughly, which turned out to be KDKA. After getting this to loud-speaker strength without any hair's-breadth tuning, I thought it too easy, so I tried for some of the other American stations but without success. I went back to KDKA on 410-420 metres, and was just in time to hear the splashing, gurgling noises peculiar to the German language. It was KDKA all right, only it was being relayed from Munster or Breslau, who were using tremendously increased power.—J. H. M. (London, N.).

Tapping the H.T. Battery

SIR,—We see in No. 147, on page 511, a paragraph relating to tapping a high-tension battery.

While the fact may be obvious to many, we suggest it might be worth while to point out that with an arrangement such as you describe it is most important that the brush or moving arm of the switch should not bridge across two contacts, otherwise the intermediate cells between these two contacts will be short-circuited.

This is a matter which is of importance to all manufacturers of H.T. dry batteries, because batteries of this type often get very severely treated, and when they fail in consequence the manufacturer is blamed. — FULLER'S UNITED ELECTRIC WORKS, LTD.

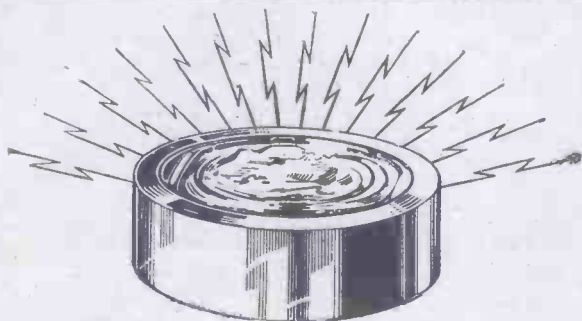
KDKA on a Crystal

SIR,—With reference to S. M. S.'s letter in No. 147, I may say that a good deal of misunderstanding seems to exist as to the strength of KDKA's broadcast wavelength transmission. I state without fear of contradiction that WGY and WBZ are received in this country at least four or five times the strength of KDKA on 326 metres (now 309 metres).

If S. M. S. actually heard an American station direct on a crystal it would probably have been WBZ on a freak night.

Aberdeen, Glasgow, Oslo, *Le Petit Parisien*, Bournemouth, Madrid and several Germans have all been heard on a crystal by the writer. Occasions have been chosen when the strength was excep-

(Continued on page 650)



"TIP-TOP" CRYSTALS

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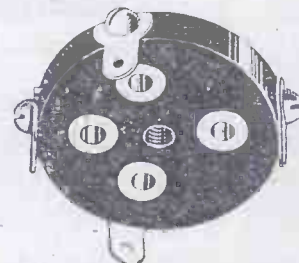
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3-Way Panel Mounting	5/6
2-Way Panel Mounting	3/9

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Once a set of basket coils is mounted in the adaptors the operation of changing basket coils becomes almost instantaneous.

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Extra Plugs	1/- each
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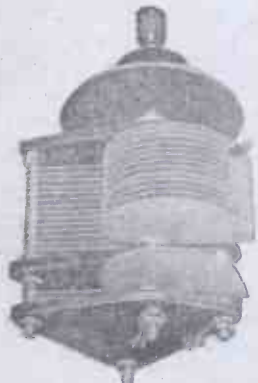
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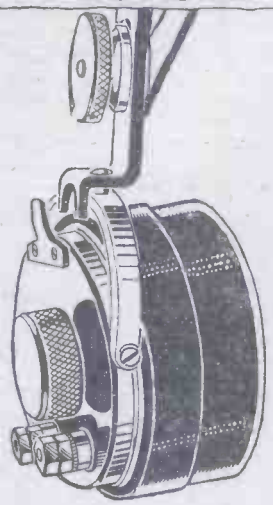


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.00075	10/6	.00075	8/-
.0005	9/6	.0005	7/-
.0003	9/-	.0003	6/6
.00025	8/9	.00025	6/-
.0002	8/6	.0002	5/6
.0001	8/-	.0001	5/-
		3 Plate Vernier	4/6



IF YOUR LOCAL DEALER CANNOT SUPPLY—SEND DIRECT. WE WILL PAY POSTAGE.

HALL & BRENNARD LTD., LONDON TERMINAL AERODROME
 Dept. A.W., CROYDON, SURREY. Telephone: Croydon 925



A Tribute

NO greater tribute could be paid to any Headphone than to specify it for use on passenger-carrying ships. When efficiency and sensitiveness are put before initial cost it is a remarkable fact that in every case Brown A Headphones are selected. You will never have to listen anxiously for a response to an S.O.S.—in your case the safety of hundreds does not depend upon your Headphones—but you should own at least one pair of the super-sensitive Brown A Headphones in order to be able to pick up far-distant Broadcasting inaudible in ordinary telephones.

es Prices

	PER PAIR
120 ohms	£2 : 18 : 0
2000 ohms	£3 : 2 : 0
4000 ohms	
8000 ohms	

From all Dealers

S. G. BROWN LIMITED
Victoria Road, N. Acton, W.3

Showrooms:
19 MORTIMER STREET, W.1
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67 HIGH ST., SOUTHAMPTON

Brown

Wireless Apparatus

Gilbert Ad 2678

CORRESPONDENCE (continues from page 648)
tionally good on a valve set for trying a crystal.

