

BROADCASTING PARLIAMENT : By Lieut.-Com. Kenworthy, R.N., M.P.

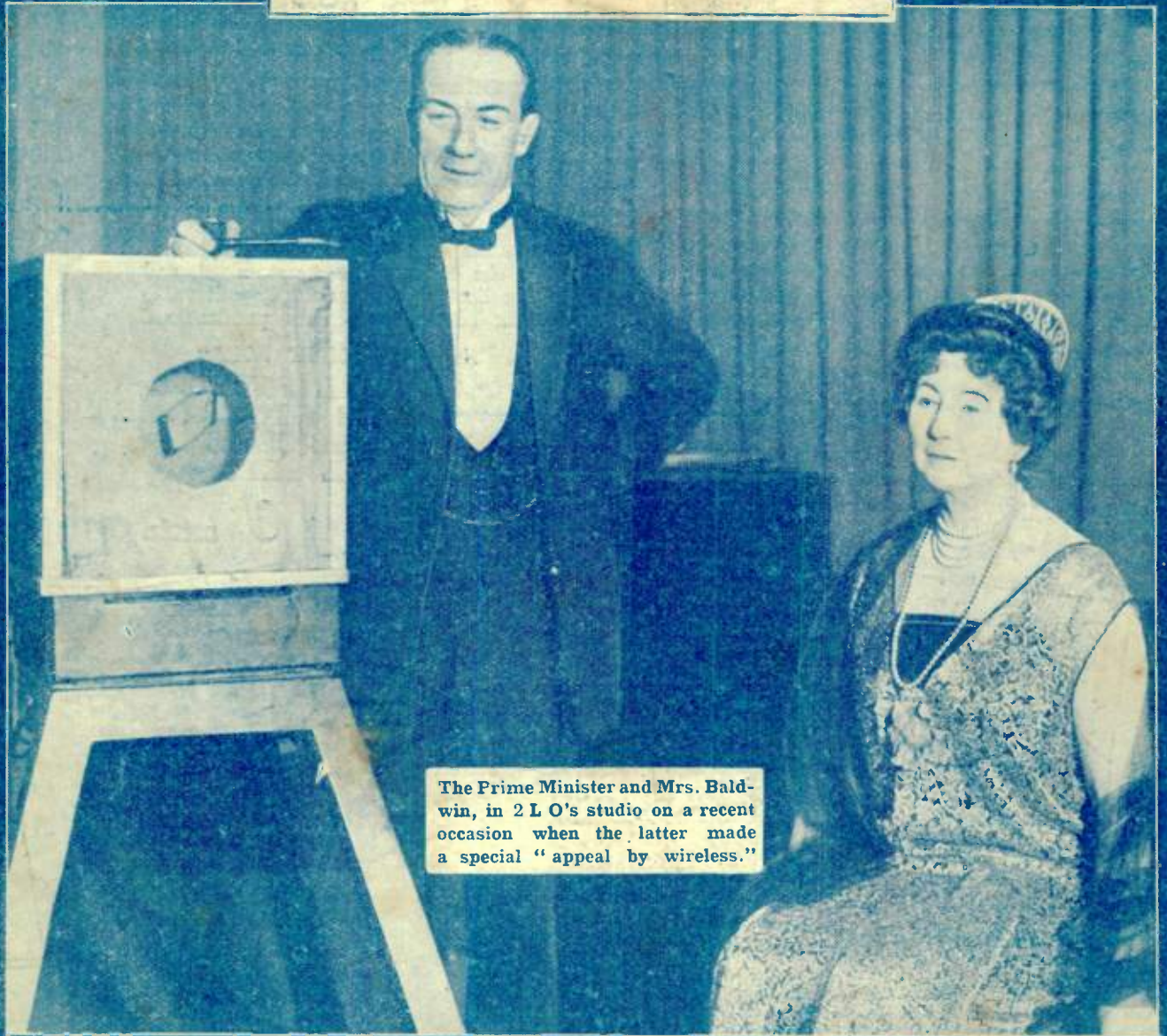
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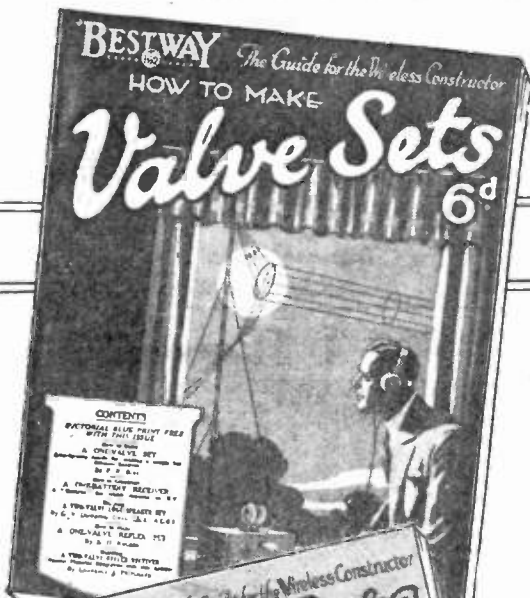
The Prime Minister and Mrs. Baldwin, in 2 L O's studio on a recent occasion when the latter made a special "appeal by wireless."

FEATURES IN THIS ISSUE.

An Efficient Perikon Detector.
 Grid Bias in L.F. Circuits.
 The Problem of Selectivity.
 Tuning Without Squeals.

A New Type of H.F. Transformer.
 Practical Hints.
 Another Broadcasting Controversy.
 Wireless Advertising.

For the Listener-in:—A New Feature.



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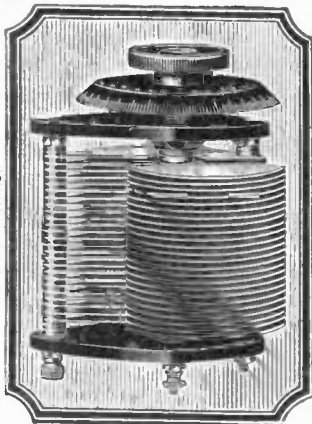
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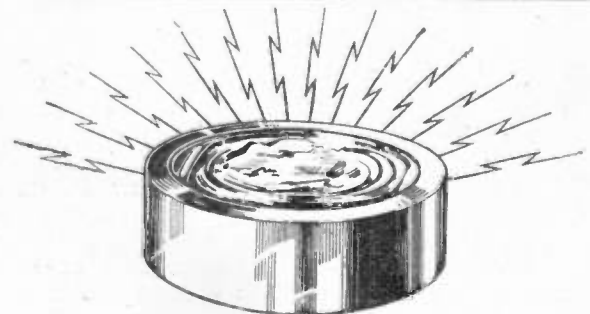
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RADIO NOTES AND NEWS.

Portable Sets—A Lucky Win—Radio Slogans—Summer Broadcasting—On 21 Metres—
The Moon Rocket—A Wireless Bomb—Changes at FL—A New Valve.

A Nice Windfall.

A WELL-KNOWN French inventor, Dr. Marius Latour, has just made a very pleasant discovery. Touring recently in America he was astonished to find that radio is a gigantic industry there, and that many of his early and almost-forgotten patents were being infringed on a huge scale. When he protested, the radio companies, to save trouble and possible loss, offered him agreements for the future, upon which he is now collecting an unexpected fortune of about £250,000.

For Inventors.

HOW can wireless be improved? A list of the most urgent requirements in the way of technical progress has been sent by the B.B.C. to the Institute of Patentees, 44, Great Russell Street, London, W.C.2. Would-be inventors can obtain free particulars from the secretary of the Institute.

Another 5 K W.

BRISBANE is now clamouring for a powerful broadcasting station of its own, and the Queensland Government has authorised the erection of a five-kilowatt transmitter there. If the present arrangements do not miscarry the station will be on the air within six months.

Where Will It End?

AN interesting point is raised by a Glasgow reader, who informs me that he has been in trouble with the Post Office over the question of licences. Apparently he has two houses—lucky man—and when the local P.O. demanded two licences he paid up accordingly. He also owns a portable set, and now the Post Office demands that he should take out a licence for this also. Naturally enough, he is wondering where it will end, and how

many licences he will need if he buys another set, or puts up another aerial.

Portable Sets.

THE whole question of licences will be thrashed out in the forthcoming Wireless Bill, but in the meantime, I

A Good Scheme.

I HEAR that the management of the Piccadilly Hotel is considering a scheme for fitting up 250 rooms and suites with wireless. 2 LO will be "laid on" permanently, and the hotel guests will be able to switch entertainment on or off just as easily as they do the electric light. The system—which has a great vogue in America—is sure to become popular here, for the concerts are always there in full strength, and once tapped, the cost of upkeep is trifling.

A Treat in Store.

WEST of England amateurs are looking forward to the forthcoming concerts on 200 metres, to be provided by the Transmitting Section of the Bristol and District Radio Society. It is probable that transmissions of one kind or another from the Society's new clubroom in Park Row will be sent out nearly every evening.

A Lucky Win.

ATTRACTED by a notice in a wireless shop window, offering £50 to anyone who could prove that the articles displayed at low prices were imitations of the genuine article, a Liverpool electrician purchased a pair of "Ericsson Continental" headphones. Finding that they were made in Germany, and believing that the genuine Ericssons were only manufactured at Stockholm, Vienna, Buda-Pest, and Prague, he claimed and was refused the reward. When the case was brought before the Liverpool court, Judge Dowdall, K.C., awarded the electrician £50 and costs.

Radio Slogans.

IT is suggested that every B.B.C. station ought to have a slogan of its own. (Continued on page 376.)



The Wireless Transmitter used to inform watchers of the Boat Race the progress made by the two boats.

understand the Post Office policy is based not on the aerial, nor set in use, but on the address. That is why you can own two sets and pay only one licence, and why portable sets—"of no fixed abode"—must have a special licence of their own. Readers in similar circumstances who cannot get satisfaction locally should write direct to the Secretary, G.P.O., London, for a ruling on their case.

NOTES AND NEWS.

(Continued from page 375.)

Instead of just a call-sign, which is meaningless and easily missed by distant listeners, why not a short sentence, characteristic of the city it comes from? The B.B.C. will welcome suggestions from listeners, and I put forward "Liverpool, Where the Liners Lie," as being a great improvement on "Liverpool, 6 L.V." Send along your own suggestions to the local station, and help to liven up those deadly dull announcements.

Summer Broadcasting.

ALTHOUGH the country will be keeping Summer Time after 2 a.m. on Sunday (April 19th), it has not been decided at the time of writing when the B.B.C. will adopt their own summer schedule. The later programmes adopted last year were very popular with listeners, and the general opinion is that this summer's time-table will follow last year's very closely, with a possible rearrangement of the hours for school-talks.

An Underground Aerial.

EXPERIMENTS with an underground aerial will shortly be carried out from 2 A Y L, the amateur station belonging to Mr. A. Ackland, "Kenwell," Walderslade, Chatham (Kent). Mr. Ackland tells me that he will be very pleased to hear from "P.W." readers who tune in to any of his test transmissions.

—On Toast?

A NEW process by which wireless signals can be "scrambled" was referred to by Dr. E. F. W. Alexanderson, of the General Electric Co., in his recent address to the American Institute of Electrical Engineers. He said that signals from different European stations could be picked up on the coast, scrambled together, and then sent inland on one wave-band by a single transmitter. At the receiving end they can be unscrambled and fed back into long-wave receivers, without showing the slightest sign of the mixing.

On 21 Metres.

VERY SHORT-WAVE tests are now being carried out on Sundays at 3 p.m. (G.M.T.), by the American amateurs 1 X A M and 1 A N A. Sent on a wave-length of twenty-one metres, these signals are intended to test the new theory of high-angle radiation in daylight.

Derby Day Stunts.

A SUGGESTION that the B.B.C. should broadcast Derby Day noises to listeners is being considered, and I hear that it is looked upon with considerable favour. Apart from the race itself there is plenty of noise at Epsom to make an interesting "stunt" programme, and I think it would prove to be one of the most entertaining hours that the B.B.C. ever gave us.

The Moon Rocket.

FURTHER details of the "Moon Rocket," to which I referred recently in these Notes, are now to hand from America.

After it has been fired at the moon, the rocket will be propelled by powerful high-explosive charges, fired automatically, which will maintain its velocity beyond the point where gravity would tend to pull it back to earth. The wireless transmitter, sending out easily recognised signals, would work for many hours, and every wireless amateur on earth would be invited to cooperate in receiving the signals.

The Aerial and "Earth."

PROFESSOR ROBERT GODDARD, of Clark University, Worcester, Mass., who proposed this fantastic projectile, has been working upon the idea for five

SHORT WAVES.

"Not even the Archangel Gabriel could draw up a programme that would satisfy all listeners-in."—Sir Harry Brittain, M.P.

"English people like to combine their enjoyments with the comfort of their home life. And with wireless alone can they do it."—Mine. Luisa Tetrizzini.

"In its very earliest stages wireless has established itself as far the cheapest entertainment ever provided, whether the broadcasting programmes are satisfactory or not."—"Newsman," writing in the "Daily News."

"It is no betrayal of confidence to say that those in authority definitely consider that the day is not far distant when cheap light, heat, and power will be transmitted over long distances by what we now know as wireless."—Professor A. M. Low, in the "Sunday Pictorial."

"It was quite clear that the Post Office does not like wireless."—Sir Alfred Mond.

"The pleasantest memory I have of last night's programme was the calm beauty and harmony of Big Ben's voice at seven o'clock."—The Radio Critic of the "Westminster Gazette."

years. He calculates that by using an insulator ring in the centre of the rocket, he can employ its metal nose as an aerial, and its steel shell as a counterpoise "earth." Whether powerful telescopes or the radio receivers would keep in touch with the rocket longest, is a point now being discussed very heatedly.

Improvements at 2 L O.

OSCILLATIONS from Oxford Street have improved tremendously since the engineers recent experiments there. In the main 2 L O's audience is much better off than before, and even the South-East Streak (which affected reception from London right down to the coast between Dover and Folkestone) is now providing reports of really good reception. Just how it was done has not been disclosed, but a double aerial, and the introduction of mast shields had a lot to do with the increase in efficiency.

Changes at F L.

I HEAR that Eiffel Tower's evening concerts are to be extended as soon as the problem of the best wave-length has been solved; 2,650 metres is unsuitable because of the Government business and international signals dealt with on that wave-length, and the recent tests on 1,500 metres left much to be desired. A special

aerial for broadcasting has been erected on the Tower, and tests on 1,980 metres are now going forward.

Parliamentary Broadcasting.

THE first experiment in Parliamentary broadcasting is already claimed by several different stations. Some weeks ago the Oslo station broadcast a debate; and now Sydney station (2 F C) claims the transmission of a complete sitting of the State Legislative Assembly as "the first experiment of the kind in the world's history." But isn't Big Ben the best example of all of a Parliamentary broadcast?

The P.M.'s Decision.

THE Prime Minister has decided to postpone the proposed Parliamentary inquiry into broadcasting, as the whole question of wireless is to come before the Commons next winter. The leaders of all parties in the House approve of this decision, so it is very unlikely that listeners will hear "House of Commons Calling" before 1926.

A Wireless Bomb.

TO counteract the pilotless aeroplane, a wireless-controlled bomb has just been invented. It is claimed that if a raid were made by a machine controlled from the ground, the bomb could be made to pursue and destroy the aeroplane, by means of a magnetic device steering it towards the invading machine. By automatically following any manoeuvres that were made, escape would be impossible.

Point-to-Point.

