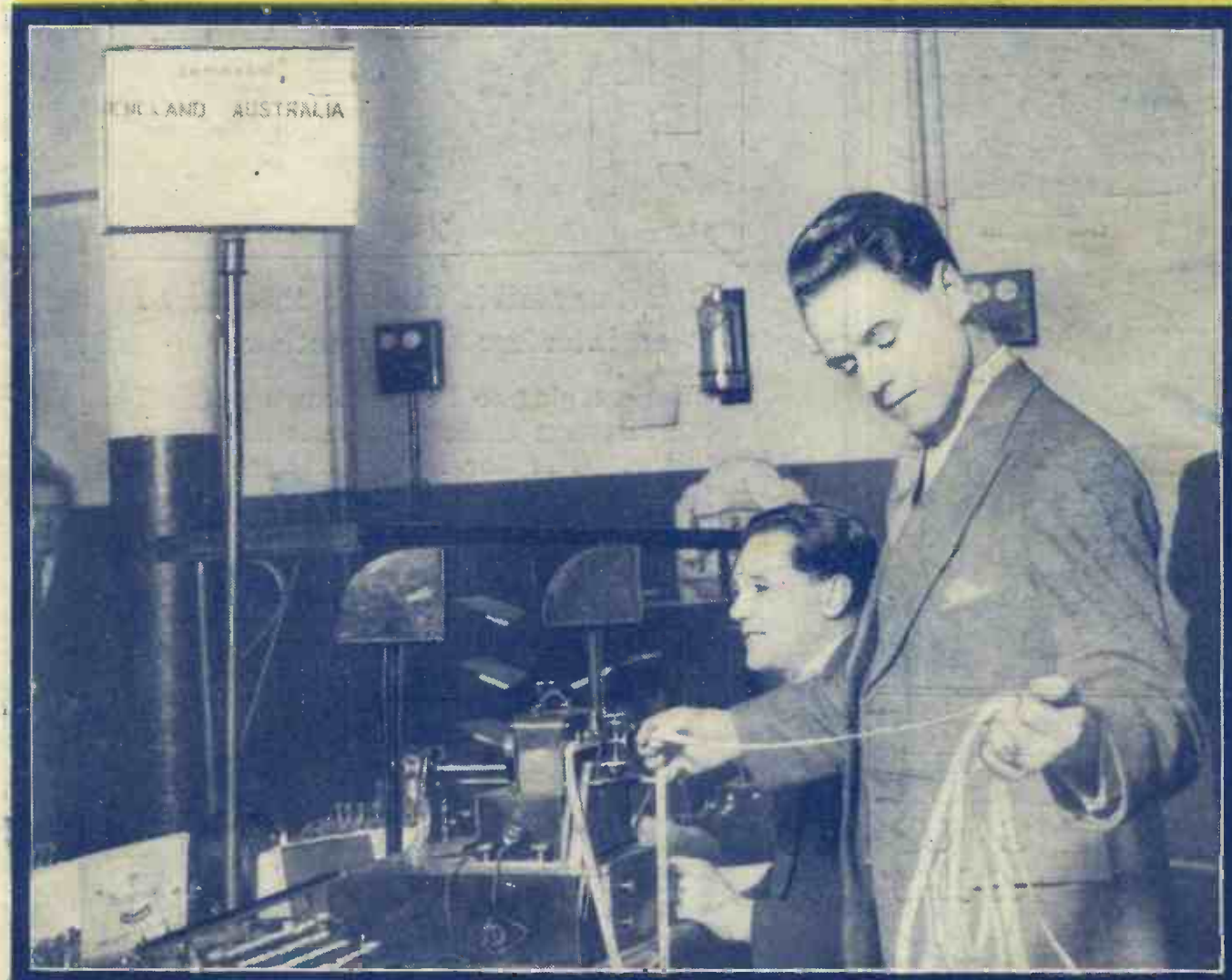
POPULAR WIRELESS, April 30th, 1927. REGISTERED AT THE G.P.O. AS A NEWSPAPER.

A NEW "FILADYNE" ONE VALVE SET (See Page 375)

Popular Wireless

Every Thursday PRICE 3d.

No. 256. Vol. XI. INCORPORATING "WIRELESS" April 30th, 1927.



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An Inexpensive Loud Speaker Is the Crystal Set Played Out?

Your 1927 Portable Set Coupling Card Inductances

MICROPHONE FRIGHT

By Professor D. Fraser-Harris, M.D., D.Sc., B.Sc. (Lond.), F.R.C.S.

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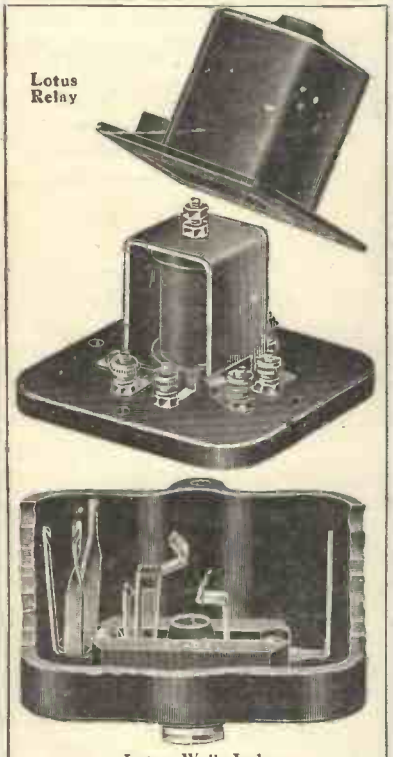

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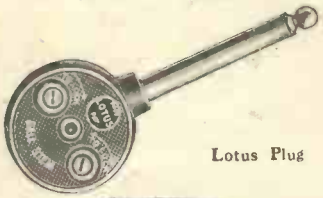

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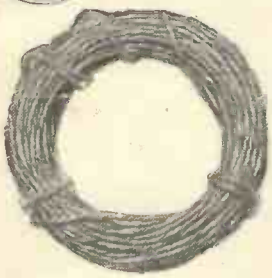

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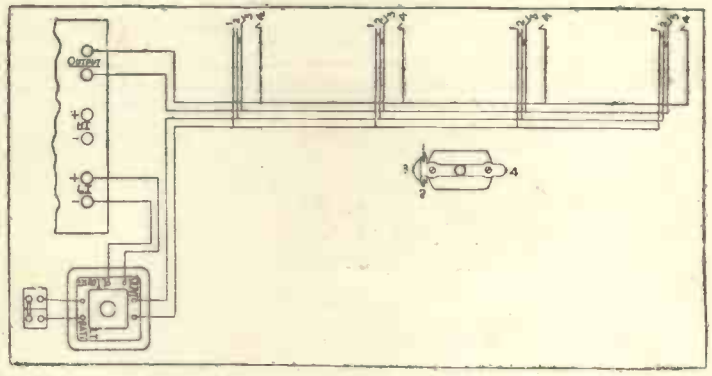

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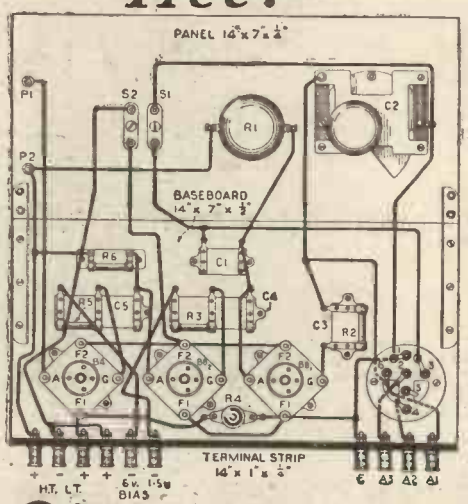
FILL in the coupon below and get your copy of the "Resistor" Book. From it you will be able easily to construct, in a few hours, a "Resistor" receiver which will cost less and give much better results than the ordinary valve set.



There are no transformers in "Resistor" sets; hence their remarkable purity of tone and low cost. The wonderful B.8 valve with its tremendous amplification factor gives all the volume of transformer coupling without any of the disadvantages of that method. The diagram below is taken from the "Resistor" book and is of a 3-valve receiver. Its extreme simplicity is obvious. This set requires very few components and can be built for approximately £2 : 15 : 0. The "Resistor" book contains all necessary details for constructing this receiver. Full details are also given for building 2, 4 and 5-valve "Resistor" receivers and a 2-valve "Resistor" amplifier.

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The price of 14/- for the B8 *is applicable in Great Britain and Northern Ireland only*

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The British Thomson-Houston Co., Ltd.,
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Dear Sirs,

Please send me a copy of your "RESISTOR" Booklet of Resistance-Capacity Coupled Receivers.

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The sweet high notes of the Violin

The throbbing of the Drums

The liquid tones of the Cornet

The majesty of the 'Cello

Cossor Valves are now available for 2, 4, and 6 volt Accumulators in a wide range of types.

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USE the new Cossor Valves and enjoy the thrill of true-to-life Radio. No longer an inanimate and mechanical reproduction, but living music—exactly as it sounds in the studio and the concert hall. Hear every instrument in all its natural beauty. No harshness—no discordant sounds—no distortion. The underlying reason for such marked superiority of tone and volume lies in the Kalenised filament—an exclusive Cossor feature. No other valve gives such purity of reproduction and long service with such a meagre consumption of current. Your Dealer stocks them—let him advise you which types are best suited to your Receiving Set.

The valve with the Kalenised filament

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

Gilbert Ad. 8734

Popular Wireless

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RADIO NOTES AND NEWS.

Easter Observations—Wireless and the Blind—A Clever Scheme—Longer and Grander—Winston's Easter Gift—Television—Radio Exhibition—Oscillating Crystals.

Easter Observations.

DURING the holidays I must have seen many hundreds of motor-cars, but never a sign of wireless on any one of them. Eighty per cent of the drivers looked as though their own cars and the antics of other people's motor-cycles were sufficient causes of preoccupation. Somehow, I am inclined to think that radio and motoring don't mix well as serious pastimes.

Wireless and the Blind.

ALTHOUGH wireless licences are free to blind persons and 4,300 have already been issued, it is estimated that there are still some 44,000 blind people still without wireless sets. A well-known firm of manufacturers has arranged to buy from any purchasers of one of their two or three-valve sets any unwanted crystal set and head-telephones the said purchasers may have, for the price of £1.

A Clever Scheme.

CRYSTAL sets so acquired will be overhauled and installed free of charge, and with a new aerial, in the homes of blind people in any part of the country, and customers who take advantage of this scheme may, if they wish, nominate the blind persons to whom they desire their crystal sets to be given. By the way, the valve sets bought under the scheme will be installed free by the manufacturer.

Longer and Grander.

I HEAR that Chicago (WBBM), in a laudable attempt to improve the black sheep of the broadcast studio, the piano, has just acquired a piano nine feet long, which has been specially designed for broadcasting. It's lucky the trombone broadcasts well; otherwise they might have to keep the window open in order to give a special model room to "trom."

Winston's Easter Gift.

WE owe the Chancellor at least one kindly thought for letting the licence fee go unaltered—for the present. I should have been vastly surprised had he touched it this year; I shall be if he passes it by next.

Television.

THERE are rumours that television receivers are likely to be on sale before the end of the year. Very interesting, and we all wish such enterprise luck. But what are they going to screen which will be sufficiently attractive to keep folks from *the* "pictures"?

Radio Exhibition.

I UNDERSTAND that the annual radio exhibition, organised by the N.A.R.M.A.T., will be held at Olympia from September 21st till October 1st.

Mr. Heywood Broun, the well-known American journalist, has added radio to his many other interests. He is shown above tuning in his modern receiver.

Oscillating Crystals.

SOMEONE has sent me an advertisement of an "oscillating detector," which appears to be a crystal, and which it is alleged will oscillate without a battery in the circuit. I have never before heard of an oscillating crystal circuit without a battery, and should be glad to hear from anyone who had tried out this gadget.

Private Broadcast.

A PECULIAR instance has been brought to my notice, of the reception at loud-speaker strength on a two-valve set, of piano music played in the next house, in a room where another set was operative but not actually in use, the telephones lying on the table. Both sets were tuned to 2 L O, which at the time was not transmitting. The strength at which the music came through was such that the recipients fancied it came from 2 L O.

More Miami.

C. A. W. (Rugby) tells me he has received Miami on a "straight" detector circuit with magnetic reaction, using a 0·06 valve. My friend should now go all out for the DX record, as he is well in the running. By the way, he adds that when he switched in his L.F. power valve the signals disappeared. I shall not offer an explanation of this till I hear of further similar tragedies, with full details of circuits and valves.

Rugby at Close Quarters.

THE same reader has much to say about Rugby Radio, eight miles from his house. Harried by harmonics, muddled by Morse, and tormented by transatlantic telephony, he has to fall back for his fun on the frantic efforts of the telephone operator to raise New York. I gather that London and New York are not even yet in that harmonious contact alleged by P.O. publicists.

(*Continued on next page.*)

NOTES AND NEWS.

(*Continued from previous page.*)

The Latest in Receivers.

A SEVEN-VALVE receiver, working from a 6 ft.-square frame aerial, and guaranteed for aural reception of any long-wave C.W. station at the extreme limit of its range, is the Marconi Company's latest achievement, and is an instrument to make an amateur's mouth water, though it is intended for commercial or official use.

For Long-Range Press.

SIGNALS from places as far distant as Java and the Argentine are child's play to it. It is designed specially for the reception of press in Morse from the world's high-power stations, and incorporates two tuned stages of H.F., followed by an "anode bend" rectifier, two L.F. filter systems, comprising two valve-coupled tuning circuits designed for a note-frequency of 1,200 cycles, and a transformer-coupled stage of L.F. amplification. It has also a phasing unit of extra selectivity.

What is Nothing?

A KINDLY evening paper in an attempt to teach its readers the Morse code says that O (Zero) is *dah-dah-dah-dah-dah*. Sounds rather a lot, doesn't it? Still, when we are asked to say nothing, we can, on this authority, relieve our feelings by saying *dah*, etc.

A Hint to the P.M.G.

IT is reported that the U.S.A. and Canadian public spend about £200,000 per annum in telegrams to the various broadcasting stations, conveying congratulations and requests for certain items. Of course, an American would be sure to telegraph rather than send a postcard! But if the P.M.G. will arrange for our telegraph rate to be a ha'penny a word, we will all see what we can do about it.

"P.W.'s" to Spare.

MR. F. H. LLOYD, Yew Tree Cottage, Ludlow Road, Bitterley, Ludlow, Salop, has a considerable number of copies of "P.W.," "Modern Wireless" and "Wireless Constructor" at the disposal of interested readers in return for postage. Mr. Lloyd has made good use of us, having built many sets to our designs, amongst the best being a one-valve "Unidyne."

W G Y Programmes.

A REGULAR listener to W G Y's programmes tells me that the General Electric Company (New York State) send him each week printed matter about the programmes. I have seen the jolly little five-page brochure; it gives a week's full programmes. They have some very pleasant traits "over there," even though the basic idea may be publicity and more business.

"Returned with Compliments."

UNITED STATES Secretary of Commerce Hoover broadcast an address from W G Y last month, which was also transmitted by 2 X A F on 32·70 metres. Gramophone records of the speech were made in Cape Town from the signals received there, and are being sent to W G Y. Not content with this, the man who picked up the signals told the story over his own transmitter (F O—A 4 L), and his message was received by *a Schenectady amateur* (2 A H M). My aunt! What times we live in!

Our Notice Board.

MR. F. W. WOODWARD, 5, Portland Gardens, Harringay, N.4, asks me to say that the call sign 2 O W no longer is allocated to him. He is inundated with cards about 2 O W's transmissions, and cannot reply to each sender. His call sign is now 2 A C Q.

A Strange Tale.

AN Australian paper reports that President Calles of Mexico is greatly annoyed by a secret broadcasting station which daily denounces his political policy. I don't see any difficulty. True, you can't shoot radio, but you can D.F. it. But perhaps the station is on a lorry and shifts rapidly from point to point like a Mexican jumping bean.

The Tamer Tamed.

DENVER (K O A) broadcast a talk some time ago on "How to Tame Lions." The lion-tamer, a young man of twenty-one, confessed that although he felt quite bold in a cageful of lions he was afraid of girls. I expect the presiding "Auntie" had just told him to speak up and not shuffle his feet in front of the "mike."

SHORT WAVES.

Under the New Regime. Yawning in.—"Sunday Pictorial."

* * *

A correspondent in an Australian paper writes:

"Recently Mr. J. Howlett Ross broadcast a story of some great hymns. His talks, some time ago, on Great Australians were on great 'Hims.'"

* * *

"Daddy, the wireless set's on fire! Look at the smoke."

"Oh, keep quiet, my boy. It's all right. I've just got Sheffield."—"News of the World."

* * *

To speak into the microphone requires the courage of Nelson, the brains of Napoleon, and the honesty of Washington, according to Mr. Will Rogers, the American humorist.—"News of the World."

* * *

Your old crystal set. Why not give it to the blind?—"Evening News."

Or the deaf?

* * *

Another time when a conversation with London isn't worth anything like $75 is when the fellow on the other end of the wire says: "Well, so long, I'm going out and have a highball to your good health."—"Kansas City Star."

* * *

Soon after a certain group of eccentric literary celebrities had said their little piece, the 'phone bell went.

"Hello, is that the B.B.C.!" said a voice.

"Yes."

"Well, this is Colney Hatch speaking. Will you put the ——s in a taxi, or shall we send the ambulance for them?"—"Sunday Pictorial."

* * *

Prof.: "Can you give the definition of watt?"

P. B. K.: "A watt is an inqnisitive pronoun."—"Penn Punch Bowl."

* * *

2 L O!

Whisp'ring through the ether all the
things we want to know;
The horse I backed has lost again,
A deep depression's over Spain,
I send you all, in language plain,
To L oh!

—G. B., "Yorkshire Observer."

Amateur Transmitter.

MR. T. WOODCOCK (Bridlington), call sign G 6 O O, works two-way telegraphy with the U.S.A., using as little as 8 watts input, and a wavelength of 44·5 metres. Quite good, eh? And in 1910, I recollect, I communicated over a distance of five miles, using an ordinary buzzer as a spark transmitter. "How toime flys!"

Overhead and Underwater.

DID you hear the diver talking to the airman? This is not a riddle, but a real radio question about a "stunt" German programme, recently sent out from Hamburg, Frankfurt, and other stations. The diver went down in the North Sea, and the airman, who was flying above, discussed things generally with him by wireless. As a programme-stunt it was quite a success, though a friend of mine who speaks German fluently tells me that the voices were less clear than during similar stunts carried out by the B.B.C.

"Say When."

THE interruption in the programme from Eastbourne some months ago, when a stentorian voice cut across the programme with a loud "Say when," has brought to light several amusing recollections of similar unexpected "turns."

The best of all was the Sheffield one, when the local station became tangled up with a call office telephone box. The surprised Sheffield audience heard the telephone operator demand "Two pennies, please," and then a lady spoke her mind to a gentleman friend, in no uncertain terms, while everyone in Sheffield gazed open-mouthed at his loud speaker, wondering what on earth it was all about!

An Interesting Controversy.

I HAVE been following the Transformer v. Resistance controversy which has been raging in the correspondence columns of "P.W." with considerable interest. A great deal of invaluable information has been brought forward, and the subject treated from very many new angles. However, I think all my readers will agree with me that the honours are going to—but are they? Perhaps I am bivouacing in the wrong camp!

"P.W." Sets.