Another point mentioned by S. M. S. is that the signals came in in waves. This does not occur except in the case of KDKA's short-wave transmission, the reception of the normal wave American transmission being merely subject to the usual periodic fading.

There are one or two amateur transmitters who openly brag of relaying stations on a different wavelength. Possibly one of these was attempting to relay KDKA's 65-metre transmission.—F. G. S. (Theydon Bois).

Atmospherics

SIR,—I have given a lot of time to atmospherics, and the best thing so far is a Tesla tube across earth and aerial fixed some distance from the receiver. This does appear to be effective. When there is much electrical pressure near, the tube will glow. Normal atmospherics only show if very strong.—W. T. T. (Loughborough).

Other Correspondence Summarised

6HC ("Morning Dawn," Burnt Ash Lane, Bromley, Kent) would be glad to receive reports from amateurs hearing this station.

J. F. X. A. (Baghdad, Iraq) has received 2KZ, 2OD, 2KW, 2NW, 2LZ, 8AB, 8JBL, 8NK, 8JST, 1AF, 1SM, 3MIU, FN2NM, and FN2NS on his two-valve receiver, not using an aerial or earth.

C. W. (Nottingham) wishes to acknowledge kind attention and the replacement of a faulty R-type valve by the British Thomson-Houston Co., Ltd.

6NF (West Norwood) wishes to notify amateurs that, owing to the enormous correspondence received from America and other countries on his station's transmissions, unsolicited reports and inquiries re wavelength, etc., from stations situated in the British Isles, other than transmitters, cannot be answered unless a stamped addressed envelope is enclosed.

FOUR

"AMATEUR WIRELESS"

HANDBOOKS—1s. 6d. EACH

WIRELESS TELEPHONY
EXPLAINED

SIMPLE CRYSTAL
RECEIVING SETS

WIRELESS COMPONENT
PARTS

SIMPLE VALVE
RECEIVING SETS

From all newsagents and booksellers, 1/6 net each, or post free by return 1/9 from the editor of "Amateur Wireless," La Belle Sauvage, London, E.C.4.

TRADE NOTES AND CATALOGUES

THE St. Helens Cable and Rubber Co., Ltd., of Slough, have submitted to us for test samples of their ebonite panels for wireless receivers. The insulating properties of this material are excellent. Tested with H.F. and high voltage D.C. current no leakage could be detected.

The Igranic Electric Co., Ltd., of 149, Queen Victoria Street, London, have sent us copies of their latest publications, "Radio Accessories" and "Honeycomb Duolateral Inductance Coils."

An illustrated catalogue of Tungar battery chargers has been sent us by the British Thomson-Houston Co., Ltd., Mazda House, Newman Street, Oxford Street, W.1.

Siemens Brothers and Co., Ltd., Woolwich, S.E.18, have just issued two very attractive advertisement signs in the form of window transparencies. These are coloured reproductions of their well-known showcards of loud-speakers and phones.

An attractive window poster advertising the Pleasure-Time loud-speaker has been sent us by the General Radio Co., Ltd., of 235, Regent Street, W.1.

We are informed of a change of address of the National Wireless and Electric Co., Ltd., who have taken new premises at 42, Gray's Inn Road, London, W.C.1.

Messrs. Fuller's United Electric Works, Ltd., of Chadwell Heath, Essex, have removed their London depot from 58, High Street, W.C.2, to more commodious premises at Sparta House, 176, Tottenham Court Road, W.1, where large stocks of components will be available. Messrs. Fullers also also notify us that their Leeds agent, Mr. F. Dawson, has also taken larger premises at 7, Park Square, Leeds.

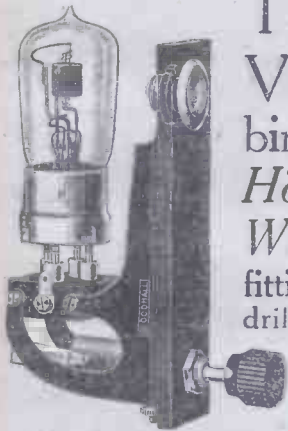
From Kent Bros. Electric Wire Co. and E. H. Phillips, Ltd., of 15, Berners Street, Oxford Street, W.1, we have received a price list of copper wire and insulated coverings.

To cope with increasing business, Fuller's United Electric Works, Ltd., have removed their Manchester depot to larger premises at 19, Chapel Walks, Cross Street. Phone: City 857.

A catalogue of accumulator-charging boards for direct-current circuits has been sent us The Electric Depot, Ltd., Pritchett Street, Aston, Birmingham.

Tuning Coils and Methods of Tuning by W. James (Iliffe and Sons, Ltd., Dorset House, Tudor Street, E.C.4), is the title of an interesting manual describing the theory and practice of the tuning coil and methods of tuning in.

Three chapters are devoted to electrical principles, condensers, inductances, and alternating-current circuits, and the remaining five describe the practical side of tuning, the construction of coils and various methods of mounting. The price of this interesting manual is 2s. 6d. net.