A RECORD in relaying has been set up by a Norfolk amateur, who recently called up the Savoy Hotel by 'phone. One of the Savoy Bands, which was playing at the time, was being broadcast from 5 X X, and this was successfully picked up and re-broadcast from America. The Norfolk listener tuned in to K D K A, and then placed his loud speaker near the telephone so that the Savoy could hear their own music, after it had travelled through London, Chelmsford, Pittsburg, and back through Norfolk to London.

A Famous Mast.

ONE of the masts from Sir Thomas Lipton's yacht, "Shamrock IV.," which raced for the America Cup in 1920, is now doing duty as a wireless mast. It has been purchased by the University of the City of New York for their new station, which will soon be "on the air" with educational talks and university extension lectures.

A New Valve.

PROFESSOR A. M. LOW tells me that he has just perfected a new valve which combines three valves in one bulb.

It includes H.F., Detector, and L.F. stages all in one, and as the preparation of the vacuum is an expensive item in the ordinary way, the new valve will effect an enormous saving in the cost of production.

ARIEL.



Broadcasting Parliament

A special article outlining a practical scheme for broadcasting speeches made in the House of Commons.
 By Lieut.-Commander The Hon. J. M. KENWORTHY, R.N., M.P.

THE Government have undertaken to set up a Select Committee for both Houses of Parliament to look into the question of broadcasting. Members of Parliament who heard the Prime Minister's recent answer to a question took it for granted that this referred to broadcasting the proceedings of Parliament. But it is not altogether certain whether the committee will not have the duty of looking into the whole question in addition. This will be made plain in due time.

I think there is little doubt that the public would like part of the proceedings of Parliament broadcast. And if the public wants it, it should have it. The people pay for Parliament and elect its representatives, and "what they say goes" in the long run. There are some old-fashioned members of both the House of Lords and the House of Commons who talk of the dignity of Parliament, but there surely can be nothing undignified in proceedings being broadcast any more than their being reported in the Press.

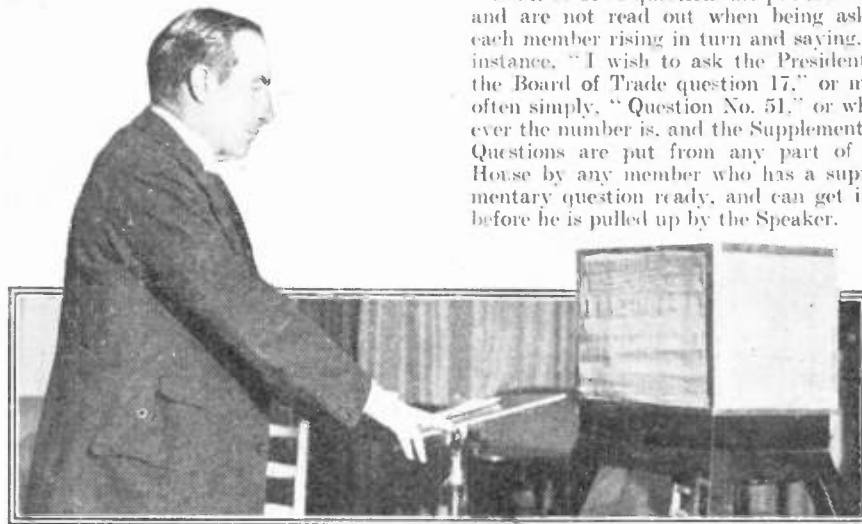
Technical Difficulties.

As a matter of fact, it is only in the last two or three hundred years that Parliament has been reported in the Press or even referred to, and the sittings used to be held behind closed doors, all strangers being rigidly excluded. Even now, any M.P. is entitled to "spy strangers," when all the public galleries have to be cleared immediately. The last occasion on which I remember this happening was when Mr. Devlin was being suspended from the House and one of his fellow-members informed the Speaker that he "spied strangers" in order to give more time to the proceedings. But the Speaker refused to see or hear him on this occasion.

As to the question of the dignity of high personages, the Prince of Wales has broadcast on many occasions, and surely this should be good enough for the most exalted amongst the Bishops, Lords, or Commons. Therefore, we may take it that this innovation will be made sooner or later, and the sooner the better. The spoken word heard by the ear is always more effective than the printed word read by the eye. Newspapers have little space for Parliamentary

proceedings these days, and the official report of the day's proceedings in Parliament, known popularly as "Hansard," costs sixpence a day, which is beyond the means of most people, and is even a tax on the majority of clubs and institutions.

Now let me first examine the question of the technical difficulties. It has been suggested that a microphone should be placed on each of the two dispatch boxes. These stand on the table at which the clerks sit



Mr. Stanley Baldwin, the Prime Minister, broadcasting an election speech from 2 L O.

between the two Front Benches, and here ministers and ex-ministers, privy councillors, lean, place their papers, or thump, according to their various styles and as the occasion demands.

But this would not do at all. It would be unfair to the 550 members who are not entitled to speak at the Box; and, after all, it is not only the Great and Good who speak from the Front Benches that the public want to hear all the time. The constituents are entitled, and naturally desire, to hear their own member occasionally.

Now, there are a certain number of corner seats on either side of the gangways that run down on each side of the House of Commons which are favourite vantage points. In practice, these seats are occupied

by certain recognised leaders, such as Mr. Lloyd George—now that he is a Back Bencher again—Sir Robert Horne, since he has left office, and so on, although it is now usual for anyone who is going to make a speech to move up to the corner seat from which to deliver it.

This is the case with the Conservative, Liberal, and Labour benches, and is a recognised convention. My suggestion is that six microphones should be installed, viz., one in each corner seat on the third bench on either side of the gangway, and one at each dispatch box. Thus, whether Front Bencher or Back Bencher, the person speaking at the time when the proceedings were being broadcast, would move nearer to the microphone.

What to Broadcast.

Now, on this committee, of which I expect to be a member, an attempt will be made only to broadcast the speeches of the Exalted, the Great, and the Good. But we may at once expect a revolt from the rank and file, who are as necessary in Parliament as in the Army, and it is hoped they will receive the support of all who believe in fair play.

We now come to the question of which part of the proceedings should be broadcast. The proceedings of Parliament start with questions at 2.45, which last till 3.45, and are very often the most interesting part of the day. It would be technically difficult to broadcast question-time, and undesirable in other ways. It would be almost impossible to follow the proceedings to begin with, unless one were present.

Some 80 or 90 questions are put each day, and are not read out when being asked, each member rising in turn and saying, for instance, "I wish to ask the President of the Board of Trade question 17," or more often simply, "Question No. 51," or whatever the number is, and the Supplementary Questions are put from any part of the House by any member who has a supplementary question ready, and can get it in before he is pulled up by the Speaker.

I think I have said enough to show that the whole atmosphere and value of question-time could not be reproduced for the benefit of listeners-in.

The main debates then begin, and usually last till 11 p.m. There are three important hours during the debate in the House of Commons. These are from four to five, from seven to eight, which is the hour before the House of Commons retires for late dinner, which takes place at 8.15; and from ten to eleven at night.

To get the best of Parliament, one of these three hours, or a portion of one of them, should be broadcast. I think it will be found that seven to eight will be the best time. Four to five is too early in the day,

(Continued on page 378.)

ANOTHER BROADCASTING CONTROVERSY. MADAME TETRAZZINI'S VIEWS.

By "ARIEL."

THE controversy about Madame Tetravzini and broadcasting which enlivened the columns of the Press a few days ago is one which has already been fully experienced in America, when McCormack gave a broadcast recital. The theatre managers in this case attributed empty houses to the counter-attraction of a "star" radio recital.

That is as it may be, but in the case of Tetravzini a statement made by her concert agents to the effect that her recent recital at the Albert Hall was a failure because she agreed to broadcast, the reader will note that the great diva herself does not blame broadcasting at all. She believes that the concert was a failure because it was badly advertised, and because the day was unsuitable and the prices of the seats too high.

Tetravzini has the courage of her convictions, and she frankly disagrees with her managers.

When I saw her again, a few days ago, on behalf of "P.W.," the unfortunate result of her Albert Hall recital had not been made the subject of newspaper gossip, but I had an interesting chat with her about broadcasting in general.

On the question of broadcasting programmes Tetravzini has certain definite views.

"What should I do if I were a programme director?" she repeated, in answer to a question I put to her.

"Ah, well, I should probably have wireless for breakfast! Why not? If people started the day with a song, they'd feel ever so much better. Yes, wireless for breakfast, certainly.

What is Wanted.

"I should have plenty of singers, for I think the singing voice comes through so well by radio. I love to sit in my villa in Rome and hear the English singers. I like the violin, too; it seems better than the piano. I have not heard many plays by radio, but they have to be very good to hold your interest from beginning to end.

"Of course, I have listened-in for hours to the British Broadcasting Company's programmes, and I think they are wonderful—probably the best in the world. But I think they are so good that they ought to start earlier. There must be thousands of women in England who would be glad to hear music in the morning as they do their work. I love to hear people singing or playing as I do my dusting.

"Reception itself is wonderful in London; but, of course, I couldn't have got much nearer to 2 L.O., could I? (Tetravzini was staying at the Savoy Hotel at the time.)

She was discreetly silent about people not paying their licence fees, but murmured something to the effect that "people were very naughty not to pay for what they enjoy." It is an open secret, of course,

that the prima donna has generously backed the wireless industry in her own country.

"What is wanted now," said Tetravzini, "is some device that will link up the wireless artiste with the listener more intimately than is the case at present.

"Every artiste sings to someone—maybe to himself—but I think before long there



Madame Tetravzini and one of the special loud-speaker sets she had installed in her apartments at the Savoy Hotel, London, during her recent visit.

BROADCASTING PARLIAMENT.

(Continued from page 377.)

and ten to eleven too late. Furthermore, four to five is nearly always occupied by one or other of the leaders or ministers, either introducing estimates or a Bill, or moving an amendment or motion.

Again, ten to eleven is very often a noisy time of the day, spirits have been worked up, and there is a good deal of post-prandial wit and horseplay, which would interfere with the listeners-in, as it certainly sometimes interferes with the orators. Seven to eight, although an important hour, is occupied by ministers and ex-ministers, and also by Back Benchers. And for these reasons, and others, I consider it should be the time chosen.

It will be obvious that as soon as it is known that broadcasting will take place at a certain hour, everyone will try to speak *then*. Politicians are only human, after all, and they think a little of the effect of their speeches in the country and on their constituents as well as on the immediate business of the day.

Ministers and ex-ministers have a right of precedence in being "called" by Mr. Speaker. But the Speaker is scrupulously fair, and is always mindful of the rights of the private member, especially of the

must be something that will tell the artiste just what the listeners are thinking of him. That will be the triumph of broadcasting.

"I think it will only be a question of months before every famous artiste in the world will be performing by radio. My people in Italy are only just beginning to realise what broadcasting means. I suppose none of us realise what it will be in ten years' time."

Her concluding words will have a significance for the reader, in view of the recent arguments about celebrity stars broadcasting. But I am convinced that, whatever happens, Tetravzini will never go back on her statement that radio is not harmful to the big artiste. She is too fair-minded and too imaginative to attribute the failure of a badly organised concert to the fact that she sang a few songs by wireless to the people of a country who give way to no one in their admiration of a great singer and a most lovable personality.

younger member. If the matter were left to his discretion, I am sure he would give all parties a fair show.

There are only four Parliamentary days, from the broadcasting point of view, which are Monday, Tuesday, Wednesday, and Thursday. The House of Lords rarely meets on Mondays, except towards the end of a Session. The House never meets on Saturday except in great emergency, and on Friday meets at 11 in the morning and disperses at 4 in the afternoon.

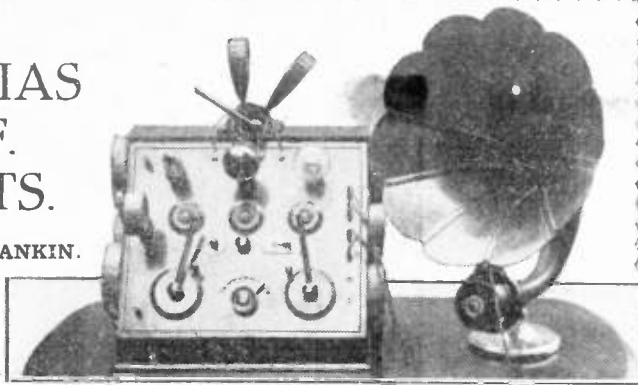
I suggest, therefore, that the House of Commons should be broadcast on Mondays, Wednesdays, and Thursdays; and the House of Lords on Tuesdays, always at the same time—seven to eight, or seven to seven-thirty, or seven-thirty to eight.

To sum up, I can see nothing but advantage and no drawbacks to the broadcasting of Parliamentary proceedings. People have a right to know how they are governed and how their representatives comport themselves. Few papers report the proceedings fully, and the galleries for the public are small, and always crowded for a big debate. We have enlarged the electorate, and propose to add some millions of women by reducing the voting age to twenty-one.

It is right that democracy should take an interest in politics, and I believe that the broadcasting of Parliamentary proceedings will be one of the best means of attaining this desirable end.

GRID BIAS IN L.F. CIRCUITS.

By OSWALD J. RANKIN.



THIS article deals with the practical application of grid bias in L.F. amplify circuits, and the construction of a biasing unit of rather novel design is described.

There is little doubt but that the greater part of that annoying and uninspiring background of mush so common with even the

plate of that valve, etc., and therefore it should be variable, with tappings provided at every single cell from $1\frac{1}{2}$ to about 9 volts, so that it is then possible to find the best value by trial. The method of using the battery is clearly outlined in the diagram, Fig. 1, which gives both theoretical and practical examples of applying the biasing current to the valve grid.

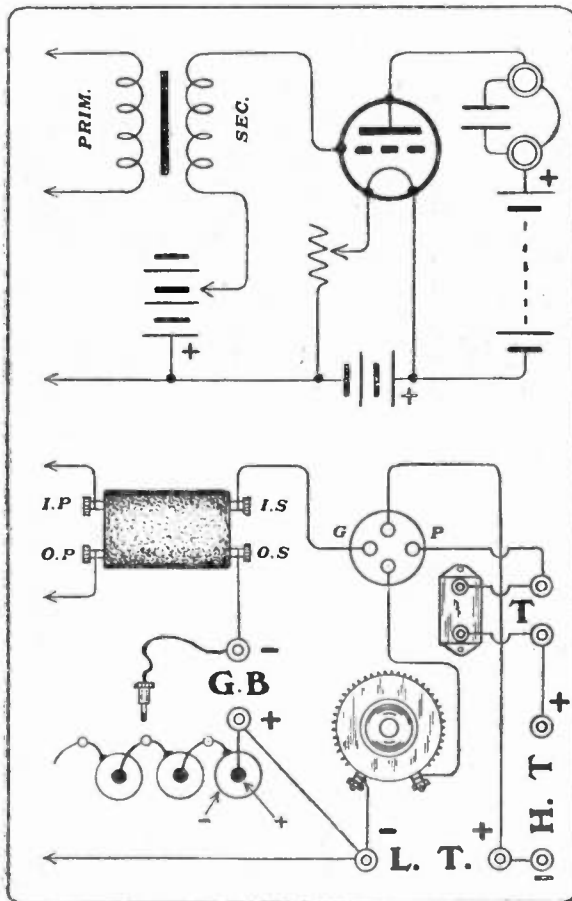


Fig. 1. Theoretical and pictorial representations of an L.F. current employing grid bias.

best of loud speakers is caused by the adverse conditions under which the last L.F. valve is functioning, and that it may be effectively suppressed by the suitable application of a negative bias to the grid of the valve.