THE Technical Editor tells me that there are some very interesting "P.W." receivers in the course of preparation. A programme has been laid down which will eclipse that of any other period both for its comprehensiveness and originality. Therefore, my readers, if you do not come across just *the* set you want within the next few weeks, hold tight, for you can be sure that it is coming.

Those Summer Talks.

I HAVE just been looking over some of the items included in the B.B.C.'s *summer* programme, and notice a definite leaning towards the serious business in connection with talks. Personally, I think this a mistake, especially in the summer, and I cannot imagine what the effect will be like of a talk on Spanish or Psychology, two of the subjects threatened, on a sultry evening in July. If we must have so many talks, why can't they be bright ones.

ARIEL.

YOUR 1927 PORTABLE SET

An article that includes many practical suggestions.

By A CORRESPONDENT.

ABOUT this time of the year a good many constructors begin to consider the prospects of summer radio, and either overhaul their last season's portable receiver or decide to make a new one. This summer should certainly see a great increase in the number of portable sets in use, because the recent advances in technique have made it easier to design and build a compact and efficient outfit.

A really portable receiver, by which I mean one that is neither a burden to carry nor a bother to work, has a fascination even greater than that of the general purpose set. Besides providing entertainment and relaxation in and out of town, a portable receiver can be of considerable interest and value to the keen experimenter. He can carry out reception tests in fresh localities under all manner of conditions. Not being bound down to one particular spot, he can choose a more favourable position, from the wireless point of view, when remarkable results are often obtainable.

Now the constructor of a portable set, whether he is out for entertainment or experiment naturally considers first its size, weight and cost. One might truly say that the ideal is a crystal set, because it can be made up in a matchbox for a few pence. However, portability and cost are not the only obstacles, for the more you expect from your portable, as regards range and volume, the more will you begin to realise you are "up against it," range and volume being very hard to reconcile with minimum weight and cost. This problem of weight seems to have baffled some manufacturers in the past, for I have seen commercial sets weighing thirty pounds and more; excellent sets as regards range and volume, but hopeless without the accompanying gift of a light car.

Question of Weight.

However, where the would-be owner of a portable set does possess a car, the question of weight is not of so much importance. The ideal set is then a compact super-het which is capable of receiving under favourable conditions many long-distance stations at loud speaker strength on a small frame aerial. Such a set provides entertainment "on tap" without any trouble.

However, where the means of transport is but "one man-power," the lighter the set the greater the pleasure to be derived from it.

The type of receiver which will probably appeal to most constructors is one giving good loud-speaker reception with a daylight range of perhaps ten to fifteen miles from a main broadcasting station, using a self-contained or collapsible frame aerial. Where the erection of a temporary aerial is possible the receiver will give loud-speaker results up to, say 50 miles or more, and 'phone reception at much greater distances. The receiver, as a whole, must be ready for operation at a moment's notice, and weigh not more than twelve pounds or so with all accessories.

In case you now have visions of some remarkably light-weight super-het. let me hasten to add that all this can be achieved with a minimum of three valves. The type of set which I have in mind is quite simple and easily made up to the above specification, without involving an excessive outlay.

Another point of great interest is that if you do not want loud-speaker volume, such a set will give you strong signals on several pairs of 'phones from at least one station in any but the worst spots for reception, on the self-contained frame alone.

Available Circuits.

Having put our ideas into more concrete form, we can begin to consider circuits and constructional details for the type of receiver already specified. It is not every constructor who wants a 3-valve set, but by reading through what follows I hope that you will glean ideas for the particular set that you have in mind, certain schemes mentioned below being eminently suitable for all types of portable receivers.

First of all, the circuit. This must be highly efficient and shorn of all unnecessary frills. Of many 3-valve combinations, the one which I have found most satisfactory for easy tuning and plenty of "punch," is a straightforward detector valve followed by two L.F. stages. A representative circuit is depicted in Fig. 1, in which are also indicated the values of the chief components.

A receiver based on this circuit is very easy to tune, even to distant stations, as there are only two controls, the tuning condenser C_1 and the reaction condenser C_2. The overall amplification is very high, while the maximum sensitivity is obtained by the use of a simple form of capacity reaction. The most interesting feature of this circuit, however, is the method of coupling the L.F. valves.

Resistance Coupling.

A year or so ago resistance coupling in a portable receiver would have been hopeless. Besides requiring an outsize in H.T. batteries, such a set would not have been very reliable, nor would it have given much amplification. However, the comparatively recent introduction of valves with a high magnification factor has made it possible to design highly efficient resistance coupled L.F. stages giving the amplification previously only obtainable with trans-

(*Continued on next page.*)

A two-valve portable set constructed by the author.

YOUR 1927 PORTABLE SET.

(Continued from previous page.)

former couplings, and this without the necessity of an increase in the size of the H.T. battery. More important still, these resistance couplings occupy an exceedingly small space, while the elimination of heavy iron-cored transformers effects a great saving in weight. The actual working parts of the receiver can be built into a space of 300 cubic inches, or less, grid leaks being used for the anode resistance, with a common anode voltage of 80 or so, this being all that is required for general work. It is essential to use the special metallised resistances, such as the Dumetohm, Ediswan, etc., grid leaks. Notice that these anode resistances have a high value and that the coupling grid condensers are quite small. This, in conjunction with valves such as the S.P.18 Blue Spot, Cossor R.C., etc., in the first and second stages, accounts for the high degree of amplification obtainable. The development of this method of resistance coupling in a more extended form is due to Von Ardenne and Heinert. The last valve is of the type P.M.1 L.F., or P.M.2, the latter being more suitable for handling more than the average loud-speaker volume.

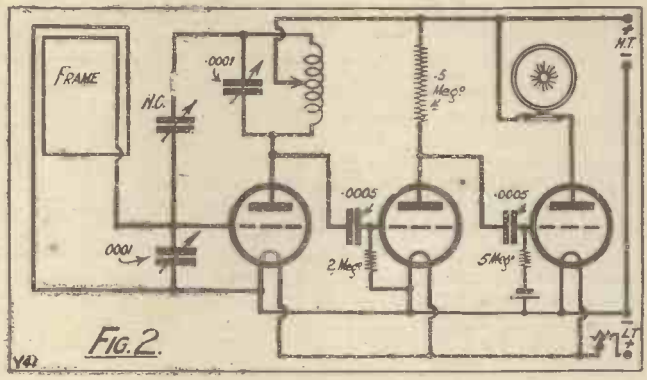


FIG. 2.

A Set for 5 X X.

Before considering this type of set in detail let us pass on to receivers of special nature, such as a set for the reception of Daventry on a self-contained frame aerial. With this type it is more or less essential to use at least one stage of H.F. amplification. This is necessary for good loud-speaker results, Daventry being in many cases more distant than the local station. On the higher wave-lengths H.F. amplification is more stable than on lower broadcast bands, so that a circuit similar to that of Fig. 2 can be used with quite good results.

A simple frame comprising about 45 turns, each turn being one square foot in area, can be mounted in the lid of a moderate-size attaché case. A simple form of neutrodyned H.F. coupling is used, giving high amplification in conjunction with the high impedance valves mentioned above. Sensitivity can be increased by slightly unbalancing the neutrodyned H.F. valve. The second valve is of the same type, and operates as a leaky grid rectifier. All three valves have a common anode voltage of 75 or so. It is a good idea to tune to Daventry before setting out on an expedition, the anode condenser being adjusted once for all. When switching on the set later only a slight adjustment of C_1, if any, will be required to bring in the high-power station.

As for the actual construction of portable receivers, there is not a great deal of definite detail that can be given in an article of this nature. However, in building the more general type one cannot do better than use a leather or fibre attaché case as the basis of the receiver. A light wooden framework can then be put together just big enough to fit into the case, with one or two cross partitions. On one of these the components can be mounted, with a panel for tuning condensers and the rheostat set across one section of the framework. Another section can be set aside for the batteries, bearing in mind that even distribution of weight makes the set less fatiguing to carry whatever its size.

Consider the Layout.

I should like to emphasise the point that constructing a portable receiver provides no excuse for untidy lay-out. Some sets I have seen in the past looked like a scramble of components dropped into a case, while others have been marvels of neat workmanship and careful design. It really pays to devote a little extra time to design and construction in order to get a compact receiver without loss of efficiency. No component, not even a length of wire, should be used unless it is absolutely essential and gives maximum efficiency for its size and purpose.

In regard to frame aerials, there is a useful method of winding them to fit into the lids of cases, which I have used for some time with every success. A piece of thin cardboard is cut to fit into the lid and then secured by a drawing pin through the centre to a wooden board or table. Pencil lines are drawn on the cardboard from corner to corner, and points marked on these diagonals starting from the four corners. These points are spaced sufficiently close together to accommodate the required number of turns. A pin is then stuck into each point, leaning slightly away from the centre, and the wire wound round the pins, starting from one of the corners. If a thin wire, such as No. 32 D.C.C., is used, the turns will lie quite flat against the cardboard as they are wound on. When all the turns have been put on, the wired surface of the cardboard is lightly coated with hot paraffin wax. When this is cold the pins can be withdrawn, and it will be found that the winding is firmly fixed to the former.

Interchangeable Frames.

In this way interchangeable frames can be wound for various wave-length ranges. If you intend using a temporary aerial, it is a good idea to wind about a third of the number of turns of the frame on the other side of the cardboard in a similar manner. When the aerial and earth leads are connected to the ends of this second winding the aerial circuit will be efficiently coupled to the tuned grid circuit of the first valve.


A four-valve portable receiver designed and constructed by the author.

In deciding upon the types and sizes of L.T. and H.T. batteries to use, you have to bear in mind that these vital accessories comprise the major portion of the weight of the set, so that it is imperative to make the greatest reduction in weight compatible with efficiency.

The two-volt range of valves are eminently suitable for portable sets, and a small unspillable 2-volt 10 amp.-hour accumulator will be quite sufficient for L.T. This will supply the filament current for a three-valve receiver where the consumption does not exceed ·5 amp., and if the type of valves recommended above are used the total filament current will not exceed ·3 amp. An accumulator of this capacity weighs about 1½ lb., and should last for several outings on one charge.

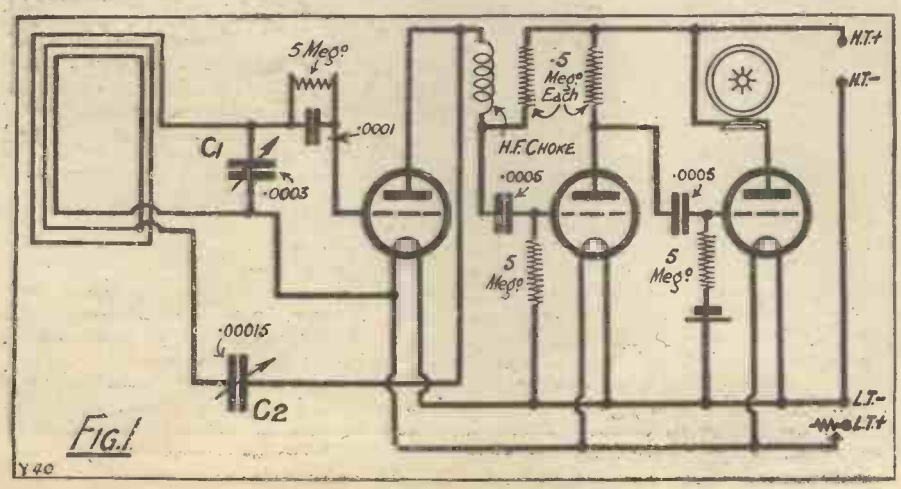


FIG. 1

AN INEXPENSIVE LOUDSPEAKER

Showing how a really efficient loud speaker of attractive appearance can be made for a few shillings.

By W. McDONALD.

WITH such a goodly range of loud-speaker units on the market, it is now a less expensive matter to provide the reproduction side of the receiver, and their possibilities are certainly well worth consideration.

However, the cost of a manufactured horn of distinctive grace, which would not look unsightly in a sitting-room, is practically that of the unit, if not more in some cases. If the purchase of a horn was an essential, the object of the makers would

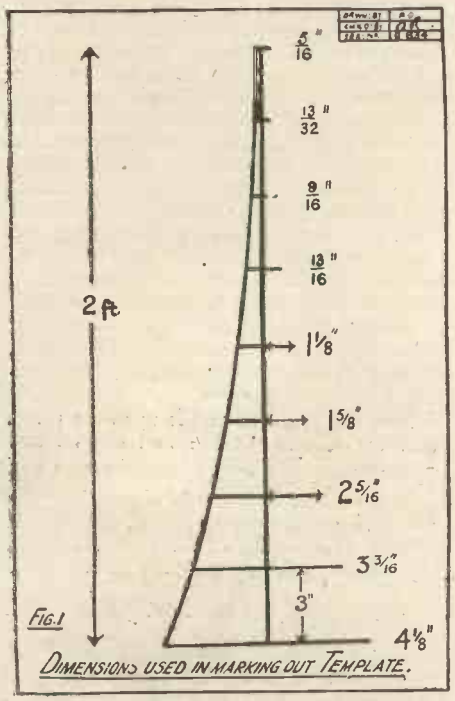


FIG. 1
DIMENSIONS USED IN MARKING OUT TEMPLATE.

be defeated, as the net cost of the finished article would equal that of a complete speaker and place it out of reach of the multitude for whom it was designed.

Some manufacturers, therefore, rely on the suggested use of the unit as a gramophone attachment whereby the horn of this instrument is successfully and economically utilised. Others have tackled the problem by providing, with the unit, a pattern of simple yet efficient design, the use of which enables the purchaser to make a horn costing but a few pence.

Making an Improvement.

The resulting apparatus, for some weeks perhaps, is a source of great delight to the constructor and his family. The horn is doing the job for which it was built, and only later does an æsthetically-minded member of the family remark on its ungraceful lines!

There is no real reason why the same material should not be fashioned into something better, except that the manufacturer must of necessity provide a pattern of perfect simplicity; the constructor, in his eagerness to get things going, pushing this together, with seldom, probably, a second thought concerning aught but the results he anticipates.

The horn shown in the photograph was built in two evenings at a cost of 1s. 4½d., the articles used being as follows:

3 sheets of cardboard	10½d.
1 tube of seccotine	6d.
Brown paper (wrapping of board)	
Enamel (happened to be on hand)	

The results obtained in use are almost indistinguishable from those of a well-seasoned oak horn of about the same dimensions.

Preparing the Materials.

A scale drawing of the template, used to mark out the panels, is shown in Fig. 1. Reproduce this full size on a piece of brown paper, 12 in. by 24 in., in the following way. Fold the paper lengthwise, pressing well the crease. Open out flat and measure off at one end $\frac{5}{16}$ in. at a right angle to either side of the median line produced by folding. Three inches from those, mark off $\frac{13}{32}$ in. in the same manner, and so on at three-inch intervals, using the specified measurements as shown in Fig. 1.

When these have been completed they should be joined up with a gracefully sloping line.

Cut this out and fold again on the median line, to assure yourself that the halves are symmetrical. This done, place the template on a piece of stout cardboard, a couple of domestic flat-irons (not heated, please!) being requisitioned to hold it in place. A pencil point is now moved round the edge marking the shape on the cardboard.

Eight such panels are required, and the template being transposed—i.e. the narrow end brought to lie parallel to where previously the broad end was, the board cut to waste is negligible.

Now for cutting them out. Obtain the largest pair of scissors from the local work-basket, and if on trial these do not prove very sharp, touch them up with a fine key file, keeping the flat of the file to the angle of the blade-edge. You will now find the cutting business much less arduous.

The piece of cardboard from which the ninth panel would have been cut (had nine been required) is rolled up diagonally, in the form of a sugar-bag, and as tightly as possible, one end having a very small diameter of about ½ in. and the other, one of about three inches. Tie up with string to prevent it uncurling until required.

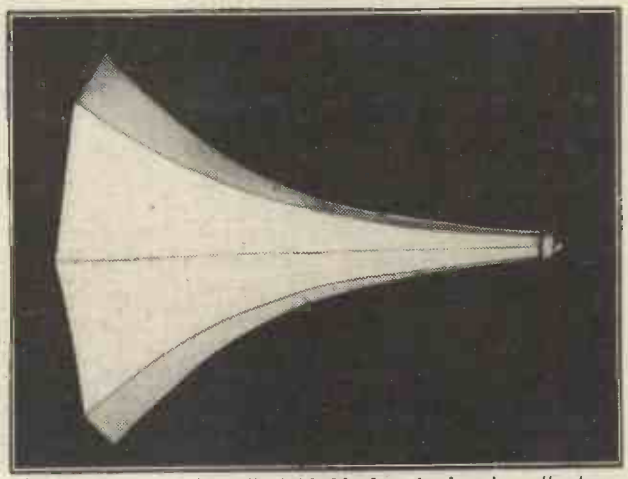
An Easy Task.

Superimpose the panels upon each other. None should be found grossly narrower or wider at any part than the rest. Now splay them on a table in one direction, as you would a hand of playing cards. Bring the narrow ends side by side, each edge touching and parallel, for three inches or so, to that of its neighbour—with the exception of those two edges on the outside—the broad ends overlapping each other, Fig. 2.

A start is now made on the assembly of the panels. If this is carried through in the following way it will be found that what might appear as a hopeless task is really quite easy.

(*a*.) Seccotine a piece of brown paper about one inch square and place this over the join to be made, where two narrow edges meet, and within an ⅛ in. of the end. This is well pressed into contact, and the same process is repeated as many times as is necessary to cover all the joins. Each new piece should be put on to overlap the preceding one by about a ¼ in.

(*b*.) During this operation the broad ends of the panels will flop about, which may tend to distress you, but they must be


As this photograph shows, the finished loud-speaker horn is as attractive in appearance as it is serviceable.

(Continued on next page.)

AN INEXPENSIVE LOUD SPEAKER.

(*Continued from previous page.*)

strictly ignored and not allowed to hamper the work in hand. After allowing the last patch five minutes or so to dry, take up the panels by the narrow ends—now, except for one pair, joined together—and form round a cylindrical object, such as a three-inch length of broom-handle, wrapped, if necessary, with folded newspaper to make up to the right diameter. If the size of this former is correct the two final edges to be joined should lie parallel and in contact. Take a turn or two of string round this end and fasten it. The remaining patch can now be stuck on in position, this making the final join. A seccotined strip, two inches wide and long enough to encircle the stem of the embryo horn two or three times, is now put on, the string being moved down sufficiently to allow this to be done, replacing it to a midway position.

Fitting the Panels.

(*c*) Stage is the one in which the panels are fixed together and the horn here attains something of its final form. Here, also, some patience is necessary—just a little, you know—and the old adage, "Slow, but sure" will help you. Fitting the panels is accomplished by a process of "tacking"—i.e. using the small patches of brown paper, already mentioned, at several intervals along the joins to be made. The scheme is to put the left hand inside, between two panels, to take the pressure of sticking on the patches; this being done with the right hand.

First place half the seccotined patch on one panel edge, about four inches from the narrow end, and after bringing the opposite edge into contact with its neighbour, lay down the other half of the patch on this edge. Proceed similarly with the next edge, and so on round the horn.

Some difficulty will be encountered at the last join in each tier and this is overcome by tying up a broom by its head, in an horizontal position, to an easy chair or table. The horn is then passed on, wide end first, so far as is necessary to take the pressure when sticking on the patch.