The Woodhall Valve Unit combines Rheostat, Valve Holder, Bracket and Window in one compact fitting . . . And you need to drill two holes only.

PRICE, complete
with 6ohms Rheostat, 6/6
" 10 " " 7/-
" 30 " " 7/6

This newest addition to the Woodhall Range of Components fills a definite need of many "Home Constructors." It gives the popular "back-of-panel" fitting for the valve, occupies a minimum of space, and is highly efficient in use. Consists of Woodhall Valve Holder, on rigid bracket with nickel-plated valve window and Woodhall Vernier Rheostat (see below).



Patent No. 213,031

The **WOODHALL** Vernier Rheostat

Combined plunger and rotary movement. Push-pull movement for coarse setting; rotary for vernier. Wonderfully smooth movement; best ebonite former; one-hole fixing. 6 ohms, 2/6; 10 or 12 ohms, 3/-; 30 ohms, 3/6.

WOODHALL

Guaranteed Components

Sold by all the best Radio Dealers.

Woodhall Wireless Manfg. Co., Ltd.—London Show Rooms, 21 Garrick St., (Tube Station: Leicester Square.) Sole Distributors: Pressland Electric Supplies, Ltd., Hampton-on-Thames

Phone: Molesey 22

EVERYBODY NEEDS The RADIO BEAD

Every Radio enthusiast is troubled by the twisting and kinking of the flexible leads of his headphones, loudspeaker, or battery and the consequent damage resulting in inferior reception. But now there is a remedy.

THE RADIO BEAD is a simple accessory which clamps on to your flex leads (no disconnecting necessary) and enables you to instantly remove kinks and prevent their recurrence. Light in weight and small in cost, it prevents that frequent and often unknown cause of loss of signal strength which is so difficult to trace.

SATISFACTION GUARANTEED. Essential to you. Get one now.

WIN PATENTS. Bridgeway House, HAMMERSMITH, LONDON, W.6
Obtainable from all Dealers Tel. Riverside 2433

1/-
EACH

Barclay's 1026

VALVES REPAIRED

We guarantee to return them
AS GOOD AS NEW

Bright Valves, from 6/6 } postage extra.
Dull Emitters, " 10/3 }

Special terms for large quantities.

ALL VALVES THOROUGHLY TESTED BEFORE BEING SENT BACK.

H. SLOOC, 45, Ct. Marlborough St., London, W.1

WIRELESS ON EASY TERMS!

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

Special Announcement by GAMAGES

to All Wireless Listeners and Experimenters.

All users of High Tension Batteries will be interested in an instrument capable of checking the consumption of current from their batteries. It is the general procedure to adjust the high tension battery until the best results are obtained, but it has been proved that by the use of a Milliammeter showing the amount of current being consumed, and by careful adjustment of filament current, and Grid Bias Battery or potentiometer that the current used from the H.T. cells can be considerably reduced with only a very slight reduction of strength. Everyone using a valve set should purchase one of these instruments which give a visible indication of the working of the set. By its means many faults can be traced very quickly. The instrument illustrated is one we can thoroughly recommend as being accurate and capable of giving complete satisfaction to the user.

This High Grade MILLIAMMETER

(illustrated on right) beautifully finished in Brass or Nickel. Reading 0-10. Complete with instructions.

PRICE
POST
FREE **30/-**



We also supply scientific instruments of every description and solicit your enquiries of special requirements. Stocks of Voltmeters, Ammeters, etc., by Messrs. Western Electric Instrument Co., and Messrs. Ernest Turner & Co.,

VOLTMETERS

Dead-beat type, as illustrated. Very reliable, and nicely made and finished throughout. Readings 0-3, 0-6, 0-12, 0-15, 0-20 volts. Post 6d. Price each **5/-**

Send now for a piece of
Gamages Famous
"PERMANITE"

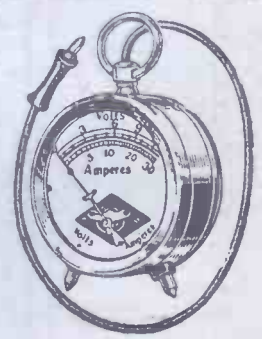
Crystal. Clear powerful results, highly sensitive and remains in adjustment longest.

Large Piece (easily broken) 1/6 Smaller Size to fit the Crystal Cup. Post free 1/-

VOLT-AMMETERS

Watch Type combined Dead-Beat Volt-Ammeter beautifully made and finished in nickelled brass case. Reading 0-12 volts, 0-30 amps. Made throughout in the usual high standard of Gamage Quality. Post 6d Price **7/6**

No Wireless Enthusiast should be without a copy of Gamages fully illustrated Wireless Catalogue. Sets, Accessories—everything you can ever want for Wireless offered at the lowest prices in London. It comes free on request.