The value of the battery of grid cells will depend on certain characteristics of the circuit; on the type of valve in use; on the amount of H.T. current supplied to the

cells are connected in series as shown; that is, the negative of one cell to the positive of the next (left to right) with tappings taken off at the junctions and connected to sockets arranged in radial formation on a circular disc of ebonite. This disc consists of an ordinary 3 in. ebonite dial to which is also fitted two terminals, and a small wander-plug to engage the sockets. The positive pole of the first battery in circuit is

The Battery.

Instead of connecting the O.S. lead of the L.F. interval transformer to the L.T. negative, as is most usual, it is connected to the negative pole of one of the cells, which, of course, are joined together in series to form a small battery, the positive end of the battery being joined to the L.T. negative terminal of the receiver. Actually, two extra terminals are fitted to the panel, these being marked "G.B."—positive and negative—and connected up exactly as shown in the lower diagram. Thus, by adjusting the wander plug the best value is easily ascertained. Such a battery may be conveniently made up from a number of dry cells taken from fairly large size flash-lamp refills; the central contact (carbon) will always be the positive, and the outer casing (zinc) the negative pole of any dry cell, and if we take six cells and connect them together in series we have $1\frac{1}{2}$ volts \times 6 = 9, which should be ample for all general purposes.

The Arrangement.

The arrangement shown in Fig. 2 conforms with the idea embodied in the variable grid biasing battery to be described in this article. Here the six

connected to the right hand terminal, and the wander-plug is joined to the left hand terminal.

Thus, when the plug engages the first socket (nearest left hand terminal) we have $1\frac{1}{2}$ volts between the leads Y and Z; when engaging the next socket (clockwise) we have 3 volts between Y and Z; third socket, $4\frac{1}{2}$ volts; fourth socket, 6 volts, and so on. If we now join the lead Y to the negative, and the lead Z to the positive "G. B."

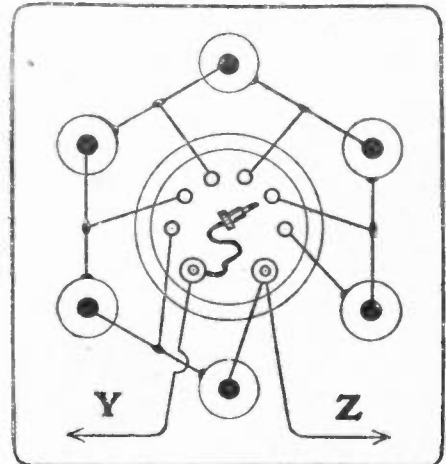


Fig. 2. The method of connecting the cells to the sockets.

terminals in Fig. 1 we have a 9-volt grid biasing battery variable in $1\frac{1}{2}$ -volt stages, which can be arranged in a most compact form and made up at little cost. Such is the arrangement to be described.

(Continued on page 380.)

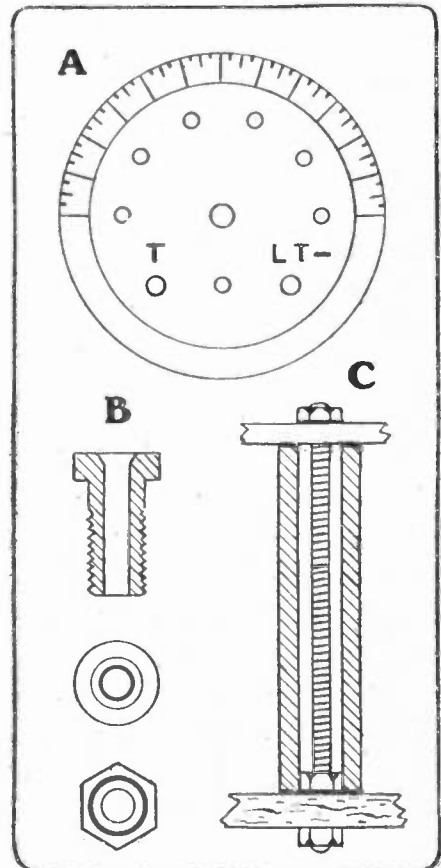


Fig. 3. Dial drilling and centre support details.

GRID BIAS IN L.F. CIRCUITS.

(Continued from page 379.)

The essential materials and parts comprise: six small $1\frac{1}{2}$ -volt dry cells (those used were taken from a damaged H.T. battery and are each $2\frac{1}{4}$ in. long by $\frac{5}{8}$ in. in diameter); a 3 in. diameter ebonite indicating dial; a cardboard former 3 in. in

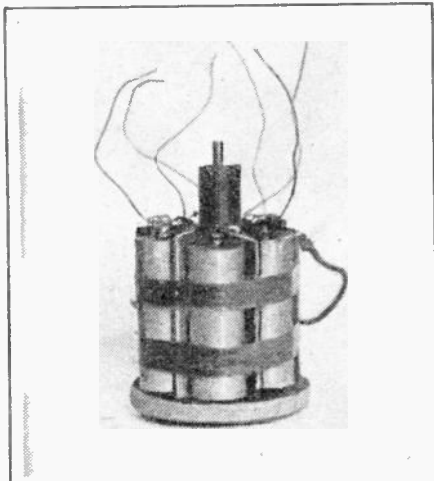


Fig. 4.—Showing how the cells are held in position.

diameter by $3\frac{1}{2}$ in. long; six sockets; a wander-plug with short flexible lead; two terminals; a 3 in. length of $\frac{1}{2}$ in. diameter ebonite or fibre tubing; a $3\frac{1}{2}$ in. length of 2 or 4 B.A. screwed brass rod with three nuts; and a wooden disc, the diameter of which is equal to that of the inside of the cardboard former.

Imitation Ebonite.

The six cells may be taken from two $4\frac{1}{2}$ -volt flash-lamp batteries of such a size to conform as nearly as possible to the cell dimensions given above. If smaller cells are used the dial and cardboard tube may be proportionately smaller, say $2\frac{1}{2}$ in. in diameter. The cardboard tube is covered with a sheet of black paper, as used for packing photographic plates, and incidentally this converts the tube into the finest imitation ebonite I have ever seen. The

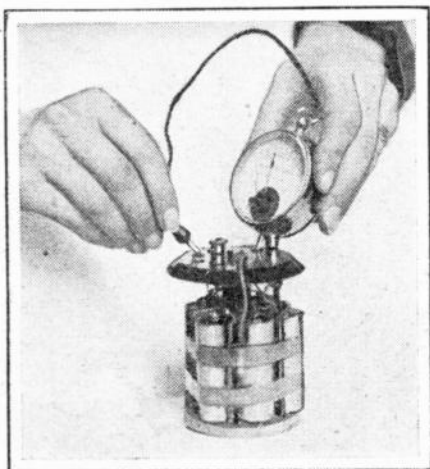


Fig. 5.—Testing the connections.

ebonite dial is drilled as shown at A, Fig. 3, and if desired the white engraving can be erased from the edge. The holes for the terminals are marked "T" (transformer) and "L.T. negative," the small hole between them being provided for the plug lead which passes through same and joins the shank of the "T" terminal under the dial.

The sockets used are of the short flush type as indicated at B. The wooden disc is clamped to the lower end of the screwed brass rod by means of two nuts, the lower end of the ebonite tube then being fitted over the top nut as shown at C, and the dial afterwards clamped to the top of the tube by means of the third nut.

The Necessary Connections.

Fig. 4 shows the wooden disc with rod and tube attached, and the six cells which are held in position by adhesive tape. Small strips of waxed cardboard are placed between the cells, which are connected in series and provided with the necessary junction leads before being assembled on the supporting disc. It should not be necessary to add that all connections must be soldered.

The next step is to clamp the prepared dial to the top of the rod and connect the junction leads to their respective sockets. This operation will present no difficulty if the diagram shown in Fig. 2 is clearly understood. The negative of the last cell in circuit constitutes a tapping and is therefore joined to the sixth socket, and the positive of the first cell goes to the right hand terminal which is marked "L.T. negative," the only connection to the left hand terminal (marked "T") being that of the plug lead.

After making the connections it is as well to carry out a simple test by means of a pocket voltmeter, as indicated in Fig. 5, and having then made quite sure that everything is in order the unit may be placed in the casing, as shown in Fig. 6.

With the present arrangement the wooden disc was made a tight push-in fit inside the cardboard casing, and so it was not necessary to glue or otherwise fix the dial to the top. Such a method is to be recommended, for it is then possible to withdraw the unit at any time in order to examine or replace the cells. The cells used were also of a most convenient size, these fitting nicely against the inside of the casing. Where smaller diameter cells are used the top binding of tape might be "pile wound" to equal the diameter of the wooden disc.

An Alternative Method.

As will be seen from Fig. 7, the device possesses a very neat appearance, besides being one of the most useful components in the hands of any enthusiast who would make a

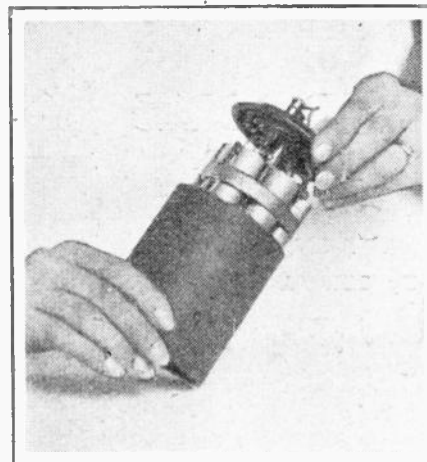


Fig. 6.—Placing the cells in the casing.

serious attempt to suppress low-frequency distortion.

The component lay-out diagram, Fig. 8, is included for the benefit of experimenters

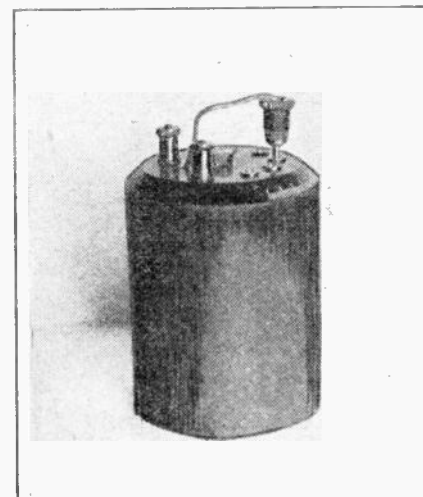


Fig. 7.—The completed battery.

who work on the separate component principle, and shows the correct method of connecting the battery to the L.F. panel.

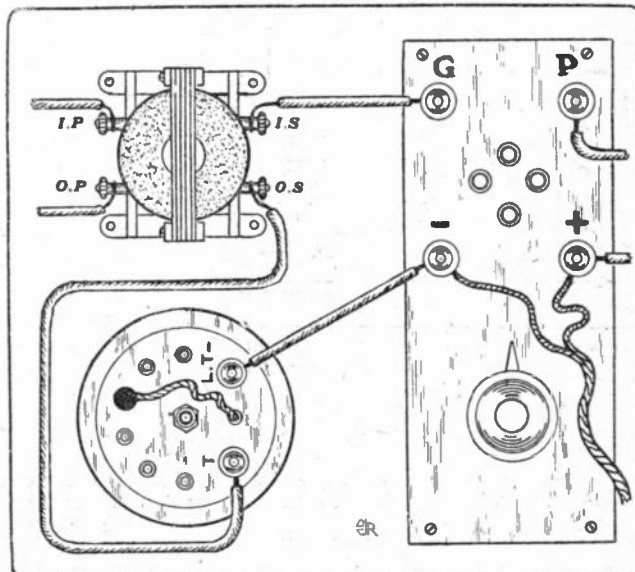
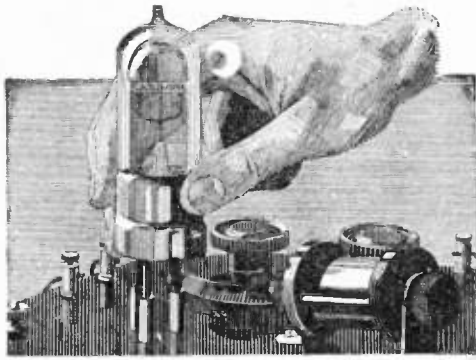


Fig. 8.—How the battery can be used in an experimental "hook-up."



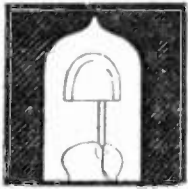
TEMPERATURE —and length of life

THE one principal factor that determines the length of life of any valve is the temperature at which the filament is run. If such a discovery were possible, a "cold" valve requiring no heat—from electric batteries or otherwise—to drive off its electron stream would possess an indefinite life.

* * * * *

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THE patent features which have built up such a reputation for Cossor Bright Emitter Valves are fully retained in the Wuncell. As every experimenter knows, the whole secret of valve reception depends on the correct use being made of the electron emission from the heated filament. In Valves with ordinary straight filaments much of this emission escapes from each end of the tubular Anode. In the Cossor, however, the hood-shaped Anode almost entirely encloses the Grid and the arched filament. Little, if any, of the electron stream can escape.

Obviously this increased efficiency means louder signals and reception over longer distances through the use of a more sensitive valve.

It was with this thought at the back of our minds that we set about designing the Wuncell Valve. *At all costs filament temperature must be kept down to the very minimum.* That our efforts have been crowned with complete success can be gauged from the fact that when the Wuncell is working in daylight its glow is practically invisible—while even in the dark it is merely comparable to the dull red embers of a dying match.

* * * * *


But filament temperature is closely related to filament thickness. The coated filament of the Wuncell Dull Emitter is exceptionally stout—in fact the eye will hardly perceive any difference between the thickness of the Wuncell filament and that of a Cossor Bright Emitter, for example. But compare it with the filament used in other Dull Emitters and you will immediately appreciate the fact that its robustness obviously means a much longer life. Pyrometer tests, indeed, have proved that while many Dull Emitters function at a filament temperature of 2,000 degrees, the Wuncell working point is approximately 800 degrees—or much less than half the temperature.

* * * * *


The Wuncell Valve gives exceptional results because it has been built upon radically different lines. Instead of obtaining low consumption by thinning down the wire used in the filament at the risk of fragility, the Wuncell filament has been specially manufactured to throw off a greatly increased electron emission. As a result, considerably less heat (or battery current) is required to operate it.

* * * * *

Before you buy your next Valve be sure to see the Wuncell. Examine the filament for yourself—compare it with any other Dull Emitter and you will readily understand why it has such a phenomenally long life. After all, it is the length of time that a valve lasts that will count most with you.



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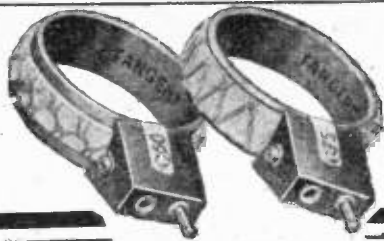
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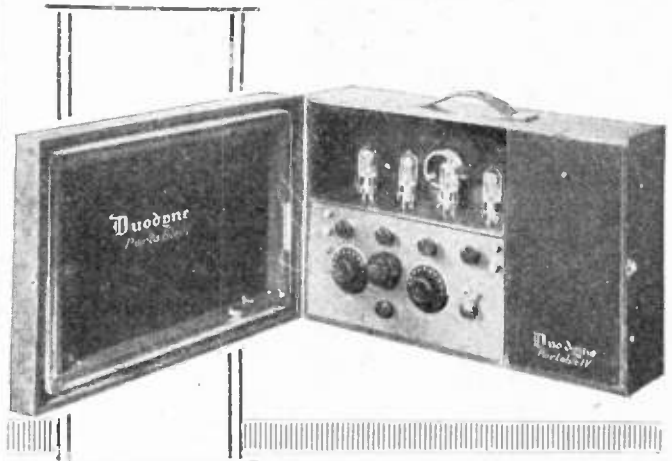
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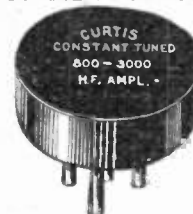
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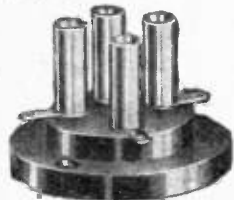
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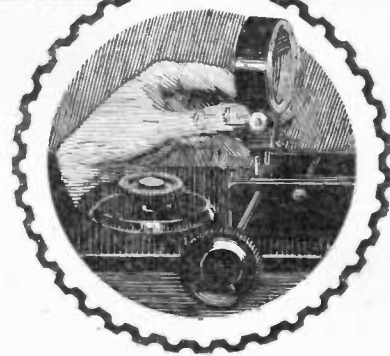
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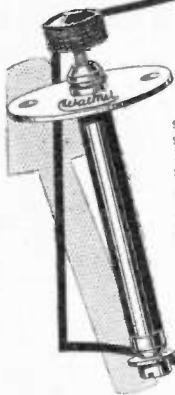
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SOLVING THE AMATEUR'S TROUBLES.