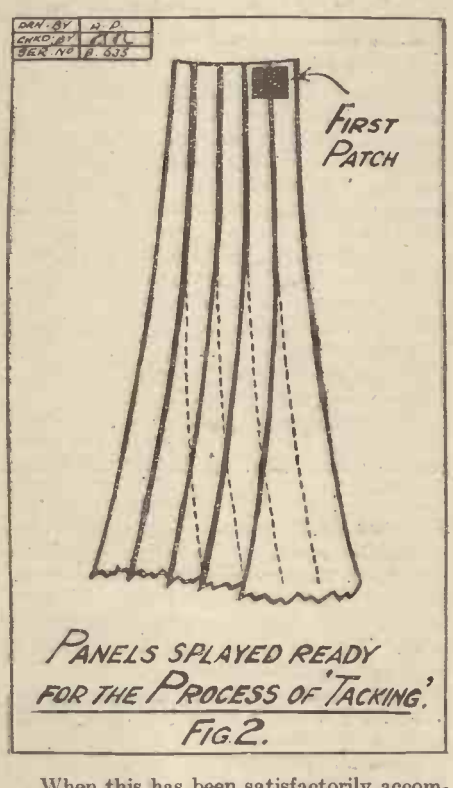
Another start is made about four inches lower down, and again still lower, finally finishing with one at the edge.

The Final Touches.

(*d*) Strips of seccotined brown paper about one inch wide and long enough to pass from the stem of the horn, down over the edge and into the mouth for about three inches, are now put on with the help of the broom-handle, using this to take the pressure, as before. This is done with each of the seams, both inside and outside, one hand taking the pressure when putting on the strips inside the horn. A strip is now placed round the edge of the flare as a binding.

(*e*) Now remove the piece of string from the cardboard that was rolled up and laid aside. You should find it has practically assumed the shape into which it was rolled. Looking inside you will see an apex of the cardboard, it being that part where rolling commenced. With scissors remove this by a cut along the length of the tube. Several inches are now cut off the wider end, where the outside diameter is approximately that of the stem of the horn, three inches from the end.

It is now fitted into the horn by passing in, via the flare, the end of the tube having the smaller diameter. This is now pulled through as far as possible with a screwing action which must tend rather to reduce the diameter of the tube than to increase it. Look into the horn and see how far this piece projects inwards. If it does to the extent that there is a space between it and the wall of the horn, judge as far as possible how much should come off to bring it into intimate contact.



PANELS SPLAYED READY FOR THE PROCESS OF 'TACKING.'
FIG. 2.

When this has been satisfactorily accomplished, and with the fitting still in position, cut off the narrow end until it is a tight fit for the rubber connection of the speaker unit. Remove it from the horn and with a rasp or piece of glass-paper rub down the inner surface of the flap edge that, when glued, this join will be flush and the outer surface even.

Glue up with some good hot glue these inner surfaces which will come together, and also the three or four inches of the inner wall at the narrow end of the horn. The tube is now pulled into position as done previously when fitting. The thick ridge formed, where the body of the horn joins the fitment, can be rasped off, afterwards binding up with a piece of seccotined brown paper.

You are now through with building, and all that remains is to give it a coat or two of enamel, the colour suiting either the set, furnishing of the room, or one's fancy. It was suggested that the one I built should be enamelled "post office red"! This I strenuously resisted. The new celluloid enamel, "Luc," of a warm brown shade, was used on the original, no care taken to avoid streaking which, from quite a short distance, gives the horn a remarkable "woody" appearance.

AN ELECTROSCOPE FOR A PENNY.

By "AMEC."

A PENNY is not an excessive amount to pay for a scientific instrument, yet for this humble cost, or for no cost at all if you already possess the necessary materials, you can make a very sensitive electroscope suitable for determining the presence of electrical charges.

As will be seen from the photograph, the present instrument consists of nothing more than an ebonite needle mounted upon a suitable pivot. For the electroscope stand we can have an ordinary wall pattern, in the centre of which is secured a small cylindrical rod, such as an ordinary penholder. On the top of this rod is secured a gramophone needle, with its business point upwards. Upon this latter is balanced the ebonite needle.

The needle should be made from a narrow strip of the *best* ebonite (it must be *real* ebonite) measuring about 1½ in. by ⅛ in. This ebonite needle should be carefully and accurately cut, its edges should be slightly rounded, and it should be rubbed over with a little sandpaper in order to make sure that its surface is clean.

In the exact centre of the underside of the ebonite needle a small hole is bored. This hole should be bored almost, but not quite, through to the other side in order that the ebonite needle can rest securely upon its pivot. The greatest care should be taken in drilling this hole, for if it is not exactly central, the balance of the needle will be destroyed, and the sensitivity of the instrument will greatly suffer.

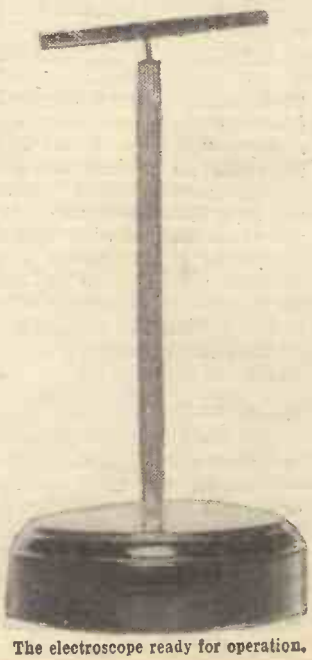
Rest the prepared needle upon the pivot, and the instrument will be ready for use.

Operation.

Now as regards its mode of working: In order to use the electroscope, first of all remove the ebonite needle from its pivot, and draw it briskly through a piece of soft, dry flannel.

Any body carrying an electric potential will attract or repel the needle of the electroscope, and when it is held an inch or so away from one end of the needle, the latter will be attracted or repelled according to the strength of the charge on the body.

Every five minutes or so, the needle should be rubbed briskly with a soft flannel rag.



The electroscope ready for operation.

A New Filadyne One Valver

This lively little set embodies a novel variation of Mr. G. V. Dowding's Filadyne circuit. It is a sensitive, stable one-valver surprisingly simple in design.

Designed, built and described by J. ENGLISH.

RECENTLY I have been carrying out further experiments with the modified Filadyne circuit which I described in "P.W." No. 242 (Fig. 8, page 1240), with a view to improving and simplifying it still further. The result of these experiments has been the production of the very interesting and efficient one-valve receiver forming the subject of this article.

This receiver is totally unlike the orthodox one-valve set. Besides the peculiar valve connections common to the Filadyne circuits, it embodies an unusual form of reaction control dispensing entirely with swinging coils and reaction condensers. Although unconventional, this receiver is a remarkably good one for DX work and for loud-speaker reception of a nearby station, being in every way quite stable and easy to handle. A noticeable feature is the excellent quality of signals.

L. S. Results.

When the receiver was tested some six miles from 2 L O, surprisingly good loud speaker volume was obtained from this station for a one-valve set. Whenever I have listened during the evenings, foreign

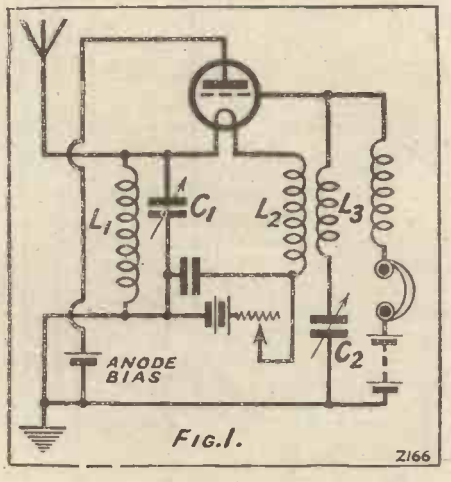


FIG. 1. Z166

stations seemed to come in at every degree or so of the tuning condenser, some being comfortably audible on the loud speaker. On other occasions, a fair sprinkling of distant stations have been received during daylight at very good 'phone strength. This remarkably simple and efficient receiver will, I am sure, soon run up new records for DX reception.

The construction of this little set is extremely simple, very few components being required, so that the cost of making it up is quite small. Using the best quality components, the total cost, excluding valve and batteries, is just under thirty shillings. In many cases you will be able to make up the set from your old components.

Before proceeding to give you constructional details, a brief description of the new circuit and its evolution may be of interest to those who have not read the article referred to above. The modified circuit described therein is reproduced in Fig. 1.

COMPONENTS REQUIRED.

- 1 ·0005 mfd. variable condenser (Ormond square law friction drive).
- 1 ·0002 mfd. fixed condenser (Dubilier).
- 1 ·0005 fixed condenser (Dubilier).
- 1 Rheostat (Igranic Pacent).
- 1 Potentiometer, 400 ohms (Igranic Pacent).
- 1 Valve holder (Benjamin).
- 2 Coil formers, 3 in. diameter.
- 8 Terminals.
- Panel, 14 × 8.
- Baseboard, 14 × 8.
- Ebonite, 7½ × 1½, 3 × 1½.
- Sundry wire and screws.

Two equal tuning coils, L_1 and L_2, are tuned by the condenser C_2, these coils taking the place of the 200 turn chokes inserted in the filament leads of the original Filadyne circuit. In the latter, the purpose of these filament chokes was to prevent the H.F. potentials at the filament from shorting to earth. In Fig. 1 the coils L_1 and L_2 act as chokes in a more efficient manner because, in tuning them to the frequency of the signals to be received, the choking effect is made a maximum for that frequency. Thus the H.F. isolation of the filament is always as complete as possible, whatever the wavelength to which the receiver is tuned. The elimination of the separate H.F. chokes, besides giving greater efficiency and stability, simplifies to some extent the layout and wiring of the set.

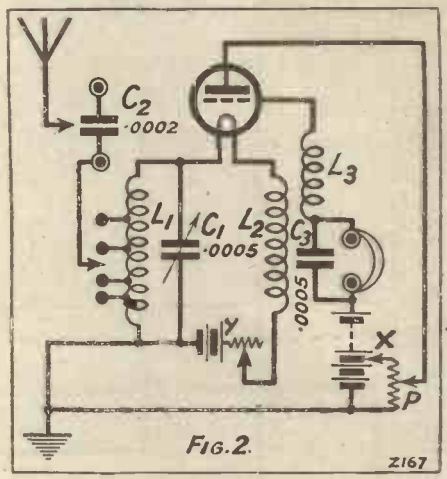


FIG. 2. Z167

The theoretical circuit of the new receiver is shown in Fig. 2. This also employs two tuning coils, one of which is tapped for the aerial connection, in order to provide some measure of selectivity. You will notice that there is no variable reaction coupling or condenser—just a simple

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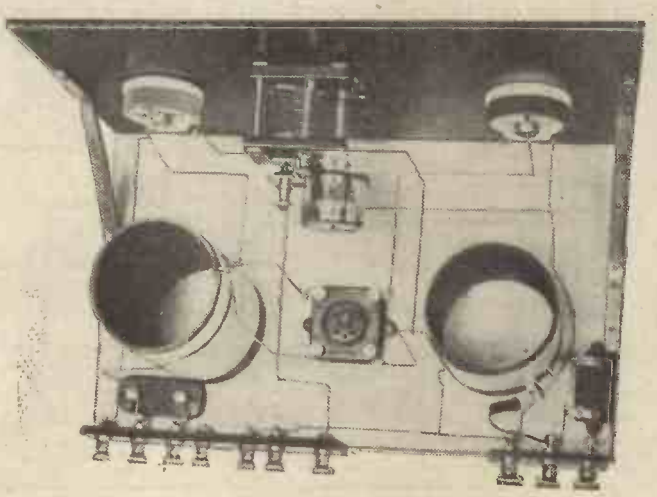

This back-of-panel view emphasises the simplicity of the new Filadyne one-valver.

A NEW FILADYNE ONE-VALVER.

(Continued from previous page.)

reaction coil L_3 coupled to one of the tuning coils L_2. You may wonder how reaction is controlled, seeing that the coupling between L_2 and L_3 is fixed. The secret of the new method of control used here is the potentiometer P, which is connected across a few cells of the H.T. battery. The slider of this potentiometer is connected to the anode so that the potential of the latter can be continuously and evenly varied from zero to a few volts positive. This variation of anode potential gives a smooth control of reaction without causing any alteration in the tuning.

Oscillation Control.

In the first part of the article referred to above, I described the effect of anode potential on the functioning of the valve, a

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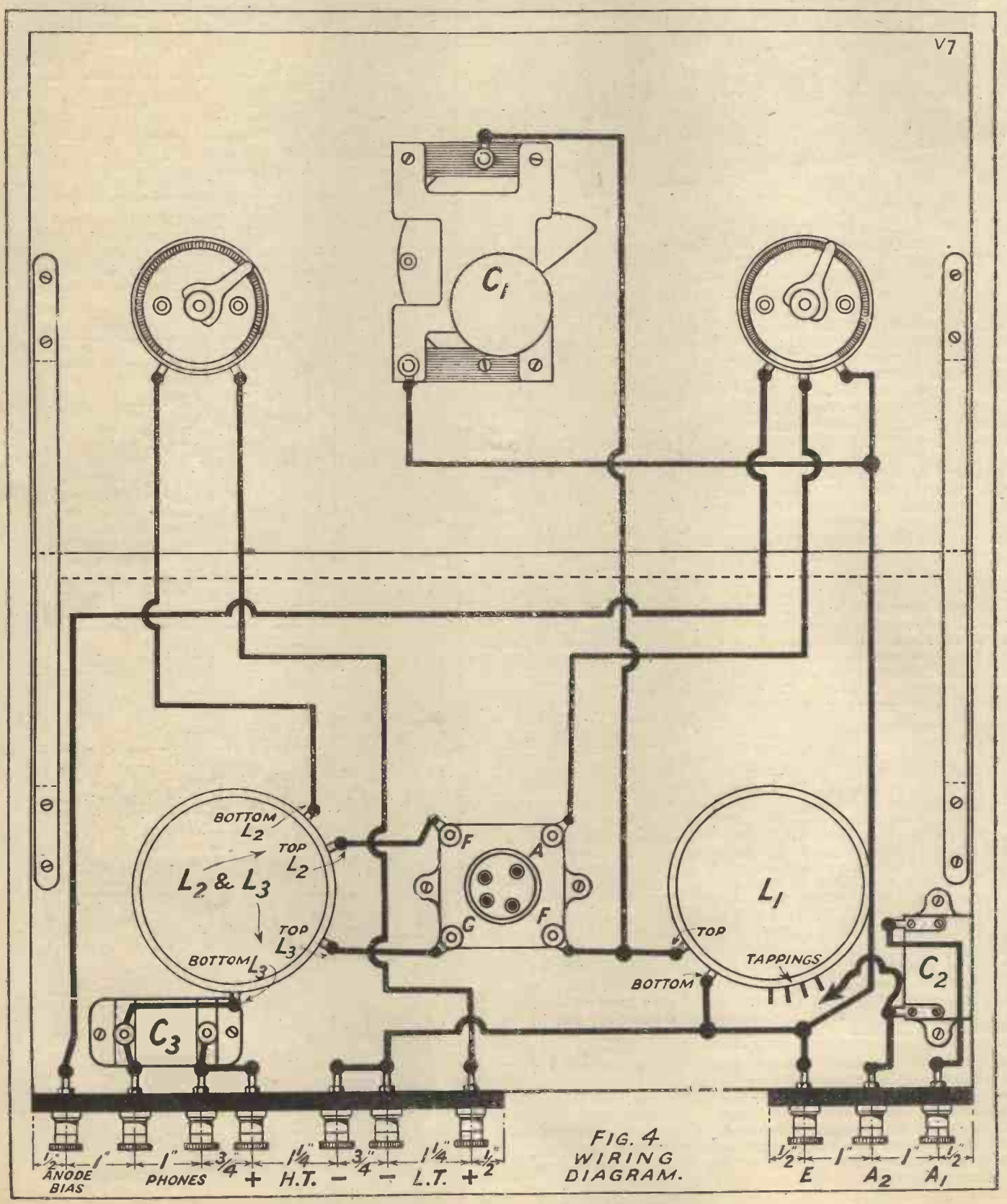

FIG. 4. WIRING DIAGRAM.

A NEW FILADYNE ONE-VALVER.

(Continued from previous page.)

small positive potential being required for maximum signals. As this potential is made more positive, signals first decrease in strength and then come back to normal again, the working points for maximum volume being on the upper and lower bends of the grid current-anode volts curve.

When the anode potential is adjusted to fall within these points, the circuit oscillates easily, especially with a close coupled reaction coil, as in Fig. 2. But as the potentiometer is turned towards either of the two settings for maximum signals, oscillation decreases in intensity and finally ceases. With suitable values of H.T. voltage and filament current, this novel method of control gives a delightfully smooth adjustment of reaction, the circuit sliding imperceptibly in and out of oscillation. The sensitive state just prior to oscillation is obtainable with two settings of the potentiometer, corresponding to the upper and lower bends. On either setting you can hold on to a weak station just as easily as with the most sensitive capacity-controlled reaction circuit.

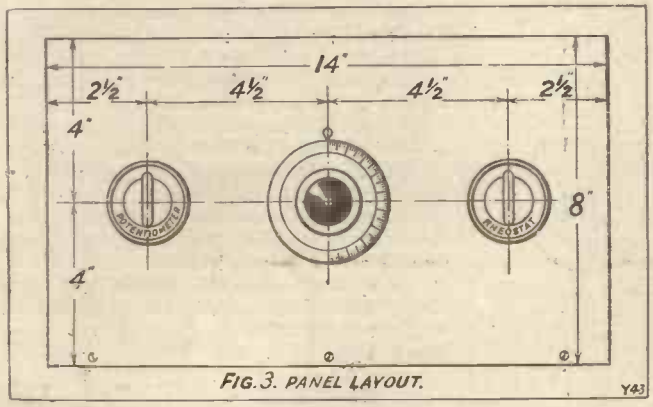

FIG. 3. PANEL LAYOUT.

Simple Lay-out.

In the photograph of the set, you will see the dial of the tuning condenser in the centre of the panel with the potentiometer on the left and the rheostat on the right. This grouping is just right for easy manipulation, giving at the same time a symmetrical panel lay-out. The variable condenser should be fitted with some form of slow motion device, as tuning is quite satisfactorily sharp and selective. The resistance of the potentiometer should not be less than 400 ohms to minimise the current drain on the first few cells of the H.T. battery. More particularly, the movement of the potentiometer slider must be smooth, so that easy adjustment is possible. The rheostat need not have a resistance greater than five ohms or so, with a 2-volt valve, as there is some voltage drop across the coils L_1 and L_2, so that not much extra resistance is necessary.

The rear view illustrations of the receiver indicate the simple lay-out of the baseboard components, of which the two tuning coils are the only ones to be specially constructed. Both coils are wound on three-inch diameter formers, and I have used in the original set waxed cardboard tubes, which are quite as satisfactory as the more expensive ebonite pirtoid or paxolin formers.

Coil Construction.

The aerial coil L_1 consists of 60 turns of 22 D.C.C. wound on a 3½-inch length tube, tapping loops being taken at the fifth, tenth, twenty-fifth and forty-fifth turns, counting from the bottom (earth end). The parallel coil L_2 is a simple winding of 70 turns of 22 D.C.C. At a distance of ⅜-inch above it thirty turns of 30 D.C.C. are wound on in the same direction, the former in this case being five inches long.

These coils are quite easily wound, and a neat finish is obtained by soldering the ends of the windings to small soldering tags secured to the former by small 6 B.A. nuts and bolts. The connecting wires are eventually soldered to these tags.