A. W. GAMAGE, Ltd., Holborn, London, E.C.1
City Branch: Benetfinks, Cheapside.

BROADCASTING ADVERTISEMENTS

IT may not be known to all readers that some Continental and most of the South American stations intersperse the items of their programmes with paid advertisements. Possessors of multi-valve sets at times will have listened to the Madrid station, and those with but slight knowledge of the Spanish language will have had brought to their notice short talks by Radio-Iberica's announcer. It is part of the announcer's duties, between concert items, to advertise the wares of his broadcasting company, such as receiving sets, wireless components, etc., as well as other goods.

The Spanish broadcasting stations are not subsidised by the State, but the concession held by them from the authorities allows the broadcasting of advertisements for a period not exceeding five minutes in every hour of the programme. One Madrid station, it is stated, benefits by this method to the extent of about 16,000 pesetas monthly.

Such bald means of advertising are not adopted by the South American stations. In their case the powder is cleverly camouflaged. These camouflaged advertisements add to the revenue of the broadcasting station, and apparently they are not seriously objected to by the South American listener

Methods in U.S.A.

In the United States, where advertising has become a fine art, the advertisement still remains a dominant factor. A company gives a star concert, and the announcer makes it clear to all "radio fans" that the entertainment has been provided by the company in question. Recently in the United States an exceptionally brilliant concert was given by well-known opera singers, the entire costs having been defrayed by a famous gramophone company in view of the "boost" it would give to certain records in their possession.

Germany has also been studying these various methods, and in some stations the advertising principle has been adopted. For the present it still appears to be in an incipient stage.

We should be thankful that the B.B.C. has not adopted these tactics, as although we are pleased to hear a few explanatory

sentences by the announcer of the songs which may be given by a baritone singer, we should be little interested in the fact that the bell-like tones of his voice are due to his regular consumption of So-and-so's voice pastilles!
J. G. A.

"The Spring Renovation: Whitewashing" is the title of a seasonable article appearing in the current issue of "The Amateur Mechanic" (3d.), and should prove useful to many readers. Other articles appearing in the same number are: "When You Get Your New Bicycle," "Building a Rocking Stool," "Motor-cycle Practicalities," "Converting Crystal Set to Crystal-valve," "Wireless in Every Room," "Aerial Fixed to Table," "How to Repair a Sideboard," "A Small Weather Indicator," "Making Money by Inventing," "Economical Photography," "Cleaning Photographic Dishes," "Fitting Interior Lights to a Small Car," "Installing Two-way Switches for Electric Light."

Signals from an American station transmitting on a 70-metre wavelength have been picked up by Mr. G. H. Koran at his station at the Saadnail Observatory on Mount Lebanon, in Syria.

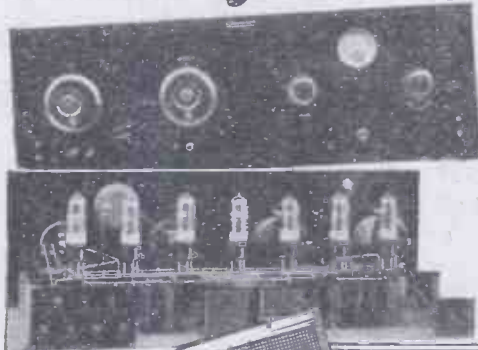
More than 35,000 messages were sent from the White Star liner *Majestic* during a recent trip across the Atlantic. This is equivalent to 3¼ words per minute during the entire voyage.

**HAVE YOU SEEN THE
"WIRELESS MAGAZINE"?**

It is acknowledged as—
the **MOST ORIGINAL**
the **MOST ENTERTAINING**
and the **MOST PRACTICAL**
—of its kind

1/- net Monthly

Learn FREE - how to make this better Super-Heterodyne



It is within the power of every keen amateur to make a successful Super-Heterodyne Set now that Bowyer-Lowe Intermediate-Transformer Units are available.

These Units are built for use with British Valves and have less internal capacity and more stability than foreign units so that high efficiency and quiet functioning are obtained with increased selectivity and power. Complete instructions for building a remarkably simple and effective Seven-Valve Receiver are given with every set.

Bowyer-Lowe Super-Heterodyne Transformer Units are all matched in complete series each guaranteed to function at a uniform peak frequency. Each set is tested at 500 volts between windings to eliminate all chance of short circuiting. The transformers are contained in cases of Grade "A" Ebonite, and sold in complete sets of four (Dubilier Fixed Condenser .0005 included) at £4 the set. A special Oscillator Coupler Unit uniform with the transformers in size and shape to cover the broadcast band with a .0005 Variable Condenser is also made and costs £1.

Complete Series

consisting of 1 Input Filter, and 3 Interstage Transformers with Dubilier .0005 Fixed Condenser for tuning primary of Filter; each set individually matched and sold in boxes with Instruction Booklet for making Seven-Valve Receiver shown.

Price £4

The set as above but with Oscillator Coupler Unit,

£5

Ample supplies. Order direct or from your dealer.

How to Build a Better Heterodyne

This book given FREE with every complete set:

Progressive wiring photographs, circuit diagram, list of parts and complete instructions for making this Seven-Valve Super-Heterodyne Receiver are given FREE with every set of Bowyer-Lowe Super-Heterodyne Transformers. Start work on it to-day. The booklet may be had separately, price 6d.