III.—THE PROBLEM OF SELECTIVITY.

By E. J. WYBORN, A.C.G.I., B.Sc.

In the third article of his interesting series our contributor deals with a subject which is of perennial interest to all classes of wireless amateurs, and in connection with this article we would remind our readers of the experimental American circuit recently described in "P.W." as The Super Selective Receiver.



SENSITIVITY, selectivity, and absence of distortion may be described as the three chief features by which the merit of a receiver is judged, and of these selectivity is not the least important.

Selectivity in a receiver is generally taken as the ability to receive a broadcast trans-

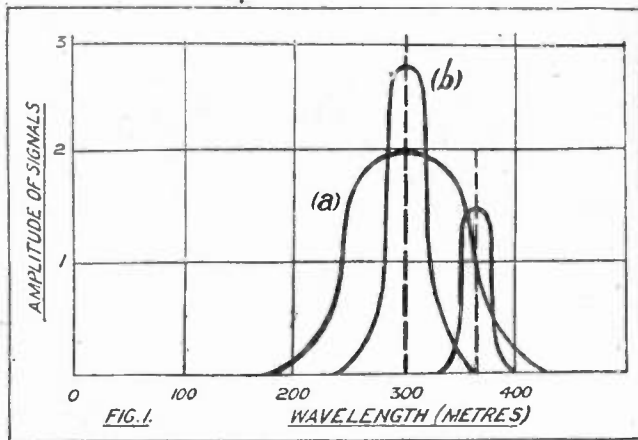
mission without interference from other stations on wave-lengths differing by only a few metres, and as such is a decidedly desirable feature. Before considering the various factors which influence the selectivity or otherwise of a receiver, it would be as well to draw attention to a mistake which is very commonly made in this matter. This is, to regard a receiver which gives a rapid variation of wave-length as the tuning knob is rotated as a selective receiver, which, of course, is not necessarily the case.

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H.F. Resistance.

One point is immediately apparent from this reasoning, that is the resistance of a tuned circuit which has no reaction should be kept as low as possible if good signals and selectivity are desired. The winding of the aerial coil of a crystal receiver and that of a valve receiver which has no reaction on to the aerial are examples which present themselves at once. If effective reaction is employed, the necessity for low resistance is absent, but even then the resistance should not be made too great owing to the damping effect on the anode circuit of excessive feed-back of energy.



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Side Band Distortion.

The rate at which the wave-length of a receiver varies as the tuning knob is turned depends principally on the range of wave-length covered by the complete rotation of the knob. For example, a tuning condenser of .001 mfd. will give a much more rapid change of wave-length than one of .0001 mfd., irrespective of the relative selectivity; the reason being, of course, that the larger condenser has to cover a much wider wave-length range over its 180° scale.

Following this explanation, it will be seen that the degree of apparent "criticalness" of a tuned circuit is no criterion of its selectivity, and that the only real measure of this quality is the actual ability to separate stations on very close wave-lengths.

A very simple method of expressing selectivity is obtained by plotting the ampli-

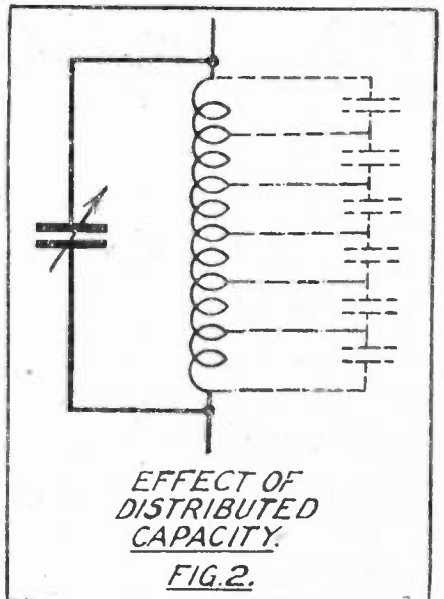
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Non-selectivity.

If the selectivity of a number of different circuits is compared, it will be found that the lower the resistance of a circuit the greater its selectivity. This explains the increase in selectivity which is obtained



The effective high-frequency resistance of a coil may be increased if it is wound on a bad dielectric. The best conditions in this respect are obtained by using air-supported turns, and if this is not possible good ebonite tube is suitable.

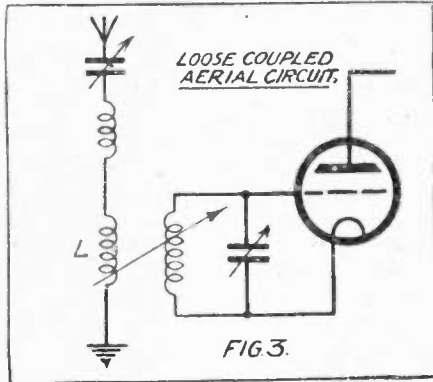
Another factor which results in unselective tuning is the presence of distributed

(Continued on page 386.)

SOLVING THE AMATEUR'S TROUBLES.

(Continued from page 385.)

self-capacity in the tuning coil. The effect of this capacity between the turns can be most easily understood by reference to the diagram in Fig. 2, in which, for the sake of illustration, the coil is divided into several sections, across each of which is a



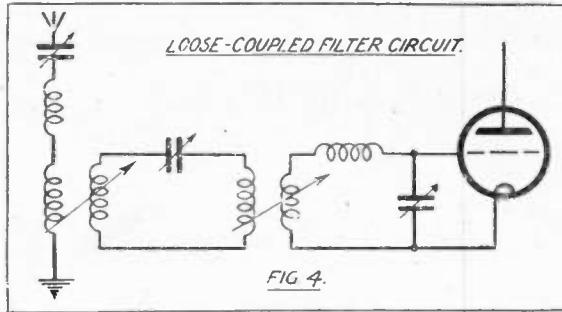
part of the distributed capacity of the coil. It will be seen that the effective capacity across each section differs slightly from the others, resulting in a flattened resonance curve. This accounts for the relatively unselective tuning obtained when a coil is used without external capacity—i.e. when it is tuned by its own distributed capacity only.

It is most important, therefore, that every tuning coil should be wound with a minimum of self-capacity by spacing adjacent turns either with other turns, as in the case of "Igranic" and other duo-lateral coils, or with string or paper, as in the case of "Duric" and "Cosmo" coils. Alternatively, the adjacent turns may be air-spaced, which is best of all.

The self-capacity of a coil is increased by the presence of an excessive quantity of wax or shellac used to hold the coil together, and the minimum possible quantity of these substances should be used.

Ratio of Inductance to Capacity.

It is fairly widely known that the loudest signals are obtained when the ratio $\frac{C}{L}$ is a minimum—i.e. when the value of the parallel capacity is a minimum. It is, however, very often believed that a large condenser across a coil increases selectivity simply because the slightest movement of the condenser knob results in a rapid increase or decrease of signal strength. This phenomenon has been explained before and the main result of adding a large capacity is to cause considerable damping in the aerial circuit, and thus to decrease the signal strength. This is one of the reasons why a great many receivers with a parallel condenser are inferior to those with series condensers, for in the latter the ratio $\frac{C}{L}$ is much smaller than when a parallel condenser is employed. Readers will do well, therefore, to keep an eye upon that formula, and see that C does not become too large.



It might be as well to point out here that the apparent "sharpness" of tuning obtained with a minimum of condenser is not indicative of selectivity, but is merely due to the greater "crowding" of wave-lengths, owing to the fact that wave-length increases in the ratio of the square root of the capacity. This effect is not present in the case of "square law" condensers.

Loose Coupling.

An important means of increasing selectivity is by the use of a loose coupling between the aerial circuit and a tuned secondary circuit. (Fig. 3.) The coil L may take the form of, say, ten turns wound on the rotor of a variometer and connected in series with the main A.T.I. As the coupling is reduced the selectivity is increased without any reduction of signal strength up to a certain point, after which loss of signal strength will occur.

A number of loosely coupled tuned circuits (or "filters") may be used in cascade when extreme selectivity is desired (see Fig. 4), but such a system is very cumbersome to tune.

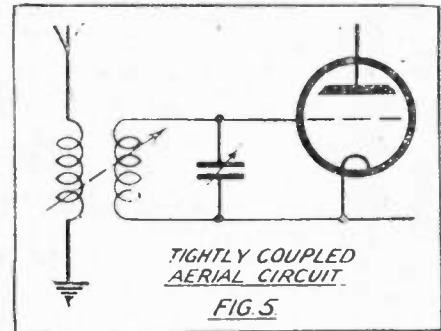
An arrangement which has some of the advantages of a loose-coupled aerial circuit without the drawback of an additional tuning control is obtained by using a few turns of wire in the aerial circuit tightly

coupled to a tuned secondary circuit. (Fig. 5, or auto-coupled as in the "P.W." Ultra Coil.) Now when two circuits are tightly coupled, tuning one of them has the effect, to a certain extent, of tuning the other as well, so that this arrangement is not really an "aperiodic" aerial circuit, as is sometimes stated. The system has many of the advantages of a loose-coupling, and is certainly more selective than the usual arrangement, without increasing tuning difficulties.

To sum up the principal points which will lead to better selectivity:

Simplicity of "Ultra" Coil.

Always use heavy gauge wire in a tuning coil unless you are reacting on to it, and always use coils having a minimum of self-capacity—e.g. coils with spaced turns.



The ultra coil mentioned will give improved selectivity without the complication of another tuned circuit, whilst a loosely coupled aerial circuit with tuned secondary will give very great selectivity.

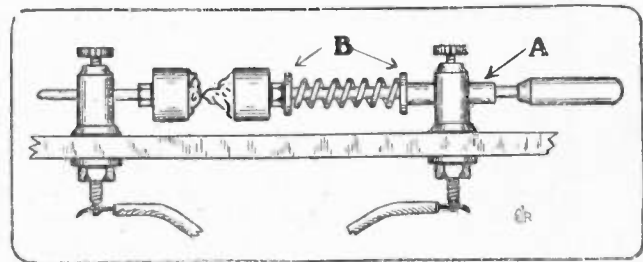
AN EFFICIENT PERIKON DETECTOR.

THE accompanying sketch shows a very simple and efficient form of Perikon detector, especially suitable for panel mounting. Two large size telephone terminals form the two pillars, these being placed about 4 in. apart and clamped very firmly to the panel. The fixed crystal cup is provided with a short brass rod which is clamped in the left-hand pillar and the hole in the right-hand pillar is opened and fitted with a short brass sleeve A to receive the sliding rod to which is attached the movable crystal cup.

A small compression spring and two brass washers B are fitted, as shown, between the cup and the inner end of the sleeve, and thus the movable crystal is kept in contact with the fixed crystal. The pressure of the

spring is varied by adjusting the rod in the left-hand pillar.

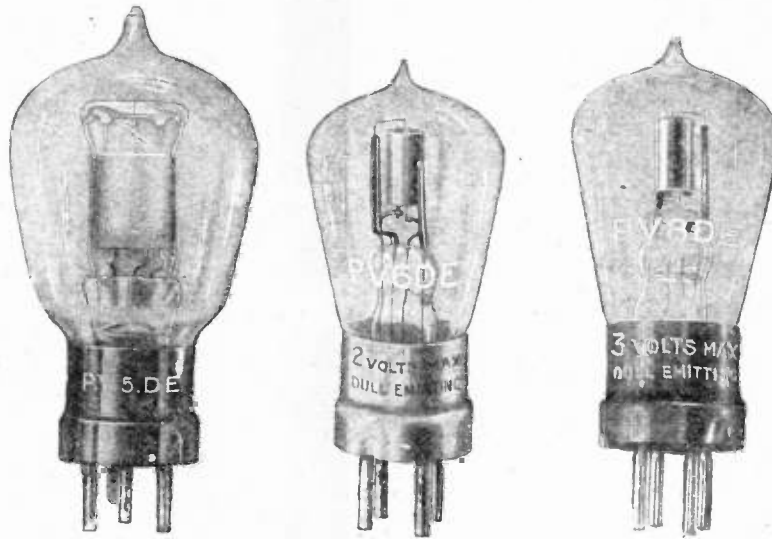
The efficiency of the device will depend on the perfectly accurate sliding fit of the long rod in the sleeve and on the correct pressure applied to the crystals. A point of zineite pressing against a flat surface of copper pyrites will give very good results.



The Perikon combination is especially suitable for use in conjunction with reflex receivers, as owing to its stability it is able to stand up to the potentials present in the anode circuits of such sets, where in a great many cases the more popular cat's-whisker type of rectifier very rapidly deteriorates, or else refuses to function at all.

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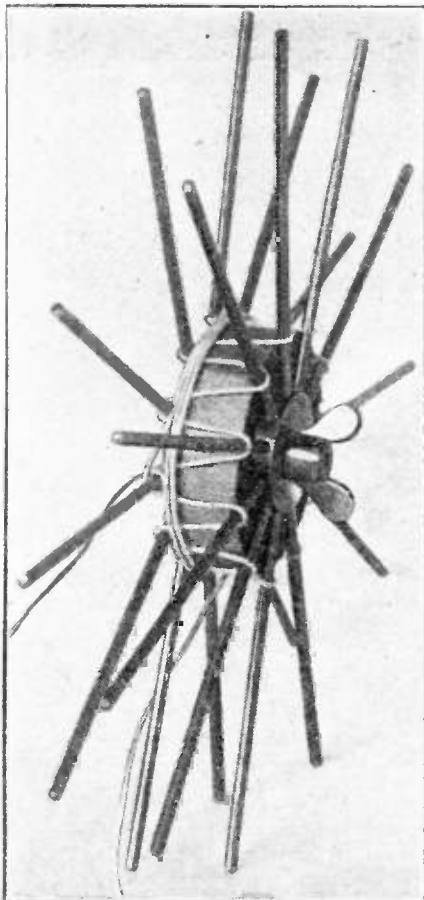


Fig. 1. Showing the construction of the former.