Almost any reliable type of components can be used, as this receiver is not at all critical in this respect. There is room for components slightly larger than those used in the original set, a list being appended for guidance only.

When mounting your components on the baseboard, it is advisable to follow somewhat closely the original lay-out, while the position of the components on the panel is shown in Fig. 3. It is by no means necessary to use an ebonite panel; actually, it is sheer waste to do so, because all the components mounted on and touching it are at earth potential, so that earth insulation is unnecessary. As for appearance, a panel of three-ply or quarter-inch hardwood can be stained and polished to look quite handsome, especially when set off by a good cabinet.

When the panel and baseboard have been joined together and the components mounted on both, you can commence to wire up. The wiring diagram is given in Fig. 4, and this is so simple that you can't very well go wrong. You may find it easier to wire up the receiver if the two coil formers are mounted after completing part of the wiring such as the rheostat and potentiometer leads, not forgetting to leave room for the coils when finally mounted.

To mount each coil, three screws are put into the baseboard just far enough to grip the inside of the former when it is placed into position. If the former is then pressed down and given a slight twist it will be held firmly to the baseboard.

The tappings on the aerial coil are scraped free of insulation, connection being made to them from terminal A_2 by a short length of flex terminating in a spring clip. The top ends of L_1 and L_2 are connected to the filament terminals of the valve holder while the bottom end of L_3 goes to the grid.

Suitable Valves.

After completing the wiring, it is a good idea to check it over again with Fig. 4 before the receiver is set up for testing. In connecting up the batteries, the lead from the anode bias terminal is plugged into the first 4½ or 6 volts of the H.T. battery, the total voltage of which need not exceed 60. The aerial lead is connected to A_1 or A_2, according to the size of the aerial system and the spring clip placed on an intermediate tapping of the aerial coil.

Then for a trial insert a valve such as a D.E.R., D.E.3 or D.E.2 H.F., and turn on the rheostat. Set the potentiometer about a quarter of the way round from the end marked negative and tune in the nearest station, which should be found without difficulty. If the set oscillates, turn the potentiometer towards the negative end until signals become quite clear and loud. The other setting for maximum signals is obtained by turning the potentiometer towards the positive end, the set passing through the oscillation stage until the anode is sufficiently positive to rectify efficiently once more without distortion. At the same time, you will notice how easily reaction can be controlled by the potentiometer. The volume of signals can

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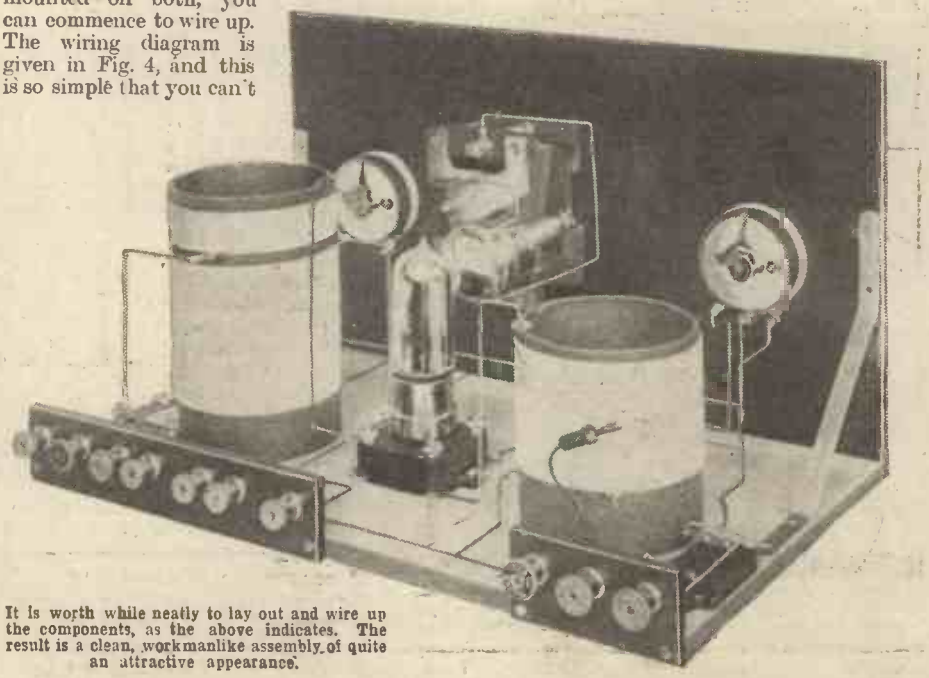

It is worth while neatly to lay out and wire up the components, as the above indicates. The result is a clean, workmanlike assembly of quite an attractive appearance.

A NEW FILADYNE ONE-VALVER.

(Continued from previous page.)

now be increased by raising the aerial tap to the top of L_1, and retuning.

If, by chance, the set refuses to oscillate either decreaso the aerial damping by lowering the aerial tap or increase filament brilliancy. The latter, however, cannot exceed a certain value or signals will fade away almost entirely, this being a peculiarity of the Filadyne circuits. As a last resort a few more turns could be put on to the reaction coil, but it is not likely that you will have to do this, or that there will be any difficulty in getting ample reaction, especially if the right type of valve is used.

When receiving distant stations the selectivity of the receiver can be enhanced by reducing the number of turns in the aerial circuit, with a corresponding sacrifice in signal strength. The receiver is quite selective, however, without lowering the aerial tap too far. As the dial of the variable condenser is rotated with the right hand, the receiver can be retained in a sensitive condition by adjusting the potentiometer knob with the left. Actually I found that by using the aerial tap with care the set remained in a sensitive condition over the major portion of the tuning dial from 60 to 170 degrees, with a fixed setting of the potentiometer. This, of course, reduced the controls to one, and quite a number of stations were picked up simply by manipulating the tuning dial.

Regarding the best valves to use in this receiver, those having a moderately high impedance, round about 20,000 ohms, appear to give smoothest oscillation and the best results as regards volume and sensitivity. Different types of valve require slightly different values of H.T. voltage and filament current, but in every case reaction and rectification can be controlled with the potentiometer.

Operating the Set.

There is no reason why you should not try any of the valves you may have at hand, but the types mentioned above have been found necessary for good loud-speaker volume from a near station.

For most valves a sufficient variation of anode potential for working on the upper band is obtainable by connecting the anode bias terminal to the L.T. positive terminal. However, in order to work on either upper or lower bends, and for some 2-volt valves, it is necessary to tap on the first few volts

(Continued on page 400.)

COUPLING CARD INDUCTANCES.

By Oswald J. Rankin.

FOLLOWING is the description of a simple home-made coil holder which is designed to be used in conjunction with basket or card inductances arranged on the "built in" principle—i.e. in cases where the coils are placed inside the receiver.

The mounting of a fixed coil is, of course, a very simple matter; it is the problem of arranging the moving coil which usually presents the difficulty, and in the absence of a specially designed coil holder one is often tempted to rig up any old substitute, often with disastrous results. Here we are concerned exclusively with the common difficulty—the moving coil—the idea being to suggest a simple and inexpensive method of mounting same inside the set, so that the operator may know, by glancing at a control dial on the panel, just how it is behaving.

A Useful Arrangement.

Fig. 1 shows how such a coil may be mounted, beside a fixed coil, inside the cabinet of a receiver fitted with a horizontal panel. A round brass spindle, D, about

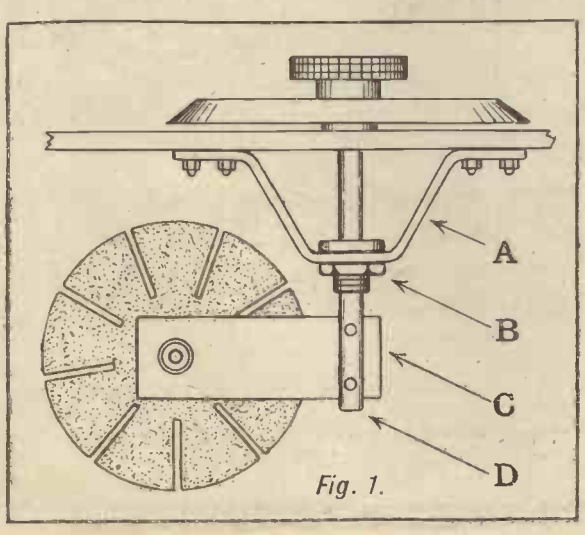

Fig. 1.

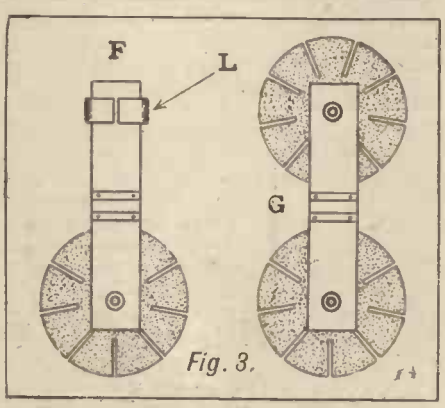

Fig. 3.

4 in. long by ¼ in. in diameter, is threaded at one end and screwed tightly into a standard knob and dial; the other end is slotted and drilled, and fitted with a piece of thin sheet ebonite or fibre, C, which is riveted in position, a small hole being drilled in the opposite end so that the coils may be quickly attached to same by means of a small bolt or terminal. A useful size for the strip is 3½ in. by 1 in.

The panel bush, through which the spindle is passed, is not sufficient to support the coil and strip (unless it is made in the form of a sleeve, at least 1 in. in length), and it is therefore necessary to provide an extra bearing, B, which consists of an ordinary panel bush fitted to the centre of a strip of ⅛ in. sheet brass, A, which is bent as shown and bolted to the panel. The method of attaching the coils to the supporting strip may, of course, be modified to suit individual tastes. The end of the strip might be fitted with two flush type sockets carrying permanent flexible leads, and each coil provided with two pins connected to the ends of the winding. Other methods will suggest themselves.

In the case of the more popular vertical panel the coil must be balanced in some way, otherwise the law of gravity will intervene. If the spindle turns too freely, the coil simply falls every time the knob is released; and, in order to prevent this happening, we have to introduce a little extra friction in the form of a compression spring, S, Fig. 2, which is adjusted by means of lock-nuts, fitted as shown. Instead of fixing the coil strip permanently to the end of the spindle, as in Fig. 1, it may be arranged to slide into the slot in the manner indicated in Fig. 2, the strip then being supported by means of four small fibre fillets which are riveted to the top as shown at E. If the strip fits very tightly into the slot, the two lower fillets may not be necessary.

A Balance Device.

In place of the spring we may use a longer coil strip, and provide a counterweight, as shown at F, in Fig. 3. This may consist of a strip of sheet lead, L, arranged in the form of a sliding clip, so that it can be adjusted to balance coils of various sizes. Another simple method is shown at G (Fig. 3), where the balance is effected by means of another coil approximating in weight to the coil in use. Either method will be found quite satisfactory, providing the necessary space is available. The Fig. 2 arrangement is, of course, more compact, and more suitable in cases where space is limited.

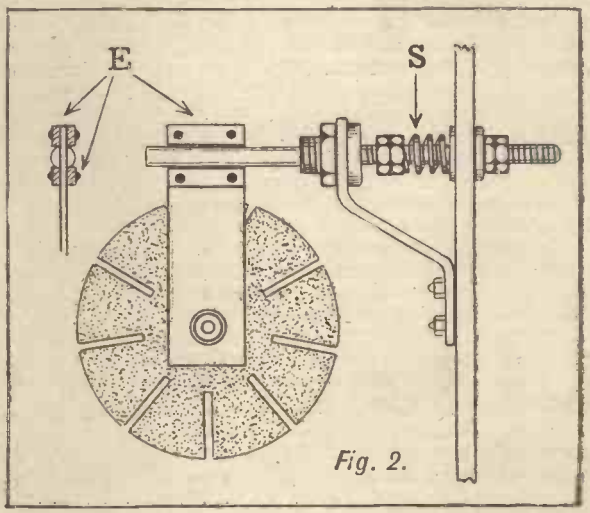

Fig. 2.

PUTS POWER INTO YOUR SET

YOUR valves and loud speaker have real power and clean smooth-flowing energy behind them if you are using a LISSEN New Process H.T. Battery in your set. This strengthens the electronic emission of each valve and makes volume bigger, loud-speaker tone fresher, and reproduction smoother and more life-like than you have ever known it before. The power of the LISSEN New Process Battery never lessens, even under the drain of the longest programme.

Before marketing the LISSEN New Process Battery we introduced our new policy of direct-to-dealer distribution. This cut out all wholesalers' profits and we were able to put the battery on the market at **10/6.** Not satisfied with this, the next step we took was a very bold one. We cut down our own profits on this battery and asked our retail friends to take less profit also. We then drastically cut the price of the battery to **7/11.** This battery then became the best value-for-money battery available, and the response from the buying public was so overwhelming that we had to discontinue advertising. Trade orders were cut down in every direction. Strenuous efforts for the past few months have enabled us to overtake arrears. Trade orders are now being executed in full and you should be able to get the LISSEN New Process Battery from any good dealer. If you have any difficulty, send direct to the factory; no postage charged, but please mention dealer's name and address.

7/11

LISSEN NEW PROCESS HIGH TENSION BATTERY

66 volt. Size 9½ by 3½ in.

Comes direct from factory—reaches you fresh and packed full of new energy

LISSEN LTD., 8-16 Friars Lane, Richmond, Surrey

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L 324

CURRENT TOPICS.

By THE EDITOR.

The B.B.C. and Variety Stars—Buying Talent Second Hand—Mr. Gulliver and Sir Oswald Stoll Make an Offer.

THE controversy between the music-hall managers and the B.B.C. has again broken out, this time in a way which would make the proverbial cat laugh.

Mr. Charles Gulliver, the well-known music-hall manager, after many emphatic refusals to consider broadcasting under any circumstances, has now stated that he will withdraw his opposition and place no restrictions in the way of any artistes under contract with him who wish to broadcast—but on condition of a payment by the B.B.C. to him of about £10,000 a year!

A Business Offer!

Not to be outdone by his business rival, Sir Oswald Stoll, managing director of the London Coliseum and other music-halls, has also adopted the same attitude, except that in his case he stipulates that the B.B.C. should compensate him with £15,000 a year!

So it comes to this—that for the sum of approximately £35,000 a year, Mr. Gulliver and Sir Oswald Stoll are prepared to tolerate broadcasting and to place no obstacles in the way of music-hall artistes in their employ from accepting invitations from the B.B.C. to broadcast.

Presumably the B.B.C. would have to pay fees to these music-hall artistes, the £35,000 being in the way of compensation to Mr. Gulliver and Sir Oswald in respect of "injury" to their music-halls due to B.B.C. competition.

To a Press reporter Sir Oswald Stoll recently made the following statement:

"The payment of compensation for the loss sustained by the variety interests should be a substantial one, and in proportion to the extent of the interests involved. In my case I should want at least £15,000 a year as a recompense for the loss sustained by my companies through broadcasting.

Settling the Question.

"I have no doubt that this plan of payment would settle the question of permission to artistes to broadcast. Should the B.B.C. consider some such reasonable scheme, I believe every member of the Entertainments Protection Association and the Provincial Managers and Proprietors Protection Association would be willing to name a figure which he would accept as compensation in respect of the interests he represents."

Mr. Gulliver declares that if the B.B.C. wants variety—which the recent "Daily Mail" contest proved to be one of the most popular items in the broadcast programme—it must pay for the services of the artistes on a scale more comparable with the salaries paid by theatrical proprietors. Mr. Gulliver's price is £10,000 a year.

An Amazing Proposal.

We understand that these amazing proposals are actually being considered by the B.B.C.—seriously considered! An official at Savoy Hill (according to the daily Press) has stated that "such an offer as that mentioned by Mr. Gulliver would receive due consideration, especially as it would mark a distinct advance on the attitude previously maintained by Mr. Gulliver."

He went on to say that "If Mr. Gulliver or Sir Oswald Stoll made an offer that a joint meeting should be held, we should consider it, and if the variety managers combined we should be pleased to negotiate with them."

On top of this, however, the B.B.C. admit that they find a growing tendency among variety artistes to resist efforts to keep them from the microphone, and we are having less trouble of this kind than we used to experience.

"We are still prepared to enter into reasonable working arrangements, and we hope the offer by Mr. Gulliver may provide a basis for negotiations," concludes the official in his statement to the Press.

No End to it.

From the latter it seems pretty clear that the B.B.C. are willing to consider some sort of financial arrangement with the Music Hall Combine, or with certain leading managers. If they do they will be guilty of a serious error of policy and also a very serious error of judging entertainment values.

For one thing, by making any payment on the basis of "compensation," the B.B.C. admit doing damage to the music-halls—and that will be said to embrace the theatres and concert halls. Consequently they contradict their past policy of repudiating any suggestion that broadcasting damages music halls and theatres. They create, as well, a precedent.

"If," concert managers and theatre managers will say, "the B.B.C. are prepared to compensate the Music Hall Combine to the tune of some thousands of pounds a year, thus admitting the justice of the claim that broadcasting is damaging to certain entertainment interests, then where do we come in?"

And the B.B.C. will receive a demand from concert and theatre managers to the effect that, if they want actors and actresses and concert stars in their programmes, they must "compensate" the managers as well as pay fees to the artistes concerned!

Where will it stop? Cinema bands, seaside bands, and dozens of other sources of entertainment will want "compensating." The B.B.C. will play right into the hands of the opponents of broadcasting if they part with a shilling to Mr. Gulliver, Sir Oswald Stoll, or any other manager, on the "compensation" basis.

The B.B.C.s Duty.

Apart from the question of policy there is the question of entertainment value. Supposing the B.B.C. paid £35,000 a year in all to Sir Oswald Stoll and Mr. Gulliver, and on top of that fees to various variety artistes. Would they get value for money? We doubt it. Not every music-hall artiste broadcasts well; in fact, very few have been really successful, and the B.B.C. would have to draw very heavily on the ranks of variety to get anything like the *quantity* of variety, apart from the *quality*, to make a payment of £35,000 a year justified.

There is no doubt that more variety is wanted in the programmes. But why buy secondhand talent? Instead of spending thousands a year for the privilege of obtaining the services of artistes already in many cases more than familiar to the public, why not search for new talent and train and develop it specifically for broadcasting purposes?

The music-halls have not a monopoly of entertainment talent; the B.B.C. must find their own, just as the music-halls found their own.

And when they have found it, boosted it and made it popular, and tied it down with a good contract, perhaps Mr. Gulliver and Sir Oswald Stoll will one day consider paying the B.B.C. £35,000 a year for the permission to let B.B.C. variety artistes appear on the "halls."

One of the Australian amateurs with whom Mr. E. J. Simmonds (2 O D) operates on short waves.

TECHNICAL NOTES.

A Weekly Feature Conducted by

Dr. J. H. T. ROBERTS, F.Inst.P.
(Staff Consultant.)

Two or Six Volts?

I MENTIONED recently the fact that I had had a great many letters from readers of these Notes giving their opinions as to the relative advantages of the 6-volt and 2-volt types of valve. This correspondence still continues, and the subject is evidently one of considerable interest to experimenters.

It almost goes without saying that if a range of 2-volt valves can be produced which will do everything that a similar range of 6-volt valves will do, the former has great advantages. The point at issue, therefore, is whether 2-volt valves really can be produced (or, at any rate, whether they have actually, up to the present, been produced) to do all that certain 6-volt valves will do.