Bowyer-Lowe INTERMEDIATE WAVELENGTH

H.F. TRANSFORMERS

BOWYER-LOWE CO. LTD. LETCHWORTH



STRAIGHT *versus* REFLEX CIRCUITS

IT is interesting to examine the advantages and disadvantages of "straight" and "reflex" circuits and speculate whether dual amplification has really come to stay.

The outstanding advantage of dual amplification is that the valve is made to perform a double duty—that is, to amplify at high- and low-frequency simultaneously. Except for this, it is no better than the conventional straight circuit; a three-valve receiver of standard design is therefore superior, or at least equal, to the best two-valve reflex set. From this it follows that the man who does not mind the larger initial cost and increased running expenses of a larger set will have no use for reflex sets, which offer no further advantage than those mentioned before.

Now the experimenter's point of view is quite different. His object is to get the very utmost out of his set with a minimum of valves; hence the reflex principle is of great use to him, since it enables one valve to do the work of two. So far as he is concerned, the older circuits are hopelessly inefficient, and he does not mind how complicated a set may be, provided that it gives super-excellent results. Being perfectly familiar with the inner workings of the receiver, the controls present no great difficulty to him. Consequently in skilled hands the reflex is undoubtedly the better of the two.

There is just one other branch of wireless in which the reflex has an advantage over the straight circuit: this is in portable sets. Portable sets must be as small and light as possible. It is easy to see that for such a purpose the reflex circuit is almost ideal, since the weight and space taken up by an extra amplifier are thereby saved.

G. J. M.

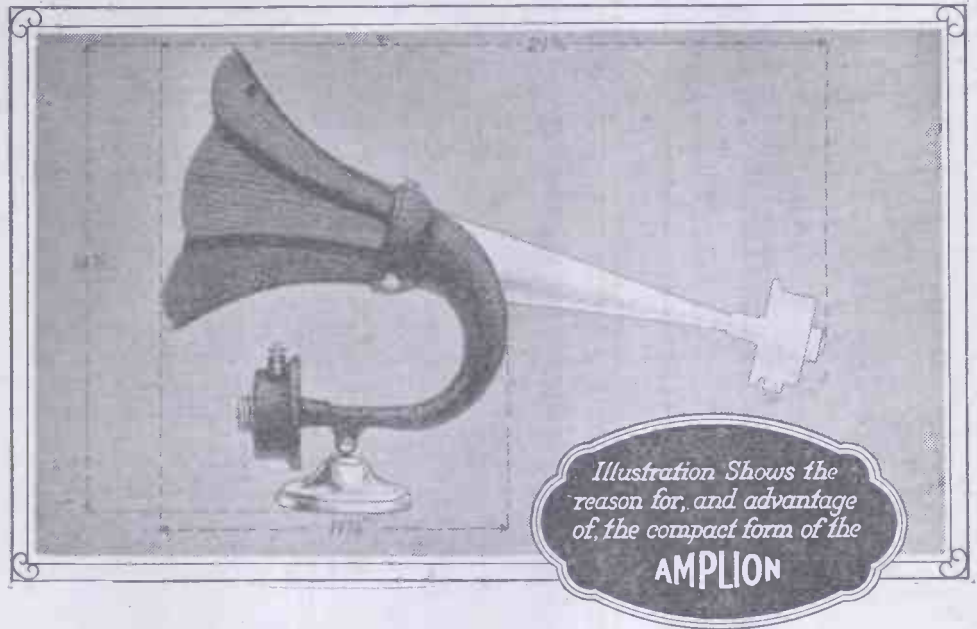
Manufacturers of wireless apparatus in Austria profited a good deal from the Vienna International Trade Fair. Seeing and listening to the various sets gave amateurs a chance to learn the merits of the different circuits.

An attempt made recently by the B.B.C. to relay a concert given in Amsterdam and despatched from the broadcasting station at Hilversum, Holland, to England, failed because of interference from a spark station.

Wates' Transformer Ratios.—We regret that the Supra Transformer, of Messrs. Wates Bros., Ltd., was incorrectly advertised on page 582 in No. 148 as having an 8-1 ratio with the price of 12s. 6d.; this ratio should be 5-1.

The "DRAGON" SHAPE

An Explanation of interest



IN Loud Speaker design it is important to secure the utmost efficiency in every essential detail, but at the same time the desirability of an attractive ensemble must not be lost sight of.

Without sacrificing one iota in the way of appearance, the AMPLION has the technical advantage of an extended and correctly developing sound conduit terminating in a radiating or amplifying trumpet occupying, together, a comparatively restricted space owing to the origination of the unique and now well-known "Dragon" shape.

Let the electro-magnetic element be of the most effective type, as that of the AMPLION certainly is, it is neces-

sary to employ a lengthy acoustic duct of appropriate contour to enable the Loud Speaker to reproduce in full volume and tone.

To illustrate the outstanding feature of AMPLION "Dragon" design the "New" Junior-de-Luxe, Model AR 114, is shown as an example. With a back-to-front measurement of 11½ inches only, there is afforded the equivalent of a "straight horn" Loud Speaker having an overall length of 21½ inches.