A GREAT amount of care and thought has been expended in the designing of aerial coils to avoid capacity effects and high resistance. To-day we have

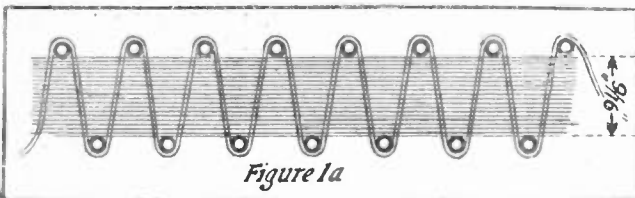


Figure 1a

the choice of many types of coils for the aerial side of the set, elaborately designed to avoid defects and provide us with a coil as nearly perfect as possible, but no great endeavour appears to have been made to avoid the same defects when we consider the H.F. transformer. It only requires a glance to see that capacity and high resist-

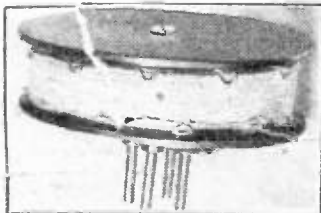


Fig. 2. The completed transformer.

ance must be present to a great extent. The very method of winding same would be entirely shunned in designing other types of coils, yet many manufacturers still

A NEW TYPE OF H.F. TRANSFORMER.

The outcome of various experiments made in connection with the one-valve Reflex Set published in "P.W." for week ending Nov. 15th, 1924.

By F. W. PLEWS.

adhere to the exceedingly primitive method which they know possesses the disadvantages mentioned above.

It was whilst experimenting with my one-valve and crystal reflex set that I thought I would make the coil I am about to explain. The coil gave me such excellent results that I thought it worth publication, and at the same time it will also provide an H.F. coil which can be easily changed for other wave-lengths when using the reflex set published on November 15th under my name, and also provide a reply to many of my correspondents who wrote me on this subject.

The Former.

Fig. 1 shows a metal former which is composed of two single metal formers between which is clamped a circular piece of wood (small toy wheel will do) 2 in. in diameter and about 1/16th in. wide. The wheel is soaked in molten wax. The space between the

spokes from side to side over the wheel is covered with a strip of card also soaked in wax. The spokes in this former can be moved in such a manner that one can either have them staggered or opposite each other. For our present purpose they will require to be staggered.

It will first of all be necessary to anchor the wire round one of the spokes, then make a layer of zig-zags as shown in Figs. 1 and 1a, then a layer to fill the full width between the spokes. I used 24 gauge D.C.C. wire, and I was able to get 17 turns between the spokes over the width of the wooden wheel; this with the zig-zag layer made 20 turns. Then I anchored this temporarily and proceeded with the winding of a secondary layer of 26 gauge, commencing with a zig-zag layer, then 19 turns in close formation anchored temporarily, and proceeded one more to make a zig-zag and 17 more turns of the primary wire.

Lattice Winding.

We proceed to wind the layers alternately until there are 60 turns of primary and 72

of the secondary. There must be sufficient wire left out at the ends after anchoring same to allow for taking to their respective terminals later. Two discs of fibre or thin ebonite are now required, one for the top of coil and one for the underside to protect it. I used fibre cut to one-eighth of an inch larger than the diameter of the coil. (See Figs. 2 and 3.) These were then varnished to protect the fibre from damp. A piece of ebonite 1/4 in. in thickness is now cut 1 1/2 in. square, and with the aid of a valve pin template we mark off the position for the four split pins.

Fixing the Coils.

Holes are now drilled to allow the pins to be screwed into it, and after we have taken the 22 brass pegs out of the former and placed a stitch or two on the coil at the ends to make them fast, we unscrew the clamp and we are now ready to assemble the various parts. Diagram 4 shows the underside of the coil support; the various pins are lettered I.P., input primary; O.P., output primary; I.S., input secondary; O.S., output secondary. Holes were made on this base to allow the four wires

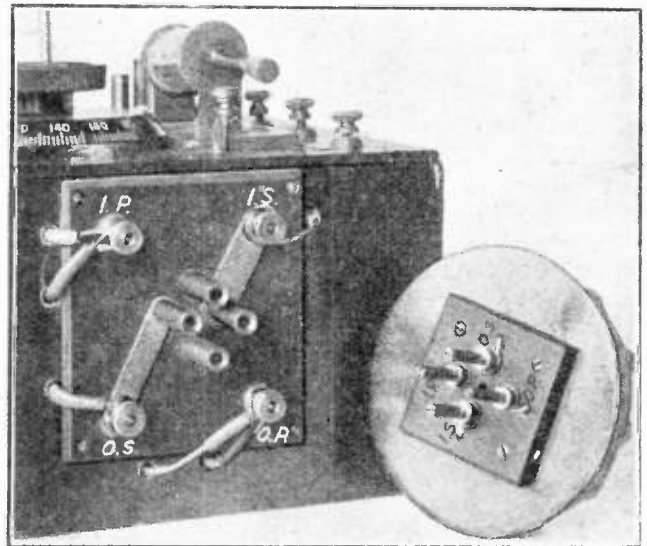


Fig. 3. This photograph shows the position of the transformer on the reflex set.

to pass to their proper terminals. The start of the primary winding, which is the start of the first layer of zig-zag turns—the winding which is laid in close proximity to the wooden wheel—is taken to the pin marked O.P.

Preparing the Sockets.

The other end of the primary or the end on the outer side of the coil is taken to the terminal marked I.P.

The end of the secondary winding, which is the one on the outer edge of coil, is taken to the terminal marked O.S., and the start of the first zig-zag winding of the secondary near the surface of the wooden wheel is brought to the terminal marked I.S.

The small ebonite base is then firmly screwed to the wooden wheel with the fibre cover to protect the windings. The cover, also of fibre, for the top covering is screwed on, and a strip of empire tape placed between the two covers and over the edge of coil completes this transformer.

Make certain the wires are taken to the O.P., I.P., O.S., I.S. pin terminals in such a

(Continued on page 390.)

A NEW TYPE OF H.F. TRANSFORMER.

(Continued from page 389.)

way that the wire will be exposed as little as possible to any handling to which the coil may be subjected.

Another little adaptation I made was the holder at the side of my set. (See Figs. 3, 5, 6.) The base is made of $\frac{1}{4}$ in. ebonite,

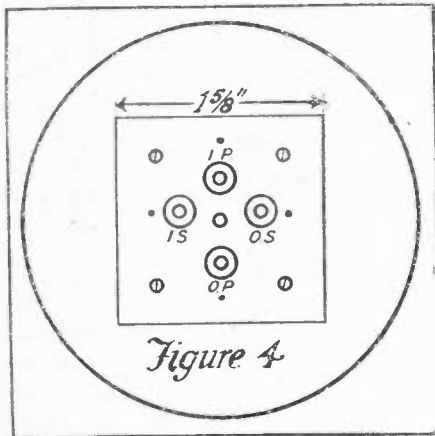


Figure 4

and sizes can be obtained from the scale on Fig. 5. Four ordinary terminals are placed one at each corner as seen in Fig. 5, and four valve sockets in the centre; for position the sockets correspond exactly to those on the transformer. The sockets are connected to the terminals with narrow brass strips, two being connected on the upper surface and two on the under surface. This adaptation is connected up on my reflex as shown in Fig. 3, and allows the use of various sizes of transformers for different wave-lengths. The one explained covers the B.B.C. wave-lengths, not Chelmsford, for which a special one with 175 turns primary and 200 secondary will be required. In this case to avoid a coil of huge dimensions it will be advisable to use 28 gauge D.C.C. wire.

Application of the Transformer.

There are many ways of using H.F. coils. The primary only may be tuned or the secondary only may be tuned with a 0000

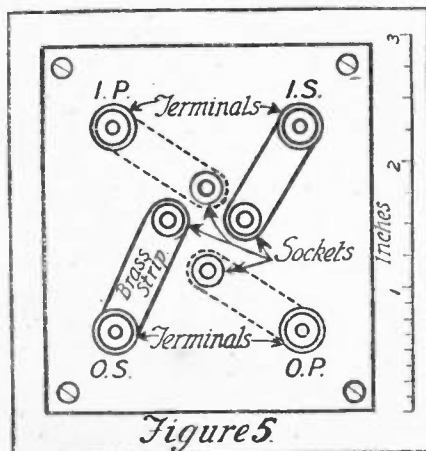


Figure 5

variable condenser across them. Another method is the aperiodic untuned system. No tuning condenser is then required. There is also the system where both primary and secondary are tuned, but this, owing to the close coupling, is superfluous. The close coupling makes the two coils practically one for tuning purposes. I have retained the usual terms applied to the various terminals of H.F. transformers, although, strictly speaking, owing to the special design of the coil, they appear to be out of place.

Connections.

The ends of the various portions of the transformer windings in my coil to which I have applied the abbreviated terms I.P., O.P., I.S., O.S., are those which in the commercial article would have the same terms applied. When I tried this coil on my reflex I found the best signals were received when I took a connection from the plate of valve to O.P., and from the terminal marked I.P. a connection was made to the right 'phone terminal. The movable plate terminal of the variable condenser was also connected to O.P. on the adapter, and the fixed plate was connected to the I.P. terminal (see Fig. 3), where the wires were brought out of the side of box. I.S. was connected up with the arm side of detector and O.S. with the L.T. minus terminal. This method of winding produces an air-spaced coil, each layer being closely coupled, which makes a most efficient H.F. transformer.

A CHEAP EARTH SWITCH.

CRYSTAL and valve users alike will welcome the following details of a very neat and efficient arrangement for connecting aerial and earth wires together when their sets are out of commission.

Apart from the factor of safety in case of lightning nothing is more unsightly or aggravating than loose ends of wire dangling from a wall or coiled over the back of a chair.

This state of things can be obviated, however, with a minimum of expense and trouble by fixing a miniature panel to the door jamb of a room as shown in our illustration.

A small piece of ebonite 2 in. by $1\frac{1}{2}$ in. by $\frac{1}{4}$ in. thick carries two substantial terminals A and B, and is fixed to the jamb by two wood screws. The link C is made from a strip of brass $\frac{3}{8}$ in. by $\frac{1}{16}$ in. and swings freely from the upper terminal stem.

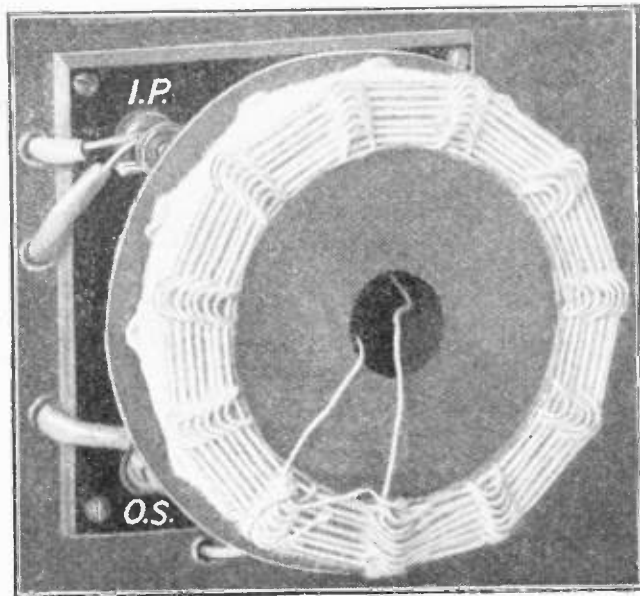
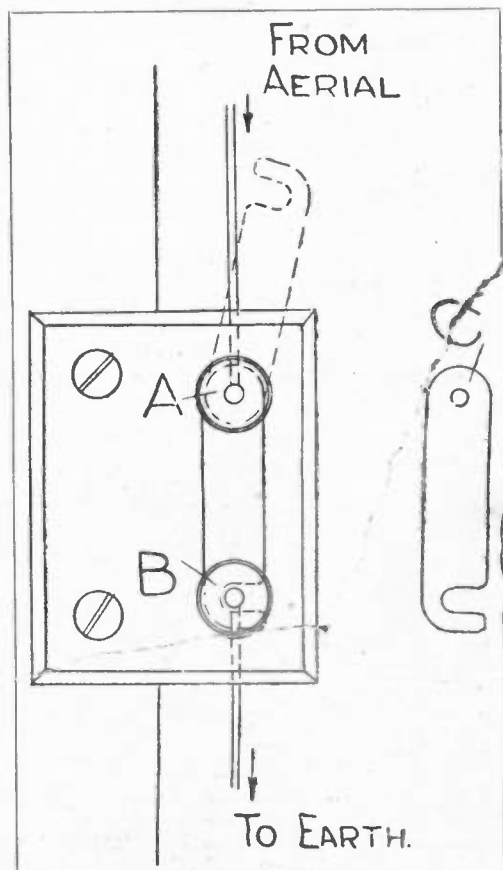


Fig. 6.—This photograph shows the transformer with the top fibre disc removed.

Aerial and earth connections are made at the rear of the panel, and when the set is in use the link is in the bottom position. Spade and detachable leads are then connected to the contacts on the front of panel and taken to set terminals "aerial" and "earth."

When out of commission the leads are removed and the link dropped into the closed position, thus making a continuous circuit to earth. Needless to say, the arrangement is quite as effective as an expensive switch and need only cost the radio "fan" a few coppers.





The bearings of our National Cash Register ran hot one day last week dealing with the enormous demand for Super-Heterodyne sets.

We are not complaining; we don't mind if they melt.

THE SUPER-HETERODYNE SET

is a Masterpiece of sensitivity and selectivity; so selective is the Super-Heterodyne set that, while 2 L.O. is being received and distributed in our Show-rooms with an ordinary 4 valve set. WE CAN GET ANY OF THE STATIONS IN THE UNITED KINGDOM loud-speaker strength without the slightest interference at the same time.

America will also come in freely and easily on this set, loud-speaker strength; a great feature being that the new Heterodyne entirely eliminates interference from ships and other spark stations.

THE WHOLE set of these parts to make a Six-valve Tropadyne Set is now on Sale for £15 11s. 2d., or with Cabinet and Baseboard £1 9s. 6d. extra.

CHART and Full Book of Instructions for making this Wonderful Receiver, 3 - post free.

FREE. Send for Special List of Super-Heterodyne Receiving Sets.

The demand for these Sets amongst the leading enthusiasts has been phenomenal and orders can only be dealt with in strict rotation. Remember no Outside Aerial is needed. The great results we are obtaining in our Show-room are from a small frame aerial 2½ ft. square.

POST YOUR ORDER TO-DAY

mentioning "POPULAR WIRELESS" to

**DAYZITE LTD., 19, Lisle St.,
Leicester Square, London, W.C.2**

'Phone :
Regent 4577.

Telegrams :
"Titles," Westrand, London.



The Only Valve Fitted with the Patented MOLYBDENUM Filament



FILAMENT VOLTS

1.5 to 2

FILAMENT CURRENT

.3 amps.

18/-

If your local dealer cannot supply you with the "SIX SIXTY," communicate with us.

DISTRIBUTORS WANTED

Every discerning dealer will want to stock this important valve innovation.

Quantities are ready for delivery and dealers are invited to write in AT ONCE.

Show cards, posters & leaflets supplied.

—which means that the "Six Sixty" is the only valve which will give you 50% greater volume than any other standard valve—bright or dull emitter.

The processes of manufacture of the "Six Sixty" valve are fully covered by patents. It represents an advance in radio valve science which is rapidly winning the enthusiasm of keen wireless amateurs everywhere.

A leaflet containing a selection of users' opinions of the "Six Sixty" awaits your request. It will be sent on receipt of your application, together with our Folder which tells you why "Six Sixty" valves will give you approximately 50% greater volume than a bright emitter, whilst consuming only one-tenth of the quantity of current they require.

Write now, giving your local dealer's name and address.



ELECTRON

TRIUMPH HOUSE, 189 REGENT STREET, LONDON, W.1.

'Phone: Regent 5336.



USE
R.G. STRIP
PLUG-IN COILS
The good aerial deserves them. - the poor one NEEDS them.

Patents pending

The strip winding incorporated is an entirely new principle in coil construction, and yields such amazingly good results that you can expect years of good service from your R.G. before a better coil comes along—even though every day sees wireless inventions.