One reader points out that it is more particularly in regard to the power valves (or what he describes as the "super-power" valves) that the 6-volt type has the advantage. He says, "We find newcomers in the B.T.-H.B8. and the S.T.21A, but there is no 2-volter to be classed as a real power valve, and I am up against the problem of the last L.F. stage, having tested the PM.2, S.T.23 and Marconi D.E.P.215.

"In all types I find the 2-volter the equal in efficiency of its 4- and 6-volt brothers, except in the real power stage, and it is a matter for wonder why makers do not introduce a 2-volt equivalent to, say, the P.M.256 or the S.T.63."

"Weighty" Considerations.

Another letter on the same subject brings out a point which, I must say, had not occurred to me, or, at any rate, not in quite the way mentioned by my correspondent. He says: "With regard to the controversy about 6-volt valves, I would have agreed a short time ago that 6-volt valves were to be preferred to the 2-volt type. But I myself am forced to use a 2-volt type for special reasons. My house is not equipped with electric supply, and I have to take my battery to a charging station, where they charge at the fixed rate (which is common in this district) of 2s. per volt. Were I to use 6-volt accumulators, my battery recharging bill would obviously be trebled, although I should probably be using accumulators of the same capacity

"Again, the difference in weight of the two types, considering that they have to be carried to and from the charging station, is no small item if the station is quite a fair distance away, as it is in my case. With the advent of popular and cheap installations for charging from the mains, these difficulties are largely overcome, and I think the valve manufacturers are rendering a very real service to the public in introducing wide ranges of 6-volt valves for those who are lucky enough to be able to use them."

Different Requirements.

I can only comment that these various points emphasize the problem with which manufacturers in general, and valve manufacturers in particular, are always faced with when endeavouring to cater for the diverse needs of a large public.

Personally, I have no doubt that before very long the 2-volt range, which is already excellent and extensive, will be still further improved so that 6-volt valves will really become quite unnecessary. Nobody seems to know quite how the arbitrary voltage of 6-volts first came to be adopted; but like many other things arbitrarily or accidentally adopted, it becomes afterwards very difficult to get away from.

Senator Dill and Congressman White on the steps of the Capitol, Washington. They are the joint authors of America's new radio legislation.

H.F. Stages.

I also continue to receive quite a number of letters on the question of the single H.F. stage, and whether or not it is worth while. This correspondence shows again how remarkably pronounced difference of opinion can be upon an apparently simple and straightforward issue. Many of my readers have been most dogmatic in asserting that the single stage of H.F. amplification gives no real advantage, and is merely a complication in operation of the set and an additional expense both in first cost and current consumption. On the other hand, others are most enthusiastic in declaring that the addition of a single stage of H.F. amplification to a set has transformed the possibilities of the latter and has turned a local station receiver into a DX instrument.

Transforming a Set.

It is impossible to cite opinions and remarks at any great length, but I would like to mention one particular case, in which the writer of the letter states, "For a very long time I have relied on a three-valve set made by a well-known manufacturer, detector and two L.F. amplifiers, for my broadcast requirements. Lately, however, I constructed a two-valve reflex, incorporating one stage split secondary H.F. amplification, using the new six-pin transformers. The results on this set are very good. The sensitivity is very much greater than that of the old set, using the same aerial and earth, and the tone is also quite as good, although the transformers are much cheaper than in the first mentioned set. Of course, since the first set was made some considerable time ago, it is not of the most up-to-date design, and perhaps it is not really fair to compare these two, but all my experience with 'hook-ups' with H.F. and detector, and with detector only, convinces me that a stage of H.F. is very well worth while."

Emergency Aerial.

As an emergency measure, if the regular aerial happens to be temporarily "down," you can usually make shift with a condenser connected to the aerial terminal and then to the earth—that is to say, the aerial terminal connected to earth through a condenser. This will often be found quite satisfactory, both for local and for distant reception.

The "earth" to which this condenser is connected should be a different earth from that to which the earth-terminal of the set is connected. For example, if the earth terminal of the set is connected to a water-pipe, the condenser which is now connected to the aerial terminal of the set may have its other set of plates connected to a radiator. The value of the condenser should be as large as possible. On the other hand, if the capacity of this condenser be reduced, although the pick-up sensitivity of the receiver will be correspondingly reduced, the selectivity will be increased.

Voltage Measurements.

I receive at various times queries from readers with regard to the use of voltmeters for measuring the voltage of electric light mains, H.T. batteries, and so on. These letters often reveal curious misapprehensions, more particularly, of course, on the part of newcomers to the science of wireless.

For one thing, many experimenters are afraid to connect a voltmeter directly to the electric light mains, even though the voltmeter is designed to read a voltage equal to, or above, that of the mains. This seems to be due to an idea that more current will flow from the mains than from an H.T. battery.

The fear is, of course, entirely groundless. The current which flows through the voltmeter depends simply upon the voltage applied to its terminals and, for the voltages for which the instrument is designed, the current is extremely small. There is, therefore, no difference whatever, so far as the voltmeter is concerned, between connecting it to a 110-volt electric light D.C. mains and a 110 H.T. dry battery.

MICROPHONE FRIGHT

Many famous variety artistes and other well-known people experience considerable nervousness in broadcasting studios. Why is this? A well-known scientist advances an explanation in an exclusive article. By Professor D. FRASER HARRIS, M.D., D.Sc., B.Sc. (Lond.), F.R.C.S. (*Author of "Nerves" and "Life and Science."*)

LISTENERS a few weeks ago were looking forward with pleasurable anticipation to a short talk—one of the appeals for a good cause—by the charming American actress, Tallulah Bankhead. Many people must have seen this talented lady in more than one play, acting her parts with singular conviction.

When the time came for her appeal, what was their amazement to hear a high-pitched voice speaking the words with painful rapidity, with not much expression and with no particular light and shade. "Surely something has gone wrong," most of us exclaimed; and, indeed, something had gone wrong, for next day we learned with regret that the speaker of the night before had had an attack of "microphone fright," or of "nerves," as it may be more familiarly but vaguely called. Miss Bankhead had become exceedingly nervous, had raced through her speech, and collapsed immediately it was over.

Contributing Causes.

Now, what exactly is this "microphone fright"? It is evidently something like stage-fright—the well-known breakdown of confidence and assurance which occasionally overtakes actors, lecturers, and preachers about to make their appearance in public.

Microphone fright, we are assured, is commoner than is supposed. To what exactly is this extreme nervousness and collapse due?

We shall find that part of the reason is concerned with the individual, and part with the surroundings. Evidently the constitutional make-up of the person, both physical and mental, must have a good deal to do with it, for whereas some speakers show no nervousness whatever, a few are decidedly unnerved opposite the same transmission microphone in the same room. Though the state of the individual nervous system has, then, much to do with the untoward result, we shall presently see that the immediate surroundings make a distinct contribution to this complex state of fright.

Physiological Reason.

The precise physiological reason for the turmoil in the nervous system is the low state of the blood pressure there, which makes it necessary for me to explain first of all what blood pressure is. There is no mystery about the pressure of the blood; it is just what it says, the pressure or force under which the blood is impelled forwards from the heart to the entire body.

The heart is a pump which seventy times in the minute forces pure blood, with its oxygen, into the already full arteries

Miss Tallulah Bankhead, the famous American actress, who recently suffered from a severe attack of "microphone fright" at 2LO.

so that a considerable degree of pressure is developed within them. Unless, of course, the arteries were elastic they could not hold this additional blood. It is under this pressure that the blood flows on to the remotest regions of the living tissues, and, of course, very freely to the brain and the rest of the nervous system.

The blood pressure is to the blood in the arteries exactly what water pressure is to the water in the mains of a city. And just as you will get a spout of water if you knock a hole in the water-pipe, so you will get a spout of blood (arterial bleeding) if you stab an artery. The water leaps up because of the high water pressure; the blood spurts out because of the high blood pressure.

Free Circulation Necessary.

Now, unless blood flows freely through a part, that part will not perform its function, and we find that the more blood that flows through a part the better will it perform its functions. The higher the blood pressure (other things being equal) the more blood will flow through the part. Now, the brain is the part in question, and we therefore see that the higher the blood pressure the more blood flows through the brain, and the more blood that flows through the brain the better it works.

But the opposite of all this is true—the lower the blood pressure the less blood flows through the brain, and therefore the less well does the brain do its work. The precise office of the brain is to be the seat of consciousness—that is, of all our mental and emotional activities, and therefore, when the blood pressure in the brain falls, the brain does its work less and less well until it ceases to work altogether and we pass into the state of unconsciousness known as sleep.

Effect of Environment.

The once familiar condition of fainting is temporary unconsciousness brought on by a too low blood pressure within the brain. The state of the blood pressure is therefore an exceedingly important thing in maintaining the proper activity of the brain and all the rest of the nervous system so intimately connected with it. But the state of the blood pressure is influenced by the varying conditions of one's surroundings, for it is well known that stirring, martial music, bright lights, good news, stimulating and exhilarating conditions generally favour a rise of blood pressure; and that conversely the opposite set of conditions, especially all such as are classed as "depressing," tend to allow the blood pressure to fall.

The studio from which the broadcasting is done is not in any sense of the word a stimulating environment. It is not brilliantly lighted, it is sound-proof, and therefore an

(*Continued on next page.*)

MICROPHONE FRIGHT.

(Continued from previous page.)

exceedingly quiet place; its walls are hung with thick curtains designed to absorb sound, and the sober colour of these hangings in the subdued light some people might find quite depressing. The microphone, into which one is invited to speak, is to the eye of the uninitiated quite an uninteresting piece of apparatus; indeed, so non-characteristic does it appear that it suggests nothing so much as a glorified cigar box with a grating over one open end.

In this strange and silent chamber Miss Bankhead had to be shut up, and was expected to address an invisible audience. The depressing effect on her sensitive, possibly hyper-sensitive, organisation was to induce so low a blood pressure that the duly co-ordinated activities of her nervous system were seriously disturbed.

One has to remember what the effect of a great audience as seen through the glare of the footlights means to the sensitive temperament of an artiste. The appreciation of our efforts, the interest taken in us by the audience, the applause, the general atmosphere of approbation mean something intensely stimulating to the truly artistic soul.

A B.B.C. broadcasting studio which, as Professor Fraser Harris says, is not a "stimulating environment."

The really sensitive person—and the true artiste is nothing if not sensitive—is so exceedingly susceptible to the approbation of the listening, living crowd that he or she cannot satisfactorily perform save in its presence.

And we have to remember that Miss Bankhead was *not* acting, could not be acting; she was making a speech which may have been a relatively unfamiliar and possibly uncongenial thing for her to do. Her daily work is to represent somebody else, to convince people she *is* somebody else. For once the possibility of doing this was denied her, with disconcerting emphasis.

Special Audiences.

Kreisler, for instance, has refused point blank to play to the microphone. Funny people are to-day provided with skeleton audiences who invariably applaud in the right place. The true artiste must have an audience of flesh and blood, else his performance suffers from the lack of that reciprocal stimulation so vital to the sensitive artiste.

In physiological language the blood pressure tends to fall, and, as a consequence, a state of disturbance, technically called inco-ordination, sets in and disturbs the harmony of the activity of the nervous system. This state of matters being imminent, Miss Bankhead tried to save the situation by a far too rapid delivery; but the blood pressure was falling during these five minutes, and so when the effort was over she collapsed.

Another possible source of disturbance to the nervous system is the smallness of the room in which one is shut up for the talk. Some people greatly dislike being enclosed in this way, so that they suffer from restricted place-fright, or claustrophobia as the learned call it. For this very reason many women greatly dislike to travel in the Tube railways.

Extra Sensitive.

Miss Bankhead's unpleasant experience during the broadcasting was thus only remotely allied to true stage fright, but it was, for all that, a real disturbance in the nervous system. The artiste, be he actor, painter, musician, or poet, is admitted to be sensitive beyond the average and to be much more highly strung than the majority of his fellow creatures.

It was, then, a "vexing" of the artiste's spirit—all unconscious on the part of the courteous officials at Savoy Hill—that led to Miss Bankhead's trying experience on the night of Sunday, March 27th.

A CAT-WHISKER "TIP."

As every crystal user knows, a blunt contact is both inefficient and uncertain in operation. The majority of synthetic crystals (sometimes known as the "ites" class) work best with a light springy contact, while even many natural crystals are sensitive only in minute parts of their surfaces, rather than on comparatively larger areas such as would be affected by a blunt contact point.

The necessity for a sharp, springy contact is admirably met by the home-constructed catwhisker shown in Fig. 1, which consists of a length of No. 22 copper wire wound into a spiral, to the free end of which is affixed a small sharp point cut from an aluminium condenser plate. The method of clipping this point on to the whisker will be evident from a glance at B.

Apart from its capabilities due to having a permanent point, this catwhisker appears to possess greater efficiency in combination with the usual synthetic galena type of crystal than any contact I have yet tried, and amateurs who are bent on getting loudest crystal reception will find it well worth a trial.

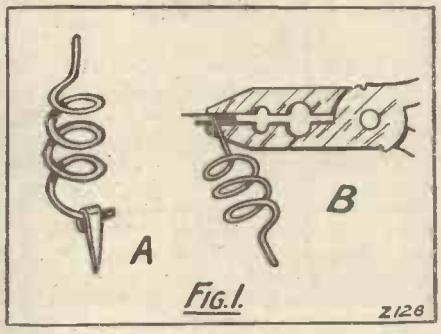


FIG. 1. Z128

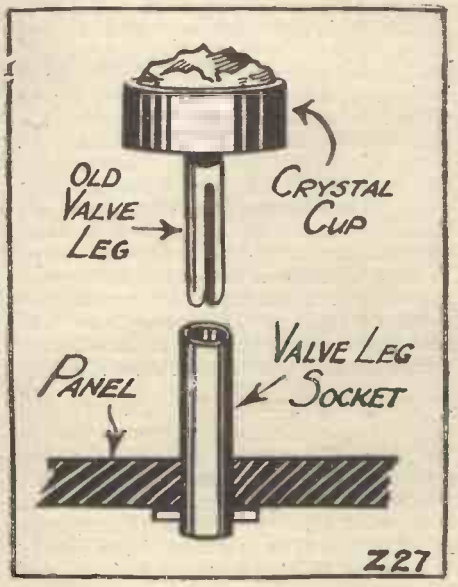
A QUICK-CHANGE CRYSTAL CUP.

STILL another type of quickly detachable crystal cup which will appeal to a number of experimenters is the one illustrated here.

As will be seen from the diagram, this type of crystal cup is of very simple construction, and it can be made from any ordinary crystal cup by soldering an old valve leg to its base. A valve leg socket is then provided on the panel, and the crystal cup is plugged into this.

By the use of crystal cups of this type, the operation of crystal changing is reduced to a matter of a second or two, and thus it becomes very easy to make rapid comparisons of the efficiencies of various types of crystals.

It is not necessary for the valve leg socket to protrude to a great distance above the panel like it is shown in the illustration, for if a thread is cut near the top of the socket; the latter can in many cases be actually recessed in the panel, this latter arrangement providing a very neat fitment indeed.



BROADCAST NOTES.

By OUR BROADCASTING CORRESPONDENTS.

Eugene Goossens Returns—A Talk on Canberra—The Nation's Art Treasures—Community Singing Again—An Embassy Broadcast—31,000 Miles by Yacht—"The Arcadians" Again—John Ansell's Success—Gainsborough—Progress of Centralisation—B.B.C. and Music—"My Journalistic Scoops"—Colour in Drama Studios—Television and Broadcasting—Captain Eckersley for Washington—Duke of Connaught.

Eugene Goossens Returns.

MR. EUGENE GOOSSENS, who is now concluding a triumphant season in the United States, will be warmly welcomed to the British microphone on Sunday afternoon, May 8th, when he will conduct a light symphony concert at Savoy Hill.

A Talk on Canberra.

Mr. Tom Clarke, Managing Editor of the "Daily News," and formerly News Editor of the "Daily Mail," is broadcasting from London on May 9th a description of Canberra, Australia's new capital, the inaugural ceremonies in connection with which the Duke and Duchess of York will perform on the same day on the spot.

The Nation's Art Treasures.

A forthcoming talk of unusual interest will be given by Sir Robert Witt, who, on Thursday, May 12th, will describe S.B. from London the Nation's Art Treasures. It is anticipated that this talk will be made the occasion of an important pronouncement on behalf of the National Art Collections Fund.

Community Singing Again.

The next big Community Singing broadcast has been fixed for Wednesday, May 11th. A special concert will be broadcast from the Kursaal at Southend-on-Sea. The concert is being organised primarily to help the local hospitals to cope with motoring accidents.

An Embassy Broadcast.

It is a distinct feather in the cap of the "O. B." people at Savoy Hill to secure the services of the exclusive Embassy Club Band, relays of which will begin early in May. The searching out and arranging of new outside broadcasts is important work very capably handled by Mr. Gerald Cock and his enterprising staff. Mr. Cock's varied career suits him admirably for this work. He has been all over the world, has "roughed it" on several continents—has included cow-punching in his accomplishments.

31,000 Miles by Yacht.

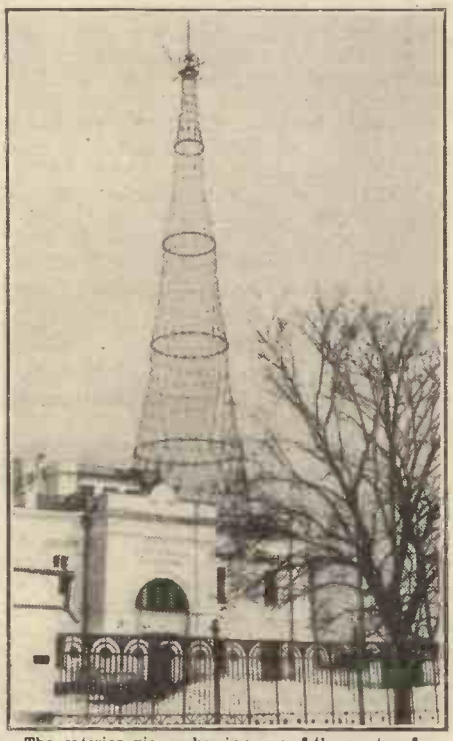
On June 20th, 1923, Captain Conor O'Brien left Ireland in the ketch-rigged yacht "Saoirse." After many vicissitudes, the yacht reached Lyttleton, New Zealand. The return voyage was completed on June 20th, 1925. The story of the 280 days spent at sea, during which 31,000 miles were covered, by way of Madeira, Cape Verde Islands, South Africa and Australia, back by way of Pernambuco, Horta, and the Azores, will be told by Captain O'Brien himself at the London Station on Saturday, May 14th.

"The Arcadians" Again.

Listeners were so appreciative of the recent performances of "The Arcadians" that it is to be repeated at London, on Tuesday, May 10th, Miss Florence Smithson again playing lead.

John Ansell's Success.

Attentive listeners are agreed that John Ansell has proved a successful conductor of the London wireless orchestra. On Friday, May 13th, Mr. Ansell is "spreading" himself on a special programme made up of light music from grand opera.



The exterior view, showing one of the masts, of Russia's new 40 k.w. broadcasting station at Moscow. It is known as the "Great Komintern."

Gainsborough.

The bi-centenary of the birth of Thomas Gainsborough will be marked by a feature to be contributed by Mr. R. H. Wilenski to the S.B. programme on Saturday, May 14th.

Progress of Centralisation.