No other style of Loud Speaker possesses or even approaches the AMPLION in the qualities which, in association with a suitable Wireless Receiving Set, ensure "Better Radio Reproduction."

Obtainable from AMPLION STOCKISTS and Wireless Dealers everywhere.

THE
WORLD'S
STANDARD

AMPLION

WIRELESS
LOUD
SPEAKER

Patentees and Manufacturers:

ALFRED GRAHAM & COMPANY
(E. A. GRAHAM),

St. Andrew's Works, Crofton Park, London, S.E.4.

Demonstrations gladly given during broadcasting hours at:—

West End Showrooms:

Suburban Showrooms:

25-26, Savile Row, W.1.

79-82, High St., Clapham, S.W.4.

THE NATURAL CRYSTAL
ETHITA

Trade Mark

IS SECOND TO NONE

Sample post free 2s. Please send local dealer's name, etc.

Proprietors: THE BRIGHT CO. LONDON, N.S.

Phone: Moun new 1996

Sole Wholesale Agent for London and Home Counties only.

A. J. CONWAY, 86, GREENWOOD ROAD, LONDON, E.8

Phone: Clissold 4936.

POLISHED EBONITE PANELS

IT has been brought home to most amateur constructors that the original polish on ebonite panels should be removed, and the panels repolished if a shiny finish is desired.

This statement was made, however, before the days of guaranteed ebonite and needs some qualification.

During a certain stage in the manufacture of ebonite the material is pressed between metallic surfaces. This gives to the ebonite a shiny appearance, but particles of metal are also left on it, and these are likely to cause serious leakage when the product is used for wireless work. Hence the instruction to matt carefully all ebonite before use.

Now, however, there is on the market polished ebonite that does not need matting. The "metallic" finish is removed and the panel repolished by a special method that leaves no conducting particles on the panel at all. This ebonite is usually guaranteed.

Before matting a shiny ebonite panel the amateur should find out from the maker whether or not the polish is due to a "metallic" finish. He will then know how it should be treated. G. W.

SPE, Rio de Janeiro, Brazil, is broadcasting daily on a wavelength of 250 metres, using a power of 500 watts.



York and District Radio Society

Hon. Sec.—MR. R. NUTBROWN, 15, Victoria Street, York.

A GENERAL meeting was held when the secretary presented the draft of the proposed rules as recommended by the executive committee. They were approved and adopted. Mr. D. Davis gave a lecture on "Electricity and Its Application to Wireless."

Whitley and Monkseaton Radio Society

Hon. Sec.—MR. DENHAM-FURNER, "Underwood," Windstr Gardens, Monkseaton.
ON APRIL the society held their first annual dinner in the Royal Hotel, Promenade, Whitley Bay.

Ilford and District Radio Society

Hon. Sec.—MR. F. W. GEDGE, 157, High Road, Ilford.

ON MARCH 26 Capt. P. P. Eckersley paid a visit and lectured at the Town Hall, Ilford. On March 31 Dr. C. E. Hiatt, of the Edison Swan Electric Co., Ltd., lectured on "Wireless Valve Manufacture."

Belfast Y.M.C.A. Radio Club

MR. J. J. COWLEY, Hon. Sec. Y.M.C.A. Radio Club, 4, St. Paul's Street, Belfast.

THE annual meeting was held on March 31 with Mr. J. S. B. Shaw in the chair during the first part of the proceedings. After the election of officers and committee the new president took the chair. The honorary secretary, Mr. J. J. Cowley, submitted a report of the club's activities during the past year. In order to extend the club's usefulness one of the rules has been modified so as to permit wireless enthusiasts outside the Y.M.C.A. to become members of the club.

South Croydon and District Radio Society

Hon. Sec.—MR. G. H. TOZER, 218, Brighton Road, S. Croydon.

ON MARCH 31 a most entertaining and instructive lantern lecture on "The Theory and Construction of Loud-speakers" was given before about 50 members by W. J. Ricketts, Esq., of Messrs. Alfred Graham and Co. This was preceded by a 2-valve loud-speaker demonstration, using the club indoor

aerial. The reproduction from the Amplion speaker was remarkable for its power and clarity, it being easily heard throughout the hotel. The society now boasts of a membership of over 80, and all those interested in practical wireless are invited to become members.

Croydon Wireless and Physical Society

Hon. Sec.—MR. H. T. P. GEE, Staple House, 31-33, Chancery Lane, W.C.2.

AT the last meeting Mr. W. F. Higgins delivered an interesting lecture on "Industrial Applications of X-rays." Diagrams and the lecturer's lucid explanations enabled all to grasp the construction of X-ray tubes.

Hackney and District Radio Society

Hon. Sec.—MR. G. E. SANDY, 114, Parnell Road, E.3.
ON MARCH 30 Mr. P. K. Turner gave an address on distortionless reception. He dealt with the overloading of valves and its remedy, whilst many members were surprised by his attack on resistance coupling, which method of amplification he proved could distort far more than by the use of L.F. transformers.