Read what a user says:
"I had previously used several of the leading makes of coils, and was satisfied with them until I tried yours, but I can conscientiously say that the R.G. Coil is far ahead of any other make I have used for volume and purity of tone..."
Original letter may be seen at any time.

FAULKNER & CO. (M/cr.), LTD.,
Patentees and Manufacturers.
Vesta Street Works, Mill Street, MANCHESTER.
Phone: City 4959.

THE SYMBOL OF EFFICIENCY.

EFESCA



ONE-HOLE-FIXING COMPONENTS
The name EFESCA on Wireless Components signifies efficiency. Efesca Components are made with engineering precision and instrument finish; the standard One-Hole-Fixing simplifies the task of panel drilling, and the absolute reliability of each Efesca Component ensures perfect results from your set.
Efesca Components cover every requirement of the home constructor or more advanced experimenter.

EFESCA VERNISTAT.
Unique construction. Smooth and silent in operation. Resistance 5 ohms, 6- each.

Ask your Wireless Dealer or Electrician to show you Efesca Components and Efescaphone Wireless Sets

WRITE FOR CATALOGUE 522/ IT IS FREE & FULL OF INTEREST

WHOLESALE ONLY. FALK, STADELMANN & CO. LTD.
Efesca Electrical Works.
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BELLING-LEE
PATENT
INDICATING TERMINALS
and
"MULTY-KONTACT" PLUGS & SOCKETS.
(Red & Black Handles & Indicating Discs)

16 most useful indications and blanks.
From all leading dealers.

BELLING & LEE, LTD.
Queensway Works, Ponders End, Middlesex.

Price 7d complete Plug, Socket & Disc.

Price Brass 3½d
N.P. 4½d

RADIAX SQUARE LAW CONDENSERS WITH FREE CHART.

Of splendid quality and finish, very strong construction and highest possible electrical efficiency this new Radiax production will Revolutionise Your Tuning. The use of a good square law condenser facilitates the tuning on that portion of the scale hitherto difficult or impossible, and gives uniform results over the whole range. A Radiax Chart FREE with each, enables you to identify by wave-lengths each station you tune in. It includes valuable hints on logging all stations heard.

Testimonial. Lifton, Devon.
Many thanks for the Square Law Condenser, which I received last night. I fixed it in my set; result was so per cent. better reception; it cut out all mush. It is a well-made condenser, and goes far above my expectations; speak come through, also music, a lot clearer than before.
L. C. Brown,
RADIAX LTD., 10, Radio House, Percy St., Tottenham Court Rd., London, W.1.
3 mins. Tottenham Court Road and Goudge St. Tube Stns. Museum 490.



Without Vernier	With Vernier
...001 9/-	11 6
...0025 8/3	10 9
...006 7/6	10/-
...0095 7-	9 6
...0025 6 6	9-

RADIAX
WE SATISFY YOU

This PAD makes all the difference in the world



The "Kumfi" de Luxe Ear Pad is a veritable boon to listeners. Instead of the hard surface of the headphone earpieces pressing continuously on your ears, you have instead a soft, luxurious pad that relieves pressure and prevents all discomfort.

The "Kumfi" de Luxe Ear Pad is the only scientifically prepared pad. It is hygienic and absorbent, and shuts out exterior noises. Try a pair and add greatly to your comfort; they are easy to fix and easy to remove.

'KUMFI' De Luxe EAR PAD

1/3d per pair

Sold by Wireless Dealers, or post free from the makers, on receipt of 1s. 3d.

A. De ST. DALMAS & CO., Limited, LEICESTER.

Patent applied for.



IN THE WIRELESS AMATEUR'S WORKSHOP.

By O. J. RANKIN.

PART II. CONCLUSION.

IT is not always an easy matter to hold an ebonite panel in the vice when it is desired to true-up the edges with a file. The easiest way out of this difficulty is to place the file in the vice and rub the edges of the panel over same. Alternatively, the file may be attached to a piece of board or to the work bench in the manner indicated at A. The edge of the panel should, of course, be pressed down very firmly on the file; the cutting stroke occurs when the panel is pushed sharply towards the file tag on the left. The edges of the panel

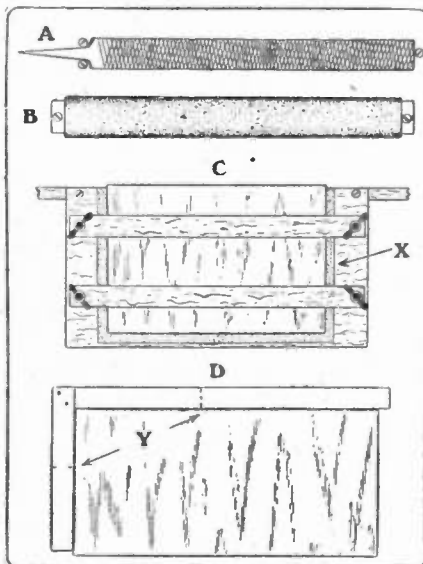


Fig. 6.

may be afterwards smoothed off by repeating the operation with a piece of emery cloth which is wrapped round a flat strip of wood and attached to the bench as shown at B.

Diagram C shows a more business-like method of dealing with large panels. Here a special vice or clamp is provided, this consisting of a large piece of thick board which is screwed to one edge of the bench and provided with two wooden stays which are attached to the board by means of bolts and fly-nuts. A layer of felt, X, is preferably glued to the board and also to the under sides of the stays or clamping strips. The edge of the panel to be filed should be about $\frac{1}{8}$ in. higher than the edge of the bench. It is then clamped very firmly in this position while the necessary filing is effected. A set of bolts from an old trouser press will be found useful for this purpose.

Large "Square" Advisable.

Diagram D illustrates the importance of a large steel square and the comparative uselessness of a very small one. When squaring up a panel one of the edges is first filed perfectly flat. The "butt" or

thick portion of the steel square is then laid flush with this edge while the next edge is trued up to the "tongue" or long portion of the square. The butt of the square is then transferred to this latter edge while the third edge is trued up, and so on. Now if the square is a large one this operation is very simple; on the other hand, should it be a small one, as indicated by the dotted lines, Y, then obviously it is a very difficult matter to square up a large panel with accuracy.

The Use of "Oddlegs."

Diagrams E and F, show two very important items which should be added to the workshop equipment, the first being a pair of sheet brass or copper vice clams which are dropped over the vice jaws to prevent same from marking soft metals such as copper or brass; the second being a simple drill and tapping gauge consisting of a piece of $\frac{1}{8}$ in. sheet iron which is provided with a series of holes of varying sizes. This gauge is not only useful for finding the correct size of drill for a certain tap; it is also very useful for many other purposes, such as finding the best size of drill for holes to take terminals, screws, and bolts.

Diagram G illustrates one of the many uses of the "oddleg" dividers where a panel is being marked off, on the under side,

for the small wood screws which secure same to the top of the cabinet. When using this instrument it is most important that the edges of the panel are squared up quite true, for the scribed line will always follow the edge of the panel. Other examples of

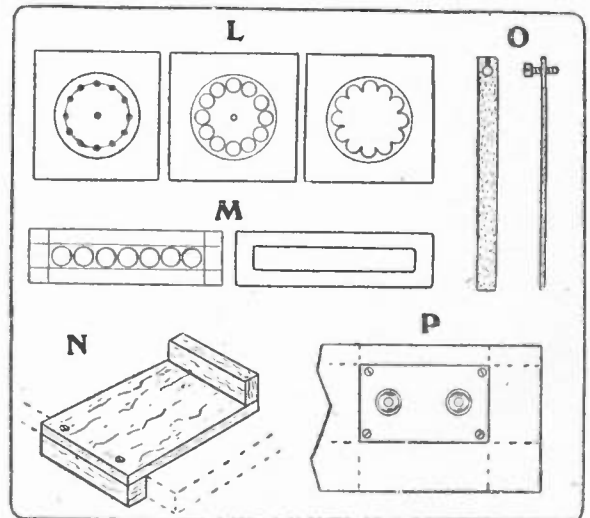


Fig. 8.

using the "oddlegs" are given in Diagrams H and I, the former showing how the unknown centre of a disc is located; the latter showing how a square piece of work is marked off from each side in order to locate the central position of the horizontal marking. Briefly, the "oddleg" dividers form a simple and convenient substitute for the more elaborate scribing-block and surface plate. The easiest and quickest way to find the centre of a true square piece of work is to scribe a line from corner to corner as shown at J.

With the average hand drill the size of the chuck is somewhat limited and thus one often encounters a difficulty when a $\frac{3}{8}$ in. hole is required for the bush of a "one-hole fixing" component. The usual method of procedure is to first drill the hole as large as possible and then open it to the required size by means of a file tag which is made to function as a reamer. Another method is indicated at K, where the correct size drill is clamped firmly in the vice between two V-blocks of fibre, while the panel, which is previously drilled with a small size drill, is turned and pressed over the point of

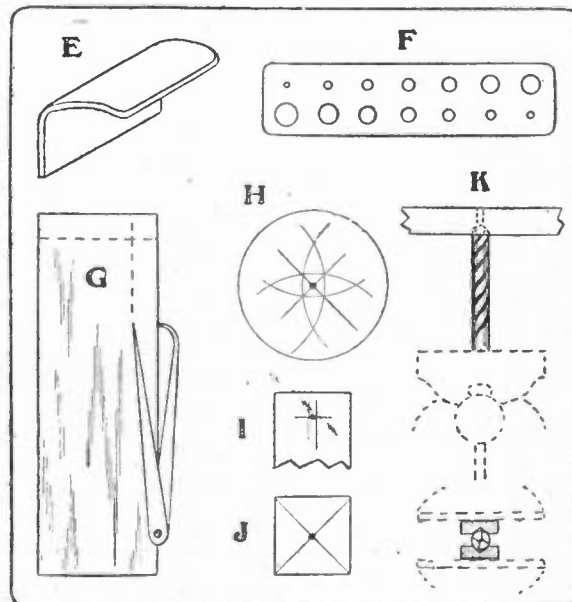


Fig. 9.

(Continued on page 392)

WIRELESS ADVERTISING.

I HAVE often been asked why the B.B.C. do not allow advertising by wireless—business men in the City have often suggested the idea to me; some have hinted at the financial success of such a scheme, and others have suggested broadcasting advertisements during intervals in the evening programmes.

Such a scheme may or may not be adopted in the future, but at the present moment it is difficult to imagine the B.B.C. making announcements about somebody's brand of soap or somebody's special beer; nor is it even conceivable that they would allow any name, or names, of any firm to be mentioned, either during the course of a lecture or broadcast "turn."

I think I am right in saying that the only advertisement which is allowed to escape the censor of the Company is the usual Thursday night announcement, about what listeners will read in the B.B.C. official organ, if—but let it go at that!

I have consulted with leading members of the wireless trade, but they cannot suggest anything which would help, even themselves, by "broadcasting their wares," because they agree that by so doing the B.B.C. would be inundated with applications from people who would be prepared to pay large sums of money for their goods to be advertised to the "listening" public.

No Possibilities.

But would theirs be such a large audience! Forced listening to advertisements is indeed very galling to many who do not care for anything about business, but only for entertainments.

I asked Mr. Ernest R. Gilbert, a well-known wireless advertising man, to give me his views on the matter.

When I mentioned the idea he replied emphatically:

"The mere suggestion is absurd. If it is allowed many thousands of listeners will give up wireless altogether," was his answer.

"But," I added, "don't you see the tremendous possibilities for the advertiser, the enorm—"

"No—no—there are no possibilities for the advertiser if he wishes to continue in business; he may take a few extra pounds to-day by the scheme, but in the long run he would lose, simply because people who possess wireless sets to-day will give them up in disgust to-morrow if radio advertising is forced upon them."

"Well, Mr. Gilbert, why not allow a few words in between items in the evening's programme, say—"

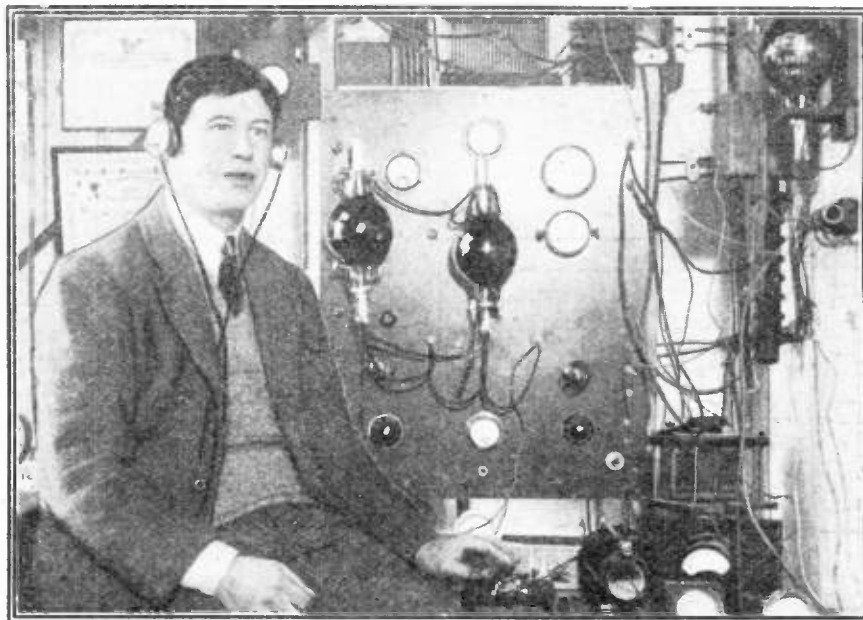
"My dear chap, can you for one moment imagine some announcer before the curtain at Covent Garden during an opera, stating, 'Ladies and gentlemen, I am now going to mention the advantages of Gilbert's patent cure for deafness?'—yes, you may laugh"—Mr. Gilbert turned on me—"but if Covent Garden did permit that form of advertising, good-bye to opera."

I suggested that although Covent Garden did not announce advertisements, there were advertisements in the programme, which patrons read during the intervals.

"Quite right; but are they forced down their throats?" he replied smilingly.

"Can you not suggest a means of wireless advertising?" I asked, as I was about to leave him.

"Yes! I can—and—I believe it will come to what I am about to tell you. Now



Mr. Gerald Marcuse, the well-known Caterham amateur (2N.M.), operating his transmitting plant.

I suggest that any firm wishing to advertise themselves by broadcasting should give a donation to the B.B.C. to assist their financial obligations, which would enable them to give an evening concert themselves, as was recently done by a London newspaper."

IN THE WIRELESS AMATEUR'S WORKSHOP.

(Continued from page 391.)

drill until the desired hole is obtained. Readers who are new to this method are advised to first practise with a few odd scraps of ebonite. Short drills are most suitable for this purpose; these may be picked up very cheaply from second-hand tool stalls in almost any market place. One or two may be ground taper and used as countersinks.

Where very large holes are required one might invest in an expanding bit and a brace, or proceed with the existing hand drill in the manner shown at L. A very small hole is first drilled through the panel, this being the centre of the circle, which is then scribed to correspond with the circumference of the required hole. The circle is marked on both sides of the panel. A smaller circle is then scribed on

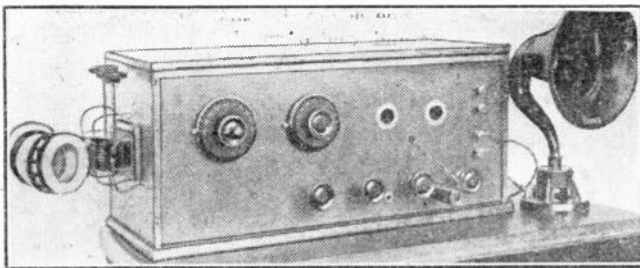
one side of the panel, this being marked off and centre punched as shown, and then drilled so that the holes do not quite cut the circumference of the larger circle. The small bridge pieces between the holes are then cut away by means of a small file and thus the bulk of the unwanted material is removed. The ragged edges are then trimmed up by means of a half-round file, the panel being reversed a few times during the final operation in order to obtain a hole which is true to both markings. Square holes and slots are cut in the same manner, an example being illustrated in Diagram M. Obviously, a square or flat file will be required for rectangular holes.