It is no doubt a tribute to the improvement of B.B.C. transmissions and landline work that the policy of concentration of programme effort in London has been allowed to advance so rapidly without local resistance or even audible protest. Even centres such as Manchester, Glasgow and Cardiff put on very little of their own work nowadays. It has been proved up to the hilt that it is more efficient and economical to organise big programmes in London. But the Savoy Hill people did not dream that they would escape criticism in applying the more efficient policy. Perhaps under redistribution, local cravings may be entertained anew.

B.B.C. and Music.

Mr. Boosey has announced that the Queen's Hall will remain under his control for another year. He adds that during this period no broadcasting will be permitted from the Queen's Hall. It is an easy deduction that nothing eventuated from the recent parleyings between the B.B.C. and Chappell's. The B.B.C. has kept absolutely silent over the whole affair. It should be recalled, however, that when the subject first attracted public attention some weeks ago, Savoy Hill expressed its willingness to sponsor or join a partnership to set up a national trust for the purpose of guaranteeing the Queen's Hall permanently as the centre of British music. It is understood that conversations were initiated in various quarters to this end. Chappell's apparently have dropped out of these conversations. But this does not mean that the position is hopeless. The B.B.C. are unlikely to give up the struggle lightly. Some important alternative announcement may be expected in the near future.

"My Journalistic Scoops."

This is the intriguing title of a talk to be given by Mr. Sidney Molesley on Tuesday, May 10th.

Colour in Drama Studios.

Mr. R. E. Jeffrey, the energetic Director of Productions at B.B.C. headquarters, is exploring the possibility of improving the technique of microphone acting by the introduction of colour. He leans to the view that he will be able to evolve a kind of impressionistic effect by the use of shaded lights, which will add much to the vitality of the dramatic work performed in the studios so fitted.

Television and Broadcasting.

The promoters and exponents of television in this country are complaining with vigour of the indifferent, almost neglectful, attitude of both the Post Office and the B.B.C. It is alleged that the B.B.C. engineers vie with the engineers of the Post Office in casting doubt on the possibilities of television. A prominent B.B.C. engineer is quoted as saying that it will be thirty years before television emerges from the preliminary experimental stage, and fifty years before its use is popularised on a feasible commercial basis. Enquiries at Savoy Hill have not drawn confirmation of this extremely discouraging attitude; but apparently little effort is made to disguise the scepticism prevailing there on the subject of television.

Captain Eckersley for Washington.

Captain Eckersley is to attend the great wireless conference at Washington this autumn. He will be away some months, but may return before the conclusion of the proceedings.

Duke of Connaught.

The Duke of Connaught's speech at the annual luncheon of the United Associations of Great Britain and France at Hotel Victoria on May 20th will be broadcast from all stations. Lord Crewe and Lord Derby also will be heard by listeners.

Is the Crystal Set Played Out?

A thoughtful reply to the question.

By J. F. CORRIGAN, M.Sc., A.I.C.
(*Staff Consultant.*)

THE B.B.C. have had to face many severe criticisms during the last few months, and I might mention that, to the average individual, the majority of these criticisms have appeared to be eminently reasonable ones. There is, however, one point at issue, a point of

A miniature crystal set compared in size with a penny.

criticism which is perhaps the direct outcome of the last few months' onslaught upon the B.B.C., and that is the statement which we not infrequently hear nowadays to the effect that the ordinary crystal set is now very much a back number, and, in fact, an entirely obsolete and trifling piece of radio apparatus.

I have noticed these views concerning crystal reception aired at considerable length in the daily press on several occasions, and such criticisms have come about, I think, in consequence of the avowed policy of the B.B.C. of endeavouring to place the majority of individuals in this country in reach of one B.B.C. station or another by means of crystal set reception alone.

Increased Valve Sales.

To my mind, this is quite a laudable policy. It may, of course, possess its disadvantages, but at the present juncture that is beside the question. The point I wish to deal with upon the present occasion is that concerning the future of the crystal set, not the distant future of that homely instrument, but the fairly immediate prospects which are in store for it.

Is the crystal set and the whole technique of crystal reception fairly well played out, as some critics would have it? I imagine that any inquirer will find a sufficiently satisfactory answer to that question in the fact that the number of crystal sets which are in actual use in the land by far exceeds the number of valve receivers in operation. Hence, one may infer that crystal reception is at the present time the most widely used means of listening-in. Such, at any rate, is the view which has been stated by the B.B.C. time and time again.

Against this we have the statement made by several manufacturers and wholesale concerns that the sales of valves, rheostats, valve holders, transformers, and other components incidental to the valve receiving set, are very much on the increase; and this fact is taken as an indication that valve receivers generally are being more widely used as a means of radio reception than they were some time ago.

Low Cost.

Which is probably very true. But is the single or multi-valve set ousting the simple and efficient crystal receiver in general popularity as a means of listening-in to the B.B.C.'s broadcast programmes?

Consider the advantages accruing to the use of a crystal set of average ordinary design. In the first place, the set is simplicity itself to operate and to control. There are no critical tuning adjustments to be made, no fragile and expensive valve filaments to burn out, or to wear out. So far as the price of scientific apparatus in general goes, the cost of an efficient crystal set is extremely low; and, added to this, we have the fact that the upkeep expenses of such an instrument are practically nil, the only probable expense of upkeep being that concerned with the purchasing of a new crystal at very infrequent intervals.

It seems to me, however, that the critics of the crystal set, in quite a praiseworthy desire for further radio advancement, lose sight of the above elementary facts, and consequently they condemn the crystal receiver as a trivial and a played-out toy. So far from being a toy, however, any crystal receiver which works, no matter if it be constructed out of a few odd bits of wire and a bent pin, is quite as scientific an instrument as the latest thing in superhets; and, in the bargain, is far more serviceable to the average man than any ultra-modern valve receiver.

Not only is the crystal set the poor man's radio instrument—it is also a tolerably ideal form of receiver for the purely non-technical listener—that is to say, for the individual who takes absolutely no technical interest in wireless apart from the mere listening to the broadcast programmes. To call the crystal set, therefore, a played-out form of radio receiver is simply a matter of flying from the face of actual fact. For the purpose of giving untold pleasure, entertainment, and instruction to the average non-technical individual, the humble crystal set constitutes one of the most remarkably satisfactory and effective inventions of all time.

Not Easily Displaced.

The crystal set may perhaps be the Cinderella of wireless instruments, but in nearly every instance it fulfils its allotted purpose excellently and, unless some entirely revolutionary radio receiving device is brought out, we may safely say that many

An elaborate form of crystal receiver providing for the use of many different circuits.

years, indeed, will have to elapse before crystal reception as a simple, reliable, and totally inexpensive method of obtaining radio broadcast from a nearby station is displaced from the well-deserved basis of popularity upon which it now rests.

A FOUR-ELECTRODE HALE.

The Editor, POPULAR WIRELESS.

Dear Sir,—I thought that it might interest your readers to know that I have been using the "Hale" one-valve circuit for some time now, employing an Osram D.E.7 four-electrode valve.

The following figures may be of interest:

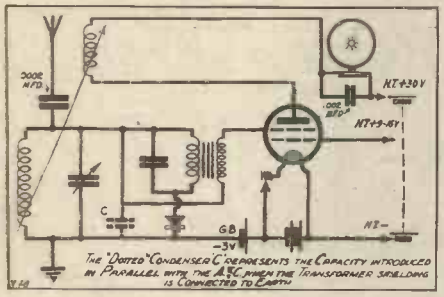
Plate volts, 30 positive; outer grid volts, 3 negative; inner grid volts, 9–16 positive.

My aerial and earth systems call for no comment being reasonably efficient.

I can confidently recommend this circuit to other four-electrode valve users, the results being audibly better than those obtained by substituting a G.P. valve of reputable make, having an impedance of 20,000 ohms with an amplification factor of 7.

The local station (relay), which is two miles away, comes in on my Brown Gramophone attachment at good loud-speaker strength, whilst on the 'phones a number of other B.B.C. stations may be tuned in without difficulty.

I am using a Ferranti A.F.3 transformer, and unlike



Mr. Aldis, whose letters appear in the March 23th number of "P.W.," I get good results with the casing connected to earth.

On disconnecting the casing from earth and insulating it, the setting of my ·0003 square-law A.T.C. is increased by about 32 degrees. This effect seems to be due to the elimination of the capacity between the casing and the windings, which is, of course, in parallel with the A.T.C.

The coupling of the reaction coil to the A.T.I. must be tighter when the casing is earthed, but when this and necessary retuning have been effected I find no noticeable difference in either volume or purity (both of which are excellent) between the two arrangements.

Wishing you a continuance of your present remarkable and deserved success,

Yours faithfully,
J. P. BANNERMAN.

11, Strathearn Place, Edinburgh.

A CORRESPONDENT'S CORRECTION.

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to my circuit published in the issue of April 2nd, 1927, of POPULAR WIRELESS, I beg to inform you that a misprint has occurred in the circuit, the earth being shown connected to the plate of the detector valve. It should, however, go to the reaction coil-transformer connection.

Yours faithfully,
G. L. WATKINS.

"Edenhurst," Bishops Road,
Whitchurch, Glam.

TOO MUCH BACH.

The Editor, POPULAR WIRELESS.

Dear Sir,—B.B.C. PROGRAMMES.—I have long endured your remarks in silence, but must now write to protest against the ghastly rot that you would fain have the B.B.C. inflict on its unfortunate subscribers. I loathe jazz, and cannot endure the so-called "entertainers," and want to have plenty of talks and classical music, so long as it is not Bach. I have to put up with a lot of stuff that I do not want, but it seems that the B.B.C. is only trying to be fair all round.

FILADYNE CIRCUIT.—I have rigged up the circuit as shown in Fig. 8, on January 22nd, omitting reaction altogether, and cannot speak too highly of the result. The quality seems absolutely as good as a crystal. But the big coils are very cumbersome. I tried Igranic in their place, and did not notice any difference.

HALE CIRCUIT.—All attempts to work any form of reflex circuit in this flat had been drowned by the A.C. hum from the electric light mains. The Hale pays no attention to them at all! My first attempt, with an R.I. transformer, and a later attempt with a Lissen transformer, left nothing to be desired. But between these two I hit a bad patch. Signals were very weak, and negative grid bias only made things worse. In fact, the signals came best with three volts positive bias. Leaving everything else as it stood, I simply changed the transformer, and all went merry as a marriage-bell. But with a Croix transformer I could get better results when the crystal was disconnected. As I tried two different

CORRESPONDENCE.

Letters from readers discussing interesting and topical wireless events, or recording unusual experiences, are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—Editor.

specimens of this make (which had given perfect satisfaction in a "straight" circuit), I can only conclude that there are transformers which the Hale will not tolerate.

Yours faithfully,
W. H. THOMPSON.

25/3, Cleveland Square, W.2.

POOR B.B.C. STATIONS?

The Editor, POPULAR WIRELESS.

Dear Sir,—I should like to answer Mr. Donnelly's letter published in a recent issue of your valuable paper.

I think that your correspondent really suffers from an inefficient receiver. Dublin and the other stations that he mentions should be quite easily received free of Belfast with a modern four-valver. And I would suggest that he uses two stages of H.F., detector, and one stage of L.F., if correctly designed, would give him excellent selectivity and somewhere about 30 stations on his loud speaker.

With reference to Daventry's strength, it is no unusual thing for distant stations to be stronger than those nearer to the receiving station. This is due to reflection. The attack upon the poor old B.B.C. is rather uncalled for. As an ex-member of the engineering staff, I can honestly say that everything is done to give the listener good reception. I think that your correspondent would be a little surprised if he knew the number of hours that the engineers put in in pursuit of perfection.

Yours faithfully,
"Ex-B.B.C."

A COMMON FAULT.

The Editor, POPULAR WIRELESS.

Dear Sir,—Re the letter of H. C. D. (Dublin), in a recent "P.W.", who can only get the local station at medium strength and cannot get his set to oscillate.

I am a wireless beginner, and had the same complaint in a "straight" 2-valver I made up. I very soon cured it by taking a yard or two off my aerial which, I found, was far too long.

Yours faithfully,
THOMAS J. PARRY.

7, Regent Road,
Wallasey, Cheshire.

RE "KING OF THE AIR."

The Editor, POPULAR WIRELESS.

Dear Sir,—It has rather surprised me that no reports have been published by you on the above receiver. I constructed the same soon after it was published, and I am enclosing a photograph which perhaps you might care to use, the cabinet and set being constructed exactly as Mr. Harris's instructions.

Mr. A. E. Manley's "King of the Air."

It is everything that Mr. Harris claims and I am more than delighted with it. I will not bother you with the number of stations received, but again thank you for bringing before my notice such a splendid set.

Yours faithfully,
A. E. MANLEY.

53, Kempe Road, Kensal Rise, N.W.6.

RECEPTION OF FOREIGN STATIONS.

The Editor, POPULAR WIRELESS.

Dear Sir,—May I, through the medium of your columns, be allowed to congratulate certain foreign stations, such as Vienna, Prague, Brunn, Hamburg, Breslau, Naples and Leipzig upon their programmes? True, Prague seems over-modulated, and there is a lot of unintelligible "talk" in all of them, but it is better than nothing.

Save for two or three days in the year, nothing save a faint wail of a carrier-wave from 5 X X comes through from old England, and it is not the fault of the set. Certainly the foreigners are ahead of us—at any rate, as regards Suez reception. Vienna, Naples, and Prague come through fairly regularly about 9 p.m. (7 p.m. G.M.T.), and the former has been received at 5.15 p.m. (3.15 p.m. G.M.T.).

I await patiently the advent of a bit more juice in British transmissions, they are only three hundred miles or so farther away. What is that in two thousand three hundred?

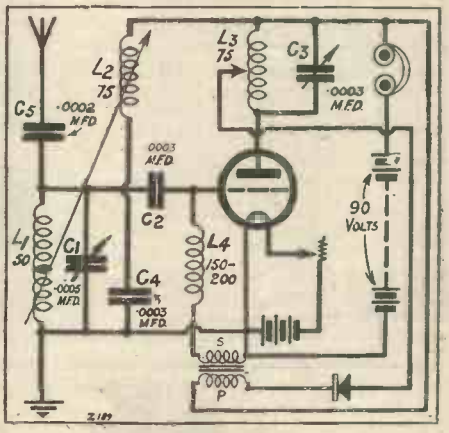
Yours faithfully,
C. W. TAYLOR.

The Anglo-Egyptian Oilfields, Ltd.,
The Refinery, Suez, Egypt.

INTERESTING REFLEX CIRCUIT.

The Editor, POPULAR WIRELESS.

Dear Sir,—I think the following circuit might prove of interest to readers. It is a reflex with modifications, and gives great volume from the local station 15 miles away, enough to work a loud



speaker comfortably, I should think. Unlike many reflex sets it is very good for distance work.

The set is quite selective, this being achieved by a series condenser in the aerial circuit, a small aerial, and a crystal tapping on the anode coil. Ninety volts or thereabouts H.T. should be used, and the method of L.T. connection affects DX results—a vernier rheostat should be used for best results. The choke coil L4 can be any value between 150 and 250. L2 can be fixed and C4 variable, but the method shown is just as good. No 'phone condenser is used. L.F. transformer being a Croix 5–1. There is no definite rules for transformer connections, the best being those giving freest oscillation (smooth).

Many foreigners are received at very good 'phone strength after dark, and most of the B.B.C. stations have been received—a great deal due to the smooth reaction. Hoping I have not wasted too much of your space and wishing continued success to "P.W."

Yours sincerely,
C. B. COXALL.

"Inglenook," Nightingale Road,
Hampton, Middlesex.

SCREENING AND ALL-METAL CABINETS.

The Editor, POPULAR WIRELESS.

Dear Sir,—Now that screening is so extensively employed in wireless receivers it is rather difficult to understand why it has not so far occurred to any enterprising manufacturer to produce cabinets for sets, constructed entirely of metal, the necessary panel insulation, and that of the familiar terminal strip, being obtained by the use of a minimum of ebonite. I can think of few things more beautiful than a large wireless cabinet of solid brass, with an oxydised silver or copper finish, which would then probably harmonise with the door furniture, electric light fittings, chandeliers, etc., which are favoured in the modern home. Or what could look nicer in a more ornate apartment than a metal cabinet finished in old gold lacquer? Each individual H.F. section in the receiver would of course consist of a separate compartment, thus doing away with the need for separate "high-loss" coil screens, and making for increased efficiency. Cannot you do something to persuade the manufacturers to produce one or two samples?

Yours faithfully,
REGD. C. BONNER.

5, Pleasant Terrace
Ashtead.

RADIOTORIAL

All Editorial Communications to be addressed to The Editor, POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts and photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All enquiries concerning advertising rates, etc., to be addressed to the Sole Agents: Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

As much of the information given in the columns of this paper concerns the most recent developments in the Radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

Readers' letters dealing with patent questions, if sent to the Editor, will be forwarded to our own patent advisers, where every facility and help will be afforded to readers. The envelope should be clearly marked: "Patent advice."

Questions and Answers

POSITIVE AND NEGATIVE.

"HOME-MADE H.T." (Petersfield, Hants.).—"I am going to make up a 48-volt H.T. battery from dry cells. How many flash-lamp batteries shall I require, and which is the positive connection in this type of cell?"

The voltage of the ordinary flash-lamp dry cell is 4½, so 10 of these will give you 45 volts, or eleven 49½ volts.

The long strip is the negative pole, and the short one the positive.

SPACING OF WIRING.

J. F. E. (Frinton-on-Sea, Essex).—"My 'P.W.' One Valver has been giving excellent long-distance results, so I am going to add an L.F. valve, rebuilding the two into a new case. I am told that good spacing is important. Does this apply to all wires, or should some be spaced more carefully than others?"

It is necessary to pay greater attention to the spacing of wires carrying H.F. currents than to those with L.F. only.

In your new set the principal H.F. wiring will be from the aerial terminal to the grid (via grid condenser, etc.), the aerial coil and condenser leads, and the reaction coil leads.

Keep all these wires spaced well apart, and remember also that in all valve receivers, whether H.F. or L.F. currents are being dealt with, it is important to keep the wiring of the grid-circuits well separated from the wiring of plate circuits, in order to avoid unwanted inter-action between these two.

CRACKLING NOISE.

F. S. (Coventry.)—"My Det. and 2 L.F. set has suddenly developed a fault which takes the form of loud crackling noises when the panel is tapped, and silence at other times. What is the cause?"

Probably one of the H.T. leads has become detached from its terminal or joint.

Disconnect all the batteries and look inside the set, testing each wire with a light pressure to ascertain if all the connections are sound. Probably you will find that one lead has come right off, but is so near to its terminal or other connection that tapping the panel causes it to swing back into place for a moment, giving rise to the crackling noises.

When this faulty connection has been repaired the set should become normal again.

(*Continued on page* 398.)

Traders and manufacturers are invited to submit wireless sets and components to the "P.W." Technical Dept. for test. All tests are carried out with strict impartiality in the "P.W." test-room under the supervision of the Technical Editor, and the general reader is asked to note that this weekly article is also intended to provide a reliable and unbiased guide as to what to buy and what to avoid.—EDITOR.

"PIRTOID" TUBING.

CONSTRUCTORS will welcome the news that Messrs. H. Clarke & Co., of Manchester, are producing a tubing in various diameters which is most suitable for winding solenoid coils, H.F. transformers, etc. Although it is quite a light, fairly thin material, "Pirtoid" has considerable mechanical strength. As readers will remember, this material was successfully used in the "R.7" Crystal Set which was recently described in "P.W."

TWO NEW MULLARD VALVES.