ANNOUNCEMENTS

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

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

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

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

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

ETHITA

Beats them ALL

High Quality Brass Parts at Rock Bottom Prices

Our Brass Parts and Specialities have long been recognised as the Finest. We have now got our stocks level to cope with the enormous and increasing demand, and have added to our range, including

Valve Holders, 9d. each

THE WATES SPADE TERMINAL helps you to make a quick, efficient and neat connection.

Price 1½d. each. 1/- per doz.

SETAW PLUG AND SOCKET TERMINALS are of great assistance where quick changing over of connection is desired. In addition they improve the appearance and efficiency of your set.

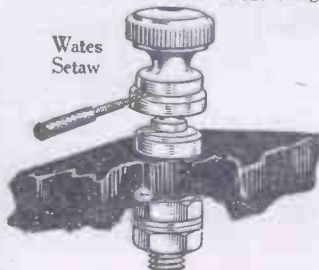
Price 4½d. each. 4/- per doz.

Here are a few more examples taken from a very wide range:—

- Valve Pin without Collar ... 4d.
- Terminals Heavy Pattern, 2 B.A. ... 2/2
- Terminals W.O., 4 B.A. ... 1/-
- Telephone Terminals, 4 B.A. ... 1/-
- Telephone Terminals, Small Barrel (special 4 B.A.) ... 1/-
- Large Barrel ... 1/-
- Fancy Terminals, 4 B.A. ... 10d.
- 4-Screw Crystal Cup ... 2d.
- Pin End Terminals ... 1/-
- Plug and Socket ... each 1d.
- Contact Studs, 5 B.A. ... doz. 4d.

Send for our latest free catalogue.

Wates Products are sold by all discriminating Radio Dealers, who will willingly demonstrate. We can supply carriage paid, but your Dealer's name must be enclosed with order.



Complete Terminal—actual size.

WATES

BROS., LTD.

Head Office: 12-14, Ct. Queen St., Kingsway, W.C.2.
Phone: GERRARD 575-576. Grams: Zywateseng, Westcent.
Works: London, Birmingham and Westcliff.



Get this Pilot's Chart!

THIS 32-page Booklet contains illustrations and specifications of more than 30 different Receiving Sets that can be built at home by anyone—no matter how inexperienced. Send for it to-day and read how little you need pay for a first-class Receiver such as the famous S.T. 100 or the Transatlantic V. No one need be without a good Valve Receiver on account of expense when Pilot Sets for home constructors cost so little. 3d. Post free.

Typical Pilot Receivers illustrated in the Pilot Chart.

- All Concert de Transatlantic V. Luxe. 7-Valve T.A.T S. 1. 190.
- Anglo-American Six
- All-Britain Family 4-Valve Etc., etc., etc.

Catalogue.

100 Sets 4-page Catalogue of Co. 1 (with 5 Large diagrams) order Catalogue in Industry. Fully illustrated. Post free. 3d.

PETO-SCOTT Co. Ltd.
77, City Road, London, E.C.1

Branches:—London: 12, High Holborn, W.C.1 & 234, Wood St., Walthamstow Card 11; 14, Queen St., Liverpool; 4, 11, 14, Chester St., Plymouth; Near Berry's Clock.

The Great "HOW-TO-DO-IT" Weekly

A paper devoted entirely to helping all who like to turn their hands to some useful domestic job or interesting practical hobby.

☞ MONEY-MAKING

It helps you to make profitable use of your spare time.

☞ MONEY-SAVING

It gives reliable help with in and out-door repairs and construction.

☞ PRACTICAL

It is written and illustrated throughout by people who know the amateur's difficulties and needs.

☞ INTERESTING

Its well-illustrated articles are always fresh, original and varied in scope.

Special Offer

A free copy of the current issue of "The Amateur Mechanic" will be sent post free to any reader who sends a postcard to the Editor, "Amateur Mechanic," 30, La Belle Sauvage, London, E.C.4.



"The Amateur Mechanic" makes all the difference to you between failure and the supreme satisfaction that comes from "something attempted, something done." It is edited by Bernard E. Jones, editor of "The Wireless Magazine," Cassell's "Work" Handbooks, "Amateur Wireless," and other famous technical publications; and the contributors to it—each an expert in his own department—not only know the Amateur's difficulties, but know exactly how to direct the Handyman to achieve his purpose. The articles are simple, practical, clear and illuminating.