Diagram N shows another very useful addition to the work bench, this consisting of a piece of ordinary board and two wooden blocks which are securely attached to the ends of same in the manner shown. This simple device will be found useful for many different purposes. It represents a bench stop for all small work which has to be sawn, drilled, or otherwise worked in a flat position.

Mounting Fixed Condensers.

Diagram O depicts a simple means of overcoming a very common difficulty—that of holding very small screws or bolts while fitting same in awkward positions. A small strip of cardboard solves the problem, this being punched at one end to receive the screw, and also slit down to the hole so that it may be easily withdrawn when the screw is well started.

When mounting small fixed condensers, etc., on wooden bases which are recessed to accommodate the metal parts, the best plan is to first fit and screw down the mounted panel as shown at P and then cut the wooden block to the size of the panel, using the edges of the panel as guides for the saw. This applies when the panel is to be quite flush with the block. If the block is cut out to the exact size beforehand it invariably happens that the panel is a misfit owing to the "pull" exerted by the wood screws.



A neat loud-speaker set made by Mr. H. C. George, 14, Kendall Road, Beckenham, Kent.

Tuning Without SQUEALS

An article for the general reader.

By R. H. WATSON.

THERE must, I suppose, be large numbers of wireless enthusiasts at the present time who wish heartily that reaction had never been invented! Properly employed reaction confers the greatest possible benefits upon the user of a receiving set; but abused, as it so frequently is, it ruins not only his own reception but that of his neighbours within a fairly wide radius. I am going to try in this short article to show how reaction can be used in such a way that you will get the most out of it whilst at the same time obtaining perfectly pure reception and causing no interference with other people.

Explaining Reaction.

Let us see, first of all, what the reaction coil does. The aerial and earth systems exercise a marked damping effect upon incoming oscillations. When a single circuit tuner is in use this damping is transferred to the grid circuit of the valve, where it leads to a loss of sensitiveness and to flatness in tuning. With a double circuit tuner, provided that the coupling is kept loose, the effects of damping are less noticeable, but they are still there to some extent. By means of the reaction coil we can feed back into either the aerial or the closed circuit an amount of energy which will serve partially to neutralise the damping. In practice we cannot eliminate its effects entirely, for if we introduce sufficient reaction to do this the set bursts into oscillation. The purpose of the reaction coil, then, is to counteract the effects of aerial damping and therefore to make the set more sensitive and more selective.

A fault that one sees in a very large number of receiving sets is that known as overlap. As the reaction coil coupling is tightened there is a slight increase in signal strength and then the set bursts suddenly into violent oscillation with a loud "plock." When the coupling is loosened oscillation does not cease until the reaction coil is moved some distance past the point at which it began. A receiving set in which overlap is present is bound to cause interference, since it is almost impossible to prevent it from oscillating when tuning is being done.

Preventing "Overlap."

Overlap can be prevented only by careful attention to the following points. The set must be so designed that stray capacities are eliminated to the greatest possible extent. The reaction coil must not be too large—on the broadcast wave-lengths a No. 50 or No. 75 coil is big enough. But most important of all, the plate voltage of the rectifying valve must be carefully adjusted. Not everyone realises that with grid leak and condenser rectification much better results are obtained with most valves by using a moderate plate potential. A

high voltage on the plate of the rectifier diminishes the flow of that grid current which is essential for proper rectification. If, therefore, your set, whether single-valve or multi-valve, is difficult to control with the reaction coil, pay attention to the plate voltage of the rectifying valve, and do not forget that suitable adjustment of the filament rheostat often works wonders. The grid leak also should receive attention, different values being tried.

The well-designed receiving set should glide quite smoothly into oscillation as the reaction coupling is tightened, and oscillation should cease at the point at which it started during the loosening of the coupling.

Tuning without squeals should be the aim of every self-respecting wireless man. It can be accomplished by the exercise of reasonable care and by being always on the look-out for signs of oscillation whilst searching and tuning are in progress. The

READERS' QUERIES.

"Popular Wireless" offers its readers the best Technical Queries Service in the country. Turn to the Radiatorial page for full details, and don't fail to take advantage of the advice of experts if you are in trouble with your receiver.

approach of the set to the oscillating point is generally heralded by a rustling noise rather like that made by the wind amongst dead leaves.

Two Bad Types.

This is caused by the fact that the set is now in a sensitive condition and it is amplifying and making audible minute noises due both to the batteries and to small atmospherics. When the set is in this condition a loud "plock" will usually be produced if the aerial terminal is touched with a wet finger. The "plock," however, is not an infallible sign of oscillation—it may not occur at all, for example, if you are wearing rubber-soled shoes. The rushing noise is a sign that you are overdoing reaction. If you work with the set in this condition whilst receiving telephony you will probably get very strong signals, but they will be badly distorted. High notes or loud passages in music will be harsh and grating, whilst speech will be woolly. Therefore, loosen the coupling a little until in the intervals when no signals are coming through you obtain something like a background of silence.

It is easy enough to pick up a fairly strong signal without getting the set into oscillation. But what of those weak and distant signals which are almost outside the range

of a particular receiver? Can they be tuned in without causing interference? The answer is yes, if you know how to do it. One may certainly be responsible for a squeak or two for a moment whilst the silent point is being found, but this will cause very little trouble to others so long as you leave matters alone once you have resolved the carrier wave and do not spend the next half hour in trying to get signals just a little better. The temptation to do so is a very strong one, but it must be resisted, for you may be quite certain that you will give rise to a great deal of interference by doing so, and that you will certainly obtain distortion in your own reception.

There are two bad types of oscillators. The first is the man to whom I have just referred, who is never quite satisfied with his tuning. The second is the fellow who does not mind distortion so long as he can obtain volume of sound. He works his set so that it is just on the verge of violent oscillation, with the result that he sends out a heterodyne in the form usually of a low continuous moan which drives his friends and neighbours to the verge of distraction.

In a good many receiving sets that I have seen, hand capacity effects are responsible for the interference that they cause. What happens is this. The operator, after a spell of painstaking work, brings in the desired signal at good strength and without distortion. He removes his hands from the controls. The set bursts into oscillation. In these circumstances anything like proper tuning is impossible. Hand capacity effects may be almost entirely eliminated by a little care in design and in construction.

Good Earth Connection Essential.

To begin with, it is most important to connect to the fixed plates of condensers those points of tuned circuits which are at radio-frequency high potential. Thus, in the primary circuit the aerial should go to the fixed plates and the earth to moving; in the secondary the grid must be connected to the fixed plates and the low-tension lead to the moving; in tuned high-frequency couplings connect the anode to the fixed plates and high-tension positive to the moving. Arrange your set so that the knobs of rheostats and of condensers are not so placed that when the hand is upon them it is very close to one of the inductances. Keep leads at different potentials well apart and do not let them run for long distances parallel to one another. If after taking all these precautions you still suffer from hand capacity effects, then fit your condensers with long handles so that you can accomplish your tuning, so to speak, from a distance.

Metal Shielding Plates are Advisable.

Lastly, do not forget that almost any kind of sensitive receiver is apt to become very unstable indeed if the earth is a poor one. The ideal state of affairs would be to have no resistance at all in the earth connection; the earth terminal of the set would then be at exactly earth potential. Actually we cannot altogether eliminate resistance, though we can keep it very low. A bad earth connection joined to the set by a long length of thin wire means a high resistance, with the result that the earth terminal may be at a potential a good deal higher than that of earth. When this happens look out for squalls!



Conducted by our Staff Consultant, Dr. J. H. T. ROBERTS, F.Inst.P.

Wave-length Standard.

THE well-known property of certain crystals, known as the piezo-electric property, has now been made the basis of a system for standardising wave-lengths. The system depends upon the simple principle of resonance, the circuit in question being tuned until it resonates with a certain oscillator of a mechanical nature. In the ordinary way, however, it is difficult to make a mechanical oscillator whose natural frequency approaches the high frequencies used in wireless transmission. The quartz crystal provides the solution to the problem. If a sheet of quartz be cut from a natural crystal in a particular direction, and two metal plates be attached to the two surfaces of the quartz, this system forms an electrical condenser, and if alternating potentials be applied to the two metal plates, the quartz crystal will lengthen and contract in synchronism with the applied alternating potentials. The quartz crystal, of course, is a mechanical vibrating system, and by making its dimensions small, its natural frequency of vibration may be made extremely high.

Constant Frequency.

Its frequency is, moreover, extremely constant, provided its temperature is kept constant. It is a fairly simple matter to calculate the natural frequency of the crystal, from the laws of piezo-electricity, and also to observe when the crystal is vibrating at resonance. Hence, the crystal forms a very reliable frequency standard, and one which is under consideration for adoption by the United States Bureau of Standards. A full account will be found in "Popular Radio" for April.

A New Crystal.

I see in the "Radio Bladet" (Stockholm) an account of a new crystal, discovered in Paris by a French metallurgist, for which the usual claims are made as to clearer and louder reception, and so on. It is stated to be a compound of silicon and iron. Accounts of "amazing" results with new crystals appear now with such regularity that they become not merely unconvincing, but positively monotonous.

The Neutrodyne and Superhet.

The continued popularity of the Neutrodyne is shown by the recent statement of R. T. Pierson, president of the Hazeltine Corporation, which controls the Neutrodyne patents. According to the "Scientific American" Mr. Pierson estimates that the manufacturers of Neutrodyne radio apparatus expect to do a combined business of five million pounds by the end of the present winter season.

According to a number of questionnaires conducted recently by some of the U.S.

wireless journals as to the popularity of different circuits, the Neutrodyne was put at 52 per cent, the super-heterodyne being placed at 37 per cent. It should be said, however, that the super-heterodyne is rapidly gaining in popularity, and has only recently been widely marketed so that figures may quite possibly be very different from what they were when the above-mentioned estimates were made. The super-het. is, of course, rapidly gaining in popularity in this country, too.



A corner of the wireless exhibition organised by the L.C.C. at Beaufoy Institute, Lambeth. A "seven-valver" exhibit is seen in the photograph.

The Microstat.

Some days ago I received from Messrs. Wates Bros. a model of their well-known "Microstat" rheostat, made in silver and enclosed in a neat case. A number of these have been presented to different people, I understand, to mark the 250,000th birthday, so to speak, of the microstat, or rather the completion and sale of 250,000 of these rheostats.

A Giant Generator.

In the laboratories of the University of Paris (according to "Radio Electricité") is a giant electrical generator capable of delivering direct current at a voltage of some 600,000 volts. Amongst its various other uses, this new machine will be employed in connection with experiments on extremely short wireless waves, although these waves will not be used for the purposes of wireless transmission. It is interesting to note that much higher voltages than this have been generated by the stepping-up of

alternating potentials, but the development of D.C. voltages of this magnitude is a much more difficult matter. Very high D.C. voltages (but with only an infinitesimal amount of power) have been developed on a laboratory scale by means of a speck of a radio-active substance upon the end of an insulating thread, the substance attaining its high potential by reason of its emission of electrified particles.

Depolarisation.

Some notes which I made recently on the subject of Leclanché batteries with automatic air depolarisation have brought me, amongst other correspondence, a letter from Messrs. Le Carbone, the well-known manufacturers of carbon electrical appliances, to the effect that air depolarising batteries have been manufactured by them for some considerable time past. According to the letter, the air depolarising cells manufactured by this firm are claimed to be quite satisfactory in use, and those made for the purpose of supplying the plate voltage for wireless sets are stated to be capable of operating a six-valve set. The

same type of cell is also used for railway signalling, and similar claims to satisfactory working are made in this connection.

I would point out that the observations which were made in these columns had no relation to the product of Messrs. Le Carbone. As regards the Le Carbone batteries, I have had no personal experience of these, and therefore merely quote the substance of the claims made in their letter, nor am I able to give here information as to comparative prices, but any readers who may be interested should write direct to the firm mentioned.

Transformer Cores.

I frequently receive inquiries from readers as to the merits of the substance known as stalloy, and as to where this material can be obtained. Stalloy, of course, is a metal akin to magnetic soft iron, but it is much superior to the latter in that the losses which occur in a transformer, for

(Continued on page 416.)



A Weekly Resumé of British Broadcasting Activities specially compiled for the general reader.

THE next twelve months are likely to provide many interesting developments in broadcasting. The various opposing forces are already gathering for the struggle for the control of broadcasting after the present licence expires at the end of 1926. The entertainment industry proposes to make a strong bid for its own service. The newspapers have their own plans, but there appears to be marked divergence of opinion in that camp.

One group, which is sponsoring a new organisation of listeners, is credited with the intention of securing direct representation on the new B.B.C. Board, or, failing this, of setting up its own show. The wireless manufacturers, too, are gathering for the fray, and there is noticeable activity on the part of the retail distributors. Meanwhile, the B.B.C. goes on with its development on the basis that it will be quite prepared to be judged by results. Altogether there will be ample material for "secret historians" during the next year and a half.

Ever since the voice of the nightingale was broadcast there have been repeated suggestions that the B.B.C. should attempt to put across the noises of other wild birds. An elaborate attempt was made in the marshes of Norfolk in February and March, but the various essential factors failed to synchronise, and the proposal had to be abandoned. The latest suggestion is that the laughing gulls of the east coast should be broadcast. These gulls appear to laugh loudest on the Watton Mere during April, and the possibility of communicating their joy is now being explored.

Derby Day Noises.

The National Association of Radio Manufacturers, who are providing a broadcast concert from 2 L O on April 28th, propose to do this on novel lines. Their idea is to take twenty minutes of the best local material from each of the following towns: Birmingham, Manchester, Glasgow, Bournemouth, and to complete the programme with London talent. The provincial contributions will be put out from the local studios, but will be dovetailed into the simultaneous broadcast arrangements, so that the listener will hardly notice the change over.

I understand that if the B.B.C. secures the extra money it expects from the regularising of the licensed position by the Wireless Bill, there will be no more provided concerts.

On Derby Day microphones will be installed at Tattenham Corner, and as near

the winning-post as possible. An interesting assortment of noises should be provided in this way. This is an example of the limitation imposed on the B.B.C. by its agreement with the newspapers. No narrative is allowed, but noises may be put across.

Speaking of noises, the next broadcast of a cabaret will be precluded by the street noises of the people arriving, in order to convey a more realistic atmosphere.

H.M. The King to Broadcast.

The negotiations between the B.B.C. and the theatre industry are somewhat long-drawn-out, but both sides are making a determined endeavour to find the elusive working formula which it is hoped will reconcile the essential interests of both parties. Of course, the theatre managers are anxious to secure some kind of control, not only of theatre broadcasts, but also of the actual studio programmes. Almost any agreement will call for more concession than gain so far as the B.B.C. is concerned, but the attitude at Savoy Hill is uniformly conciliatory. I wonder when the concert people will realise the folly of refusing to negotiate.

Many interesting "outside broadcasts" have been arranged for next month, and chief among these is that of a speech by H.M. the King who will be heard on May 19th. But more of this next week, when further details will be given.