The increasing popularity of the resistance-capacity coupling method of L.F. amplification has resulted in the production of a large number of valves specially designed for this sort of work. Among the latest arrivals are two new Mullard valves, the P.M.1A and the P.M.3A. The characteristics of the P.M.1A are as follow:

Fil. volts, 1·8–2; fil. amps, 0·1; amplification factor, 36; impedance, 72,000 ohms. Price, 14s.

It is an excellent little valve and operates very well in R.C. stages. It also makes a good detector, and it appears to be most suitable for some H.F. stages. As will be observed, it is of a most economical nature, consuming but a fifth or so of a watt of L.T. power. A high amplification valve of this sort helps to considerably increase the magnifying properties of a stage of R.C., but amateurs should be careful to avoid that overloading which can so easily happen especially when two or more stages of R.C. are employed. One valve such as the P.M.1A is really quite sufficient. The succeeding valve should preferably be one of those having an amplification factor of about 20, the output (last) valve being of the power type.

The P.M.3A is a similar R.C. type of valve, but comes in the 4-volt class. Its characteristics are:

Fil. volts, 4; fil. amps, 0·1; amplification factor, 35; impedance, 63,000 ohms. Price, 14s.

The impedance is really quite reasonable considering the high amplification factor, and the P.M.3A is another economical valve in respect of filament current consumption. It gives excellent results, more especially in a detector position preceding a stage of R.C. amplification. Similarly to the P.M.1A it can also be used successfully as an H.F. amplifier, more especially in tuned anode stages, where its magnification and the selectivity resulting from its fairly high impedance are most marked.

In conclusion, we congratulate Messrs. Mullard on the latest additions to their extensive range. One of their greatest triumphs is the really "dull" filaments they employ throughout the P.M. range. The result of such low temperature running is a considerable increase in filament life and in robustness.

TWO NEW EDISWAN VALVES.

Ediswan E.S.5 (H.F.). Fil. volts, 5; fil. amps., 0·1; impedance, 30,000 ohms; amplification factor, 20. Price, 14s.

These new Ediswan valves are of rather unique design. They each employ two grids and two filaments. These are, of course, connected together inside the valve. It is claimed that this method enables a more efficient control of the filament emission to be obtained. The E.S.5 (H.F.), the characteristics of which are given above, should prove a very popular valve, for, as its characteristics suggest, and as we found on test, it can be employed in many very useful ways. For instance, where difficulty is found in getting two high amplification valves to work together in a resistance-coupled amplifier, the second could be replaced with advantage by an E.S.5. This we have actually found to be the case in practice, although some of the devotees of "high mu's" might consider it an inefficient compromise!

In many H.F. stages we found the E.S.5 to be a most excellent valve. We tested it in neutralised circuits, in straightforward tuned anode hookups, and in the detector position of several sets, and in every case it gave very good results indeed. We prefer the E.S.5 throughout in R.C. amplifiers to many valves. It is undoubtedly the best Ediswan valve that has been introduced for some time, and is a valve which should give considerable satisfaction and gain considerable popularity.

E.S.5 (L.F.). Fil. volts, 5; fil. amps., 0·1; impedance, 10,000 ohms; amplification factor, 7. Price, 14s.

This also is a good valve, but its usefulness is a little more restricted than the H.F. type. As a straightforward L.F. valve it is well up to standard—in fact, it gives results above the average in our opinion, but, of course, it cannot cope with very heavy inputs, while it should only be used in detective stages preceding transformers or chokes. But we did find it work well in a reflex hook-up, although such are now not quite as popular as they were once upon a time.

Messrs. Ediswan's have now completed their range of economical 6-volters (the well-known P.V.5 is a 6-volter power valve), and, although rather late in the field, they should not find it difficult to hold their own. By the way, although all three Ediswans are rated at 5 volts and operate efficiently at this, they do not appear to suffer when run directly off a 6-volt accumulator.

TUNGSTONE "NO SULPHATION" FOLDER.

The Tungstone accumulator people have issued a Folder on the subject of "No Sulphation." It refers specifically to the Tungstone accumulator, but nevertheless contains a great deal of valuable information of a general interest.

LOGARITHMIC VARIABLE CONDENSERS.

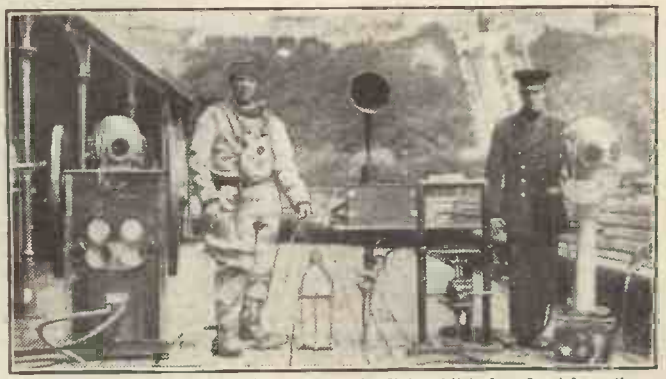
Regarding a paragraph describing a variable condenser, which recently appeared in these columns, two of our advertisers have pointed out that the logarithmic compromise between square law and S.L.F. designs is by no means new, and that they themselves adopted it some time ago.

As a matter of fact we knew that the principle was not original and that American variables had been built on these lines, but we must admit that we thought the scheme was quite new to this country. Messrs. Bowyer-Lowe write:

"We realised long since that the square law condenser as such did not give a straight line wave-length curve when used in the average circuit, and although we called our condenser square law it is really a corrected square law and is constructed to give the capacity curve of a logarithmic character. The prices of our ·0003 and ·0005 are 10s. and 10s. 6d. each respectively."

FOR WET H.T. BATTERIES.

The Wet H.T. Battery Co., 12, Brownlow St., High Holborn, W.C.1, recently sent us samples of their latest zincs for wet H.T. batteries. They are almost tubular, and thus provide large working surfaces, which is a very great advantage. On each a long tag carries two holes, one to facilitate the connection to the carbon cap of the next cell, and the other to take the wander plug used for tapping purposes. The zinc is one clean stamping and is an improvement on any other we have seen to date.



Captain Lawson Smith about to descend in diving kit to broadcast from the bottom of the sea. Messrs. Ferranti, when sending this interesting photo, informed us that one of their A.F.3 L.F. transformers was used in the amplifying apparatus.

NOTICE — WE ARE OPEN

EVERY DAY 9.30 to 7.45
SATURDAY 9.30 to 8.45
— SUNDAY 11 to 1 —
ALWAYS OPEN 11 to 1 HOLIDAYS

SO DON'T WORRY IF YOUR VALVES BREAK or your Batteries give out, WE HAVE PLENTY MORE

LONDON'S LEADING WIRELESS STORE

WHEN YOU ARE TIRED OF TRAMPING ABOUT TRYING TO GET THE GOODS YOU REQUIRE CALL HERE. WE HAVE THEM!

MULLARD P.M. VALVES.

For 2-volt accumulator.
P.M.1 H.F., 0·1 amp., 14/-
P.M.1 L.F., 0·1 amp., 14/-
*P.M.1A (Resist Capacity) 0·1 amp. 14/-
P.M.2 (Power) 0·15 amp. 18/6

For 4-volt accumulator or 3 dry cells.
P.M.3 (General Purpose) 0·1 amp. 14/-
*P.M.3A (Resist Capacity) 0·1 amp. 14/-
P.M.4 (Power) 0·1 amp. 18/6

For 6-volt accumulator or 4 dry cells.
P.M.5X (General Purpose) 0·1 amp. 14/-
*P.M.5B (Resist Capacity) 0·1 amp. 14/-
P.M.6 (Power) 0·1 amp. 18/6

Super power valves for last L.F. Stage.
P.M.254 (4-volts, 0·25 amp. 22/6
P.M.256 (6 volts, 0·25 amp. 22/6

B.T.H. VALVES

B5H, H.F. for 4 v. 14/-
B5, Det., ... 14/-
B6, Power L.F. ... 18/6
For 6-volt.
B4H, H.F. and Det. 14/-
B4, Power L.F. ... 18/6
B8, for R.C.C. coupling 14/-
Bu ... ... 22'6

EDISWAN.

2-v. R.C.2, 14/-; P.v.2, 18/6. 4-v. G.P.4, 14/-; P.v.4, 18/6.

MARCONI.

2-v. D.E.2 H.F. and L.F., 14/-; D.E.P.215, 18/6.
4-v. D.E.3 ·06, 14/-; 3B, 14/-; D.E.4, 18/6.
4-v., D.E.H. 410, 14/-; D.E.L. 410, 14/-; D.E.P. 410, 18/6.
6-v. D.E.5, 18/6; 5A, 22/6; 5B, 18/6; D.E.8 H.F. and L.F., 18/6; D.E.H.612, 14/-; L.612, 14/-.

S.T. VALVES

S.T. 21 (H.F.) 0·1 amp. 2-v. 14/-
S.T. 22 (L.F. and Det.) 0·1 amp. 2-v. 14/-
S.T. 23 (Power) 0·15 amp. 2-v. 18/6
S.T. 41 (H.F. and Det.) 0·1 amp., 4-v. ... 14/-
S.T. 42 (Power) 0·1 amp. 4-v. 18/6
S.T. 43 (Super Power) 0·25 amp., 4-v. 22/6
S.T. 61A (Res.-Cap.) 0·1 amp. Amplification 40 4-v. 14/-
S.T. 61B (H.F. and Det.) 0·1 amp., 6-v. ... 14/-
S.T. 62 (Power) 0·1 amp. 6-v. 18/6
S.T. 63 (Super Power) 0·25 amp., 6-v. 22/6

COSMOS.

2-v. S.P. 18B, 18G, 18R, each 14/-; S.P. 18RR, 18/6. 6-v. S.P. 55B, 55R, ea. 18/6.

COSSOR VALVES.

In 4 types and 3 voltages:

2-volt: 210 H.F. (Red Band), for H.F. use, 14/-; 210 Det. or L.F. (Black Band), for Detector or L.F. use, 14/-; 210 R.C. (Blue Band), Resistance or Choke Coupling, 14/-; 215 P Stentor Two-Power Valve, 18/6.
4-volt: 410 H.F. or Det. (Red Band), for H.F. or Detector use, 14/-; 410 R.C. (Blue Band), for Resistance or Choke Coupling, 14/-; 410 L.F. (Black Band) First L.F. Stage, 14/-; 410 P (Stentor Four) Super Power Valve, 18/6.
6-volt: 610 H.F. or Det. (Red Band), for H.F. or Detector use, 14/-; 610 R.C. (Blue Band), for Resistance or Choke Coupling, 14/-; 610 L.F. (Black Band) First L.F. Stage, 14/-; 610 P. (Stentor Six) Super Power Valve, 22/6.
All above valves consume .1 amp. except 215 P., which takes .15 amps.

THE NEW No. 3 ORMOND S.L.F. CONDENSER

·00025..5/6 ·00035..5/9 ·0005..6/-

All with 4 in. Ormond Dial.

ORMOND. Square Law Low-Loss. ·0005, 9/6; ·0003, 8/6; (1/6 each less no vernier); Friction Geared, ·0005, 15/-; ·0003, 14/6; ·00025, 13/6. Straight Line Frequency Friction Geared, ·0005, 20/-; ·00035, 19/6. S.L.F., ·0005, 12/-; ·00035, 11/-. SQ. LAW LOW-LOSS DUAL, ·0005, 16/- each. Ormond Friction Dial, 10/-. Filament Rheostats, Dual, 2/6; 6 ohms or 30 ohms, 2/-. Potentiometer, 400 ohms, 2/6. Standard, ·0005, 5/-; ·0001, Reaction, 4/-; Air Dielectric, 2/-; Neutralising, 4/-; Neutrodyne, 2/-. Twin Gang, ·0005, 32/-; Triple, 40/.

DX COILS

Used on P.W. 14-valve Super-het. 25 1/-, 35 1/2, 40 1/3, 50 1/4, 60 1/5, 75 1/6, 100 1/8, 150 2/-, 175 2/2, 200 2/4, 250 2/6, 300 2/9.
CENTRE TAPPED, 6d. EXTRA.
The most efficient winding. The *only* multi-layer coil wound without a former. Min. capacity & H.F. losses. *DX Coils made under Burndept License Patent No.* 168249.

OUR NOTED 1-VALVE (L.F.) & CRYSTAL SET

In Solid Polished Cabinet.
COMPLETE WITH LION MICRO DETECTOR.
SET only 22/6 Carr. 1/-.
Or complete with valves, phones, H.T. and L.T. Units, Aerial Equipment, Daventry Coil. **45/11**
Extraordinary value. Post 2/-

K. RAYMOND 27 & 28a, LISLE ST., LEICESTER SQUARE, W.C.2

Back of Daly's Theatre. Tube, Leicester Square. 'Phone: Gerrard 4637.

SETS OF COMPONENT PARTS

SCOTT-TAGGART 1927

ELSTREE SOLODYNE 3

(on Loud Speaker 25 S.W. Stations, 3 L.W.)

Twin gang ·0005 Ormond, 40/-; Sq. Law ·0003 J.B., 6/9; Ferranti A.F.3, 25/-; 3 Lotus V.H.C., 7/6; Two 6-pin Bases, 5/6; T.C.C. ·0003, and Dub. Grid Leak, 2-meg., 5/6; 3 fixed Resistors, 7/6; 3 Mansbridge 2 mfd. T.C.C., 14/-; Neutralizing Condenser, 5/-; S.M. Indiagraph Dial, 7/6; Knob and Dial for reaction, 1/-; Terminal Strip, fitted with named Terminals, 3/6; Glazite, or 16 sq. wire, 2/4; Aluminium sheet, 6½ by 4½, 1/-; 1 S.C.S.F.C. Jack, 2/6; Varley Choke, 9/6. (*NOTE.—This is not mentioned in list of components, but you will find it incorporated in blue prints and photograph.*) Total price, £7 3s. 6d. Despatched carriage paid for the inclusive sum of £6 6s.

RADIANO "THREE" (*March, '27, Wireless Constructor*). All parts as specified with Terminals. 2 Ormond S.L. Variables with friction gear, 29/6; 3 Coil Sockets, 5/3; T.C.C. ·0003 and Clips and 2-meg. Leak, 5/10; 3 Benjamin Valve Holders, 8/3; 3 Fixed Resistors and Bases, 7/6; On and Off Switch, 1/6; Gecophone 1st Stage L.F., 24/-; Brandes 2nd Stage L.F., 17/6; Engraved Strip, with Terminals and Nuts, 3/6; 2 B.L. Terminals for Front Panel, 1/6; ½ Gross Pinch-on Spades, 1/-; Quantity Rubber Flex, 6d. Total, £5 5 10. Post free for £4 12 6 nett.

2-VALVE REINARTZ DET. and L.F. (*P.W. Blue Print, '25*). 2 B.B. Coil Stands, 2/-; ·0003 and Grid Leak, 2/-; 2 Anti-Micro Valve Holders, 4/-; Varley H.F. Choke, 9/6; 1 Igranic L.F., 16/-; ·005 and ·001, Fixed, 2/6; 9 Terminals, 1/-; ·0005 and ·0003 Variable Sq. Law, with Knob and Dial, 10/-; Angle Brackets, Wire, Screws, and Transfers, 2/-. Total, 49/-. Post free for 44/- nett.

"A.W." BALLOT 3 (*J. H. Reyner, A.M.I.R.E., 19/2/27*). Original parts. Ormond, ·0005 S.L.F., 1 S.M. Dial; Ormond P.M. Vernier; 15 ohms Igr. Res.; 2-way c.o. Switch, W. & W.; Benj. c.o.; 2 C.A.V. L.F. 2 Lotus V.H.; Benj. ·0003 with leak and Choke (H.F.); 10 Terminals, Strip, Wire, Screw, etc. valve-holder; 2 Fixed Resistors, ·0001 Dubilier; R.I. List total, £4 15 0. Sent post free for 85/-. Second Selection, 65/-, all good components.

EDISWAN R.C. THREESOME. Set of Parts: 2 Ediswan R.C. units, 7/- each; 1 Ediswan P.V.2 Valve, 18/6; 2 Ediswan R.C.2 ditto, 14/-; 3 Lotus V.H. at 2/6; 3 Fil. Rheostats at 2/6; 9-v. Grid Bias, 2/-; Lotus 2-way L.H., 7/-; ·0005 Tuning Condenser, 6/11. The lot, post free, £3 19 6. (List price, 91/5. With cheaper (but good) rheostats, valve-holder and 2-way, 69/6.

COMPONENTS FOR M.C.4 (A.W.).

2 Cyldon logarithmic ·0005, £1 11s.; Peto-Scott Screen and Base, 9/6; 1 Six-pin Base and Terminals, 2/9; M.C. Aerial Coil and H.F. Transformer, 10/6; 2 R.I. Multi Ratio L.F., £2 10s.; 4 Lotus Valve Holders, 10/-; 3 Fixed Resistors to suit valves, 4/6; 1 ·0001 Reaction, 4/-; 30 ohms Igranic Pacent, 2/6; On-and-Off Switch, 1/3; Lissen B.B. Potentiometer, 1/6; 2 Panel Brackets, 1/-; 1 H.F. Choke Wearite, 6/6; ·001, ·003, ·0001 Watmel Fixed, 6/-; 13 Terminals (marked), 5/-; ·0003 T.C.C. S/P, with clips, 2/6. Total list, £7 12s. 6d. Sent post free, £6 13s. 6d.

PARTS FOR NELSON P.M. (as specified by Author). 4 A.M. Valve Holders, 2 Coil Holders Variable Condensers, 2 ·0005, 1 ·0003 S.L.F., with 4" Dial, Gambrell Neutrovernia, Mullard 100,000 ohm Anode and Clips, all Fixed Condensers and Leaks. Mullard Everest 100,000 and Stand, R.I. or Varley Choke. B.T.H. Transformer. P/P. Switch, Fil. Rheo., Split Primary H.F. Transformer, with 6-pin base, 2 aerial coils, centre-tapped secondary coils. Post free, £6 10 0.

MODERN WIRELESS

ELSTREE SOLODYNE 5

BE SURE IT IS THE CORRECT ONE, AND NOT A SO-CALLED "SOLODYNE" MADE UP OF LOW PRICED OR INFERIOR PARTS.

1 Bowyer-Lowe Triple Gang Three ·0005, £3 10s.; 1 Bowyer-Lowe Popular ·0003, 10/6; 3 Coil Screens and Bases, at 12/-, £1 16s.; 2 S.P. H.F. Transformers, at 10/-; 1 aerial, 6/-, £1 6s.; 2 B.T.H. L.F. Transformers, 4—1, 2—1 at 17/6, £1 15s. 5 Lotus Valve Holders, at 2/6, 12/6; 5 Tempyrites, with bases, at 4/-, £1; Volume Control (Igranic), 5/6; ·0003 T.C.C. and Dubilier Grid Leak, 5/-; 3 T.C.C. 2 mfd. Mansbridge, at 4/8, 14/-; Lissen H.F. Choke (new price), 5/6; 2 Peto-Scott Neutrodyne, at 5/-, 10/-; On-and-Off Switch, at 1/6, 1/6; Screw-Cap Holder, Flash-lamp Bulb, 2 Small Knobs, 2/-; Ebonite Strip and Terminals, 3/6. Total £13 2s. Post free, £11 nett.