For 3d. a week "The Amateur Mechanic" will save you pounds a year

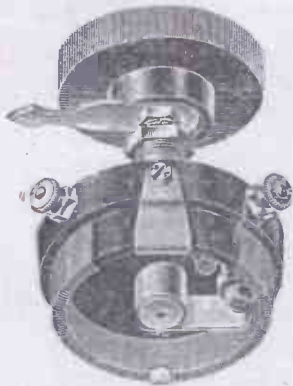
3^D

Every Thursday



A NEW "ACME" FILAMENT RHEOSTAT

Roller Arm Contact



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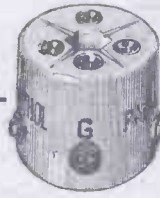
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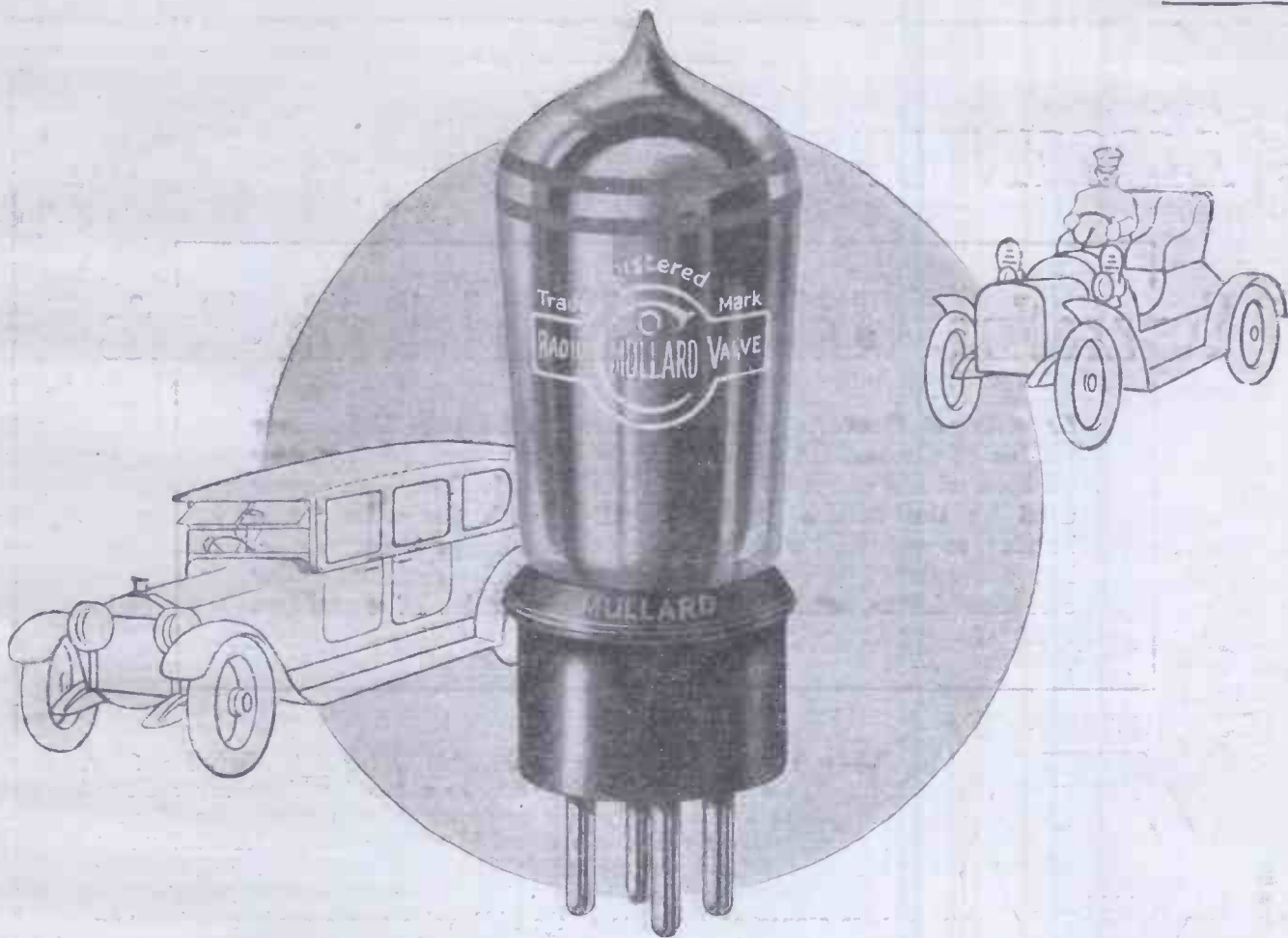
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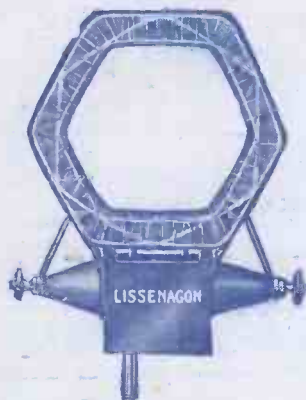
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The LISSENIUM "X" COIL can also be used as an aperiodic aerial coil, and in cases where interference is exceptionally heavy a LISSENIUM "X" COIL can be used in both aerial and anode circuits. For use as an aperiodic aerial coil it is only necessary to plug the coil into the aerial coil holder and connect the aerial to one of the terminals on the side of the coil mount. Note that the socket of the coil should be connected to earth.

In addition to the No. 250 LISSENIUM "X" COIL we are also making LISSENIUM "X" COILS Nos. 50, 60 and 75. Used as described above, they give a great degree of selectivity, stability and smoothness of reaction control on the broadcast band of wavelengths. The LISSENIUM "X" COIL No. 60 covers the 300 to 600 metre band of wavelengths, but the No. 50 "X" Coil is recommended for the lower band of wavelengths, and the No. 75 for the higher wavelengths.

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