MONODIAL RECEIVER. Original components. ("Wireless") 4 A.P.V. Holders, 10/-; R.I. Multi L.F., 25/-; Pacent Super L.F., 24/6; H.F. Varley Choke, 9/6; Varley 250,000 ohm Resistance, 9/6; On and Off Switch, 1/6; 2 Jacks, 6/-; 4 Fixed Resistors, 10/-; 2 B.B. Neutralising, 10/-; 1 Franco Midget, 3/9; 2 ·002 Fixed, 4/-; 2 H.F. Transformers, with 6-pin base ready for use, 21/-; and TWIN GANG ORMOND CONDENSER, 32/-. Total List, £8 4 9. Sent post free, £7 7s. Slow motion dial, 5/- extra.

LODGE "N" CIRCUIT. 1 var. condenser, ·00005 (3 plate), 4/11, with knob and dial. 1 special Silvertown L.F., 21/- (essential); 9 terminals, 1/-; 2 single coil stands, 1/- each; 2-valve holders, 2/3 each; 1 rheostat, 2/-; fixed, ·0001, 1/3; 1 variable gd. leak, 2/6. Wire, screws, transfers, plugs, terminal strip. The lot post free, 32/6 net.

M.C. "THREE." "*A.W.*," *Feb. 5, '27.* 2 ·0005 Variable Condensers, Geared or with S.M. Dials, at 16/-; 2 ·004 and 1 ·001 Fixed Dubilier, at 3/-, 9/-; T.C.C. ·0003, with a 2-meg. Grid Leak, 4/10; ·0001 Ormond Reaction Condenser, 4/-; 3 Lotus Valve Holders, 7/6; 1 Varley H.F. Choke, 9/6; B.T.H. Transformer, 2-1 (L.F.), 17/6; 3 Resistors, 3/9; 2 Special Coils, ready for use, 4/-; 11 Belling Lee Terminals, 4/2; Terminal Strip, drilled, 1/-; Push-Pull, Benjamin, 1/3. Total, 98/6. Post free, 85/- nett. With cheaper condensers, valve holders, terminals and fixed condensers, 67/6.

TWELVE STATIONS IN TWENTY MINUTES!

BABY HALE. "P.W." 2/4/27. By Percy W. Harris, M.I.R.E. Original Components, as specified. Decko Switch, 1/6; Precision Potentiometer, 4/6; ·0003 and ·0005 B.L. Popular, 10/6 ea.; C.A.V. L.F., 15/-; 2 Coil Sockets, 1/4; 1 adj. resistor, Magnum, 2/6; Lotus v.h., 2/6; Lissen ·0002, 1/-; Crystal Detector Carborundum, 5/-; R.P. Choke, 7/6; Ebonite Strip, complete with Terminals, engraved, Magnum, 3/6; Wire, Screws, etc., 1/-. Total List, 66/4. Sent post free for 57/6.

"H.D.L." 3. (*P.W. 5/3/27.*) R.I. Retroactive Tuner, 39/6; R.I. Anode Unit, 25/-; Ferranti A.F.3, 25/-; ·0005 S.L.F. Geared, 16/-; ·0003 Eureka O.C. variable, 14/6; 2 Push-pull, 3/-; 2 ·0002 Fixed, 2/-; 2-meg. Leak, 1/-; 3 30 ohm Rheostats, 7/6; 3 Valve-Holders 6/9; 2 Terminal Strips complete, 3/6; G.B Battery Clips, with 2 Indicators, Wire Screws, 2'6 lot. Total, £7 4s. 3d. The lot as above post free, £6 6s.

ALL-WAVE VALVE REINARTZ. "*A.W.*," *Feb. 19, '27.* Two 4" Triohte Dials, 2 ·0003 Sq. Law Low Loss Variable Condensers, Igranic 3-Spring Jack, 'Phone Plug, Varley H.F. Choke, Lotus Valve Holder Ig. Pac. 30-ohm B.B. Rheostat, 3 Coil B.B. Sockets, ·0003, ·0001 Fixed, 4-meg. Grid Leak, Dumetohm Holder, 8 Engraved Terminals, Tinned Copper Wire. Above Lot, 36/-. Post, 1/-.
Set of Igranic Short-Wave Coils, 10/-.

LOUD SPEAKERS

C.A.V. Cone
"Musicola" ... 42/-
Celeston ... 130/-, 110/-
Mellovox (Sterling) 45/-
Radiolux (Amplion) 95/-
B.T.H. C.2 ... ... 63/-
G.E.C. (Cabinet Type) 50/-
Amplion Stocked.

ALL GOOD MAKES STOCKED

DR. NESPER

De Luxe, 4,000 ohms, 25/11; Grande de Luxe, 4,000 ohms, 35/11.

EDISON BELL COILS.

25 ...	2/6	100 ...	3/6
35 ...	2/6	150 ...	3/6
50 ...	2/6	200 ...	4/6
75 ...	3/6	250 ...	4/6
300 ...	4/6		

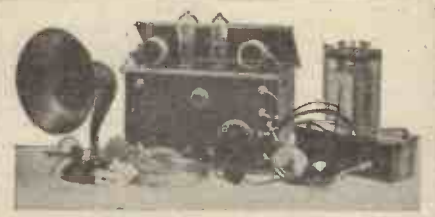
EVER-READY H.T.

Popular 66-v., 9/6; Do., 108-v., 15/6.
Latest Models.

L.F. CHOKES.

Lissen, 10/6; Success, 10/6; Pye, 12/6; Sterling, 15/-.
All New Makes Stocked.

MAGNETIC MICRO-PHONE BAR AMPLIFIER. No Valves. No Batteries. No fragile parts or distortion. Complete Amplifier, 38/-.



THIS MAGNIFICENT
TWO-VALVE SET

(D. and L.F.) as shown in Handsome American Type Cabinet, 12 by 8 Panel. Tax Paid. Complete with 2 Dull Emitter Valves, Tandco latest Coils, L.T. and H.T. Batteries, Aerial Equipment, 4-way Leads, and **LOUD SPEAKER or 2 pairs 'Phones.**

ALL PARTS ENCLOSED
£4 . 19 . 6
Carriage and Packing 5/-

SET ONLY 45/- TAX PAID

With Power and D.E. Valves, 2 Coils **59/6**

Carriage and packing, 5/-.

TESTIMONIAL.

G. A. Ross, Esq.,
21, Wharfdale Rd., N.1.,
March, 1927.

Messrs. Raymond,—I am sending this letter to tell you how pleased I am with the three 2-valve sets purchased from you. They are working in Billericay, Chiswick, and Wandsworth, and I must say the results are simply wonderful, loud-speaker reception being impossible to beat.

You may rest assured that I shall heartily recommend them to anyone whom I know is in need of a set, as there is no better value obtainable anywhere.

(*The above entirely unsolicited.*)

CARBORUNDUM.

Detector only (No. 30), 5/- Stabilising Detector Unit, with No. 30 Detector, 12/6

WIRELESS MAGAZINE "SUPER-ONE"

ONE VALVE RECEIVER
(will also work Loud Speaker)
A Wonderful Instrument

In American Type Cabinet, all parts enclosed complete with Dull Emitter Valve, 1 Pair 4,000 ohms Headphones, Tuning Coils, H.T. and L.T. Batteries, Aerial Equipment. Tax Paid. £3 3s. Post 2/6.

MAGNUM.

Newest Vibro valve-holder, with terminals and tags, 2/6; Screen and six-pin base, 12/-; Split primary Aerial coil, 6/-; H.F. Transformers, 10/- ea., Short or Long Wave (S.S., 10/-; Long Wave, 14/-); Reinartz Short Wave, 10/-, Long Wave, 14/-; Neutralising Condenser, 5/-; Single Coil Mount on Base, 1/9; Aperiodic H.F., 10/-; B.B.C or 5XX H.F Transformers, 7/- each.
New adjustable fixed Resistors, zero to 6 ohms, zero to 30 ohms, 2/6 each. Terminal Strip, engraved, with terminals, 3/6.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 392.)

INSULATED EARTH WIRE.

A. F. T. (Swansea).—"Is it necessary to insulate the earth connection, which in my case will be a lead about 5 ft. long?"

Theoretically it is better to insulate the lead up to the point where it enters the earth, but in practice it will be found that a short lead such as yours can be left uninsulated, without any ill effect.

RED HOT PLATE.

J. L. A. P. (Bradford, Yorks.).—"I have been using an H.T. Eliminator with great success so far as strength of signals goes, but recently my power-valve burnt out after only four months' use.

"Another one (of different make) only lasted six weeks, so I began to suspect the set, and then I noticed that after the set has been in use for some hours the plate of the last valve gets red and glows. Could this be caused by too much H.T.? I think it may be the case because I have to put the eliminator's full voltage across the last valve, as otherwise the set hums badly."

The fact that the plate gets hot and glows certainly indicates too much H.T., and we should not use the full tapping across the eliminator, as this may be giving 200 volts or more, according to the voltage of the mains.

The makers of the eliminator will tell you where to tap the instrument for any given voltage, if you inform them of the house-supply voltage.

Should you find that when set correctly for H.T. voltage the set hums, try inserting an extra choke into the eliminator, and/or an extra large condenser.

THE TECHNICAL QUERY DEPARTMENT

Is Your Set "Going Good"?

Perhaps some mysterious noise has appeared and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers an *unrivalled* service.

Full details, including a revised scale of charges, can be obtained direct from the Technical Query Dept., "Popular Wireless," Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do: On receipt of this an Application Form will be sent to you, free and post free, immediately. This application will place you under no obligation whatever, but having the form you will know exactly what information we require to have before us in order completely to solve your problems.

TESTING AN EARTH LEAD.

S. E. (Handsworth, Birmingham).—"My earth lead is arranged to pass under floorboards to an earth-plate, just outside the house. Owing to a new wall built since I buried the earth-lead I cannot examine it. Can it be tested to see if the connections are still sound?"

You can test whether the earth lead is making good contact with the ground by means of a flash-lamp and battery.

Get a reel of fairly stout wire, such as number 22 S.W.G., and connect one end to the nearest perfect or nearly perfect earth such as a main water-pipe or any other large buried conductor.

(*Continued on next page.*)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

Then bring the wire along to your set and connect it as follows:

The wire from the new earth is fastened to one side of a flash lamp; the other side of the flash lamp to its battery; and the other side of the flash-lamp battery to the old earth lead, which you desire to test.

If the earth connection under test is sound, a current from the battery will pass along it, through the earth itself to the large buried conductor (water-pipe, or whatever it may be), along the new wire to the lamp, and through the lamp to the battery again. This will cause the lamp to glow—possibly rather less brightly than usual if the wire lead is a long one—but the absence of any glow, even when the battery voltage is raised slightly, will indicate that there is a break in the original earth lead.

LECLANCHÉ TYPE CELLS.

"BATTERY" (Castle Cary, Somerset).—"What is a Leclanché cell made of?"

The outer jar contains a solution of ammonium chloride (sal ammoniac), and into this a zinc rod is immersed.

The porous pot that also stands in the solution contains a central rod of carbon which is surrounded by a mixture of broken carbon and black oxide of manganese (Manganese dioxide).

RESISTANCE OF WIRES.

"OHM" (Faringdon, Berks.).—"Apart from the actual material, copper, iron, etc., of which a wire is made, is it the length or the thickness of the wire that settles its resistance?"

All three of the factors mentioned have to be taken into account, the law of resistance being threefold, as outlined below.

(*a*). Resistance depends partly upon the *material*, so that two wires of exactly the same length and thickness, but made of different materials (such as copper and platinum), would have different resistances.

(*b*). Resistance is directly proportional to the *length* of the conductor. So that if either of the two wires named above were halved in length, the respective resistance would be halved also. If doubled in length, the resistance, too, would be doubled, and so on.

(*c*). The resistance is *inversely* proportional to the *thickness*, or cross-sectional area of the conductor. Thus, if one wire is of exactly the same material and length as another wire, but twice as thick, its resistance would be half. If three times as thick, the resistance would be ⅓, and so on.

Expressed as an equation

$$R = S \frac{l}{a}$$

where R is the resistance of the conductor, l its length, a its cross-sectional area, and S a factor depending upon the *material* of which the conductor is made, which is known as its specific resistance.

FILLING HOLES IN EBONITE.

F. F. (Gateshead-on-Tyne.).—"What is a good and easy method of filling up a hole in a panel? I formerly had a variable grid leak and now this is removed and a fixed one used instead, on the baseboard, the appearance of the set is rather spoiled."

One of the best fillings for a hole of this kind is ordinary shoemakers' heel-ball, especially if the panel is a shiny one. The substance is cut or rolled roughly to shape, and then warmed slightly, enough being pressed round into the edges to fill the hole. Being fairly soft, it can be smoothed into a good surface, and finally polished lightly with a cloth, the result being almost indistinguishable from the original panel.

Other good panel fillings, easily obtainable and easily worked, are Chatterton's Compound, which is used extensively by electricians, and black Glitterwax.

The latter is a compound made up and used for children's modelling, in much the same ways as Plasticine is used. Being easily softened by the heat of the hand, it can be pressed into place very quickly, and is so like ebonite that the mend is difficult to detect.

READERS' ADDRESSES.

Will the following readers, who have sent in queries with insufficient addresses, please communicate again with the Query Department?

S. C. Stevens, S. D. Ashworth, F. Bayliss, C. V. Preece, P. Flexen, S. Bryant, M. C. Ward, — Coldwell, H. C. Elliott, C. Richards, T. R. Parry, J. S. Laker, M. J. Caton, A. E. Hart, A. Moore, G. D. Aldbury, H. M. Girling, A. C. Smith, J. G. Wood, and H. Youles.

(Continued on next page.)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

PENCIL-MARKS ON PANELS.

M. K. (Harrogate).—"What is the objection to pencil-marks on panels when building up a set?"

The deposit of graphite left by a pencil-mark affords a high-resistance conductive path across the ebonite surface, and thereby impairs its insulating properties.

A NEW FILADYNE ONE-VALVER.

(Continued from page 378.)

of the H.T. battery. (This tap should be disconnected when the set is not in use.)

When you are trying out a valve in this receiver for the first time and you find that reaction is "plonky" and unstable, reduce the filament brilliancy. This always effects a cure, making reaction control quite smooth. After a little practice, the unusual method of reaction control will be readily mastered, making it easier to pick up the distant stations. Quite a number of these should be heard at good 'phone strength, provided, of course, that you have a moderately efficient aerial system.

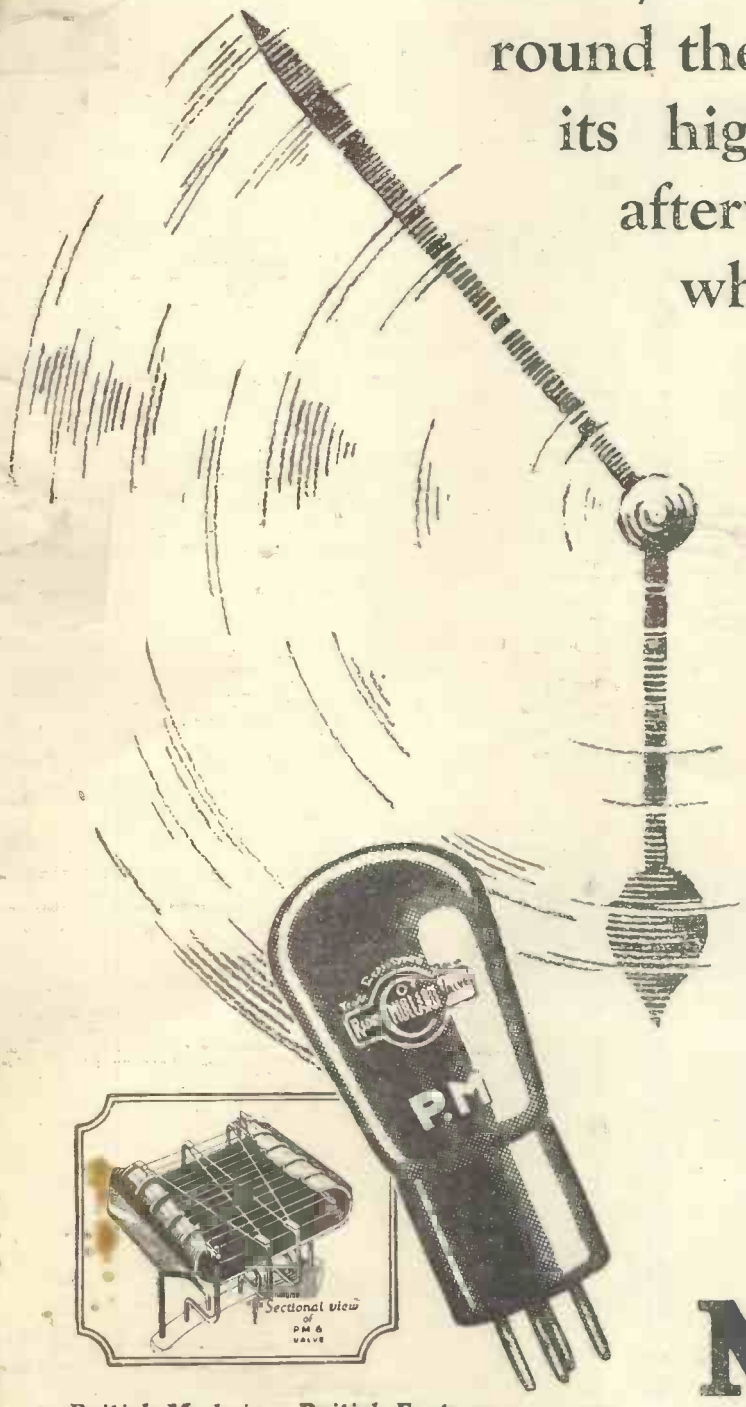
Altogether, this is one of the simplest regenerative receivers that I have yet handled, reaction control being smooth and without effect upon the tuning, while hand-capacity effects are entirely absent.

To give you some idea of the range of this receiver, I may mention that with a stage of L.F. amplification, coupled by a 6 to 1 Ideal transformer, the local station was received at very strong loud-speaker strength. With the same arrangement quite a number of Continental stations were tuned in on the loud speaker, volume being quite satisfactory. On the 'phones, stations simply poured in, one after the other, as the wave-length range of the receiver was covered.

If you should want to add an L.F. valve at any time, do not forget that the "anode" impedance of the Filadyne valve is quite low, so that you can use a high ratio transformer, thus obtaining greater amplification without loss of quality. When using this additional L.F. stage for loud-speaker reception close to the local station, it is advisable to use a power valve capable of handling the considerable input, which will in many cases be beyond the capacity of an ordinary first stage L.F valve.

The Wonderful P.M. Filament

serves you a thousand times round the clock and continues its high performance long afterwards the same as when new



Even a year's broadcasting service will not impair the original perfect results given by Mullard P.M. Valves with the wonderful P.M. Filament.

This fact was convincingly proved by the test report of the National Physical Laboratory. After 1,000 hours' rigorous life test the operating characteristics of P.M. Valves with the unique P.M. Filament were the same as before the test.

This unequalled performance is due, without question, to the gigantic emission of the P.M. Filament. Vastly increased emission from the P.M. Filament means more than long useful valve life, it secures greater sensitivity, greater volume and purer reproduction.

Enjoy the fullest possibilities of your radio receiver.

Bring in stations you have never heard before, and obtain really pure, musical reception by asking for valves that have an official Government Laboratory Test Report——

Ask for Mullard P.M. Valves with the wonderful P.M. Filament.

Mullard

THE · MASTER · VALVE

British Made in a British Factory.

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