A curious situation has arisen in the Irish Free State. The Government imposes a licence fee of £1 on all possessors of receiving apparatus, but has made no provision for a broadcasting service, nor does any of this licence money accrue to the B.B.C. The result is that listeners in the Free State get their programmes from Belfast or England, and pay nothing for them. A movement has been started in Dublin to do something in return for the B.B.C. programmes. One suggestion is that Irish listeners should provide one complete all-Irish programme from London and 5 X X.

Although the Prime Minister has abandoned the idea of setting up a Select Committee at once to consider the broadcasting of Parliamentary proceedings, the scheme is likely to continue to provoke discussion for some time.

The zealous advocates of a broadcast Hansard appear to have missed the point that if it is not handled on a special wavelength through a new high-power station

it will cut into the regular programmes, with the result that the entertainment side will be further truncated. Once the novelty of the thing has worn off I can see the complaint postbag of the B.B.C. rapidly swelling.

Still, I suppose some kind of Parliamentary broadcast is inevitable.

The syllabus of the Easter term of the "Broadcast University" has just been announced in outline. The educational side of broadcasting is far more comprehensively and thoroughly developed in this country than anywhere else in the world. A determined endeavour is made to secure speakers truly representative of the best thought in the country. A feature of the new series which began at Easter is that it includes speakers from seven different stations.

Future Items.

Here are some of the speakers and subjects:

Dr. J. J. Simpson, Keeper of Zoology in the National Museum of Wales, will speak at 7.10 p.m. on alternative weeks from April 7th on "Life in the Water."

On April 20th Sir William Schooling, vice-chairman of the National Savings Committee, will introduce an instructive series of talks entitled "Insuring, Saving, Spending."

On April 27th Professor Lascelles Abercrombie, of the University of Leeds, will begin his course of fortnightly talks on "The Association of Poetry."

On Tuesday evenings weekly from April 21st to May 26th, at 10.10 p.m., Professor J. Arthur Thomson, of Aberdeen University, the eminent biologist, will discuss "Some Wonders of Animal Life."

From June 2nd to July 14th Mr. A. Lloyd James, of University College, London, will deal with "Problems of Speech."

On Wednesday evenings at 7.10, from April 22nd to May 27th, Professor Grant Robertson, of Birmingham University, will speak on "Makers of the Empire," including Drake, Cromwell, Chatham, Clive, Cook, and Rhodes.

The above are taken at random from the syllabus as outlined.

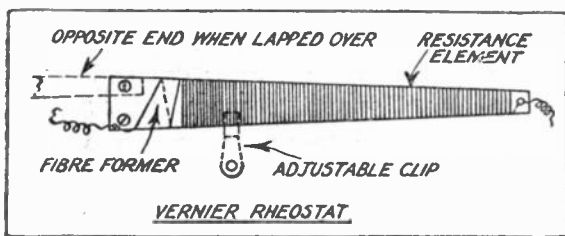
At the time of writing the new 2 L O at Oxford Street is still the subject of varied letters from listeners. Those to the North West and West are loud in their acclamations of praise, but others residing in the East and North East have not fared so well and still complain of reduced signal strength.

Constructional Notes

Conducted by our Staff Consultant, Dr. J. H. T. ROBERTS, F.Inst.P.

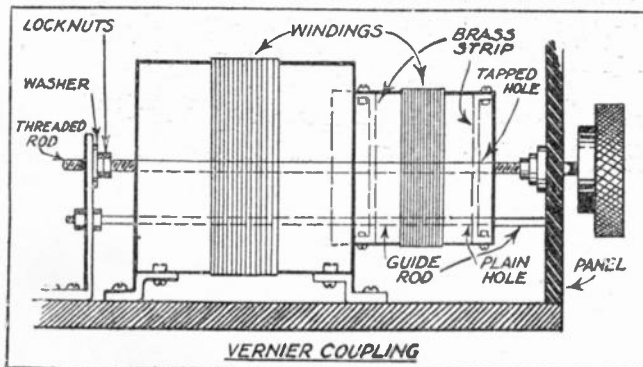
Vernier Rheostat.

IN some types of rheostat the resistance element is wound upon a fibre strip, which is secured in place by means of screws. In these, and certain other kinds of rheostats, it is possible to replace the element by one



of the form shown in the figure herewith. The strip is tapered, so that the change of resistance per turn is less towards one end than at the other end of the strip. Of course, it may happen that when the required amount of resistance is in circuit the contact-arm is near the wide end of the strip, in which case there will not be much vernier adjustment to be had.

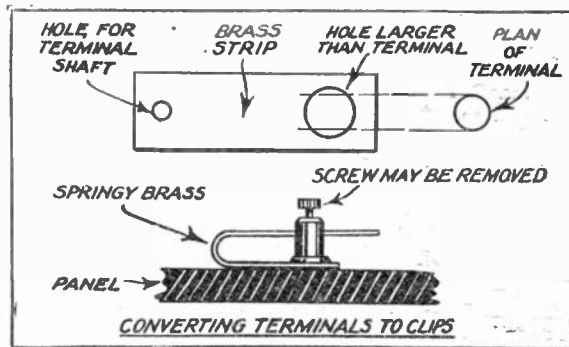
The plan is to move the contact-arm towards the narrow end of the strip, then to place a metal clip (to which the other lead of the rheostat is connected, instead of to the usual terminal) at such a position on the winding that the resistance in circuit is about of the right value. Small adjustments may then be made by means of the contact-arm in the usual way and the rheostat becomes a vernier one. The clip can be shifted from time to time according to requirements, the important point being that it should be so placed that the contact-arm operates in the region of the narrow end of the strip.



Vernier Coupling.

The principle illustrated in the accompanying drawing may be used in making tuned radio-frequency transformers or practically any kind of coupler. The method of construction will be clear from the figure. One coil former tube rests upon two pieces of bent brass strip, which are secured by screws to the base-board. Along the axis of this tube passes a threaded brass rod, supported at one end by a vertical brass strip and passing at the other end through the panel, where it is provided with a control knob in the usual way. The second coil former tube is supported

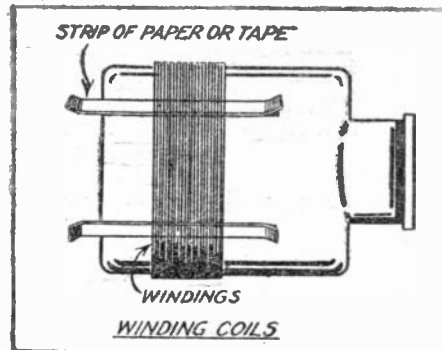
on this threaded brass rod by means of two diametrical brass strips, through the centres of which the threaded brass rod passes. Another rod (plain) is positioned below the



threaded rod and parallel to it: this serves as a guide rod and to prevent the second former from rotating when the control knob is turned. This guide-rod passes through clearing holes in the two brass strips across the second former. The threaded brass rod has lock-nuts at the two ends, so that it turns freely, but without too much play, between the panel and the brass strip support. Washers should be provided but are not absolutely necessary. As the knob is turned, vernier movement of the second coil is obtained.

Converting Terminals to Clips.

For certain purposes, where, for example, the wire to be inserted into a terminal is a single stout wire, spring clips are more convenient than regular terminals, and it is easy to adapt the ordinary terminals so that they may be used in either way. All that is required for each terminal is a short

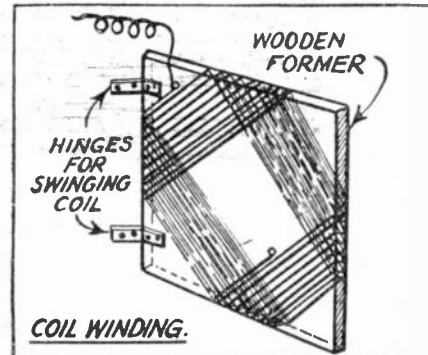


length of springy brass strip, somewhat greater in width than the overall diameter of the terminal. This strip should be about 1 1/2 in. in length, and about 1/2 or less in thickness. A small hole is drilled near one end, to clear the shaft of the terminal, and another hole near the other end to clear the whole of the terminal. The strip is now bent as shown and secured beneath the terminal. It will be seen that the terminal may now be used in either way.

Winding Low Loss Coils.

Here is a simple method of winding low-loss coils. A bottle may be used as the "former," and before commencing operations, three (or more) strips of paper or insulating tape should be lightly stuck against the bottle, as shown, at equal distances apart. The winding is then proceeded with in the ordinary way, and afterwards the strips are turned over and secured against the coil by adhesive or, in the case of insulating tape, by merely pressing firmly in position. After the coil is complete, it is slipped off from the bottle and it will be found to be self-supporting.

Another very simple way of winding a coil upon a "former," which is not only cheap and readily obtained, but is also capable of mounting, so that a variable coupling effect is obtained is made clear by the diagram below. By means of the hinges, the coil former may be mounted in such a way that it can be rotated or moved in respect to another coil, and so tuning or reaction may be controlled.



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Form D



Form C3

Mainly About Broadcasting

By
The Editor

WHAT'S WRONG WITH BROADCASTING ?

ALTHOUGH the technique of broadcasting has made remarkable progress since the inception of the British Broadcasting Company, and although hundreds and thousands of people throughout the British Isles have come to regard it as an essential and integral part of modern civilisation, the expansion of the influence and utility of broadcasting has been comparatively slow, when one eliminates the purely entertainment side of the B.B.C.'s activities.

And a good deal of the dissatisfaction expressed by critics of the B.B.C.'s programmes when analysed is due, not so much to poor programmes, but to the fact that the B.B.C.'s activities are confined and restricted in certain directions in a way which prevents them from establishing a service which no householder, man or woman, could do without.

Dislike of Originality.

Broadcasting as it is to-day is not really essential, and although—as I wrote in the opening paragraph of this article—hundreds of thousands of people have come to regard it as an essential and integral part of modern civilisation, the present scope of the activities of the B.B.C. are not of sufficient importance to really warrant this assumption. And the purpose of this article is to briefly explain that this state of affairs cannot be laid at the door of the B.B.C.

When one comes to scrutinise the work of the B.B.C., several pertinent questions at once leap to the mind.

Why, after two years, is the Broadcasting News Service farcical in the extreme? Why has Parliament, up to quite recently, looked askance at broadcasting when it has been suggested that important debates should be broadcast? Why have certain eminent divines failed to avail themselves of the most wonderful medium for propagating religion and better understanding, etc.? Why— But one could write several hundred words propounding such questions and in the end the answer would be the same, namely—dislike and fear of something new as likely to adversely affect existing customs.

Throughout the ages man has always regarded innovations with suspicion and dislike.

In 1600 Giordano Bruno introduced a novel idea about the earth, to the effect that, if it was not the centre of all things, it must then rather be one of a company of worlds, among which the earth may not even be the greatest.

This knocked the then conventional ideas of astronomy on the head. Bruno's originality was regarded with dislike and suspicion. And dislike and suspicion triumphed over Bruno in the physical sense that it was instrumental in getting him burnt alive in Rome—although a hundred years later his views were commonplace. His originality triumphed in the end at any rate.

There is no need for me to cite other

instances in the history of the world where men have suffered for introducing great changes, either in physical experience or mental philosophy—even wireless in its days of infancy had its bigoted haters, its malicious critics and footling objectors.

And broadcasting is still suffering, to a certain extent, from the same blight, although just lately it must be admitted there have been signs of the dawning of a new era of broad-mindedness and an appreciation of a new art which, one hopes, will not fade away again and leave posterity to judge us with contemptuous exasperation.

Readers of POPULAR WIRELESS are, of course, aware that it is not the fault of the B.B.C. that the news bulletins are so inadequate.

The B.B.C. are bound only to broadcast news sent to them by what one might term

that permission. Paderewski's records must have sold like hot cakes since his broadcast recital.

The broadcasting of the Boat Race this year was again knocked on the head, but it is as certain as night follows day that such conspicuous and popular events will eventually be handled by those responsible for a broadcasting service—whether the B.B.C. or others—sooner or later. What we all hope for is that prejudice will break down sooner than later.

The Finest Tonic.

Whether broadcasting will still be carried on by the B.B.C. at the end of 1926 is no concern of ours at this time; time enough to express



Mr. George Grossmith, who is now liaison officer between the B.B.C. and the Theatre Managers.

the broadcasting censors of the Press—the Press Association, Exchange Tele— But you have heard all that before.

But now that Mr. Baldwin has given rise to hopes that he will review with some favour a scheme for occasionally broadcasting speeches in the House of Commons, there may be a chance of listeners in getting a better news service.

Prejudice in one direction is breaking down, and so perhaps that will start the ball rolling and bring down prejudice in other directions.

Breaking Down Prejudice.

After all, in the long run, broadcasting will win. Already it has won in many battles which, a year or so ago, people thought would at the most be sanguinary affairs. The theatres have undoubtedly ceased hostile protests against the broadcasting of extracts of plays; in fact, a definite arrangement to broadcast so many extracts from plays per year has been arrived at between the B.B.C. and the theatre managers.

The concert world is still adamant—especially since the unfortunate failure of Madame Tetrazzini's recital; but on the other hand the Gramophone Company has acquired a clearer view of the new situation than many of us hoped for. Witness their sensible attitude in allowing M. Paderewski to broadcast, despite his contract with them. And I am sure they did not regret granting

views on that question when 1926 arrives; but the thing we ought to do at the present juncture is to get a fair and a clear perspective of the efforts being made by those at present controlling the broadcasting stations in this country to make the service a national one.

Criticism is the finest tonic in the world—but it's a mistake to overdose only one patient when there are half a dozen others who could do with more doses than the critics can concoct.

Don't run away with the idea that the B.B.C. is omnipotent. It isn't; it has its hands tied in so many places that even Houdini would get the wind up.

If the amateur and the listener will look into the matter—and I have given a few hints where to look—then perhaps the day will soon dawn when broadcasting will be indispensable for every intelligent person in Great Britain.

NEXT WEEK.

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A GRID CONDENSER OF HIGH EFFICIENCY.

REVOLUTIONARY radio inventions are extremely few and far between, but, nevertheless, steady progress is maintained in the development of existing circuits and components.

Curiously enough, however, nobody appears to worry about the grid condenser—it seems to be taken very much for granted.

Grid condensers, and, in fact, all fixed condensers are in the present form great offenders against "low loss" efficiency—and just think, every scrap of energy received on the aerial has to pass through a grid condenser before it can get to the grid of the detecting valve in a valve set—and yet the average constructor will purchase any old thing marked ".0002 mfd." or ".0003 mfd." and insert it in that all-important "key" position. At least, that is my impression gained by a considerable personal experience of home-made sets.

In an attempt to effect an improvement in this direction, I have designed a fixed condenser which I think it will be agreed is



A photograph of the completed condenser.

simple in construction, neat in appearance and efficient in operation. Tests have proved that when the "P.W." "Micair"—as I have named it—is substituted for an ordinary fixed condenser mounted on the panel, greater grid voltage variations due to received energy obtain, and this means louder signals. It is not in all cases audibly noticeable, especially when existing signals are loud, but it is very apparent when distant stations are tuned in.

Extremely Light.

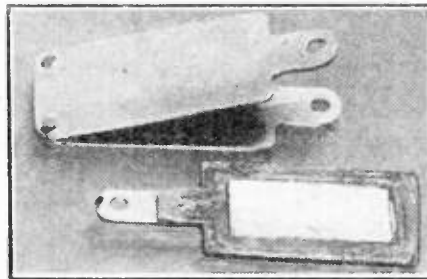
The plates being made of aluminium, the little component is extremely light, and, connected by means of 16 or 18 square section wire, a panel support would in any circumstances be quite unnecessary. Actually, of course, to avoid this is one of the main considerations.

Devoid of all insulating material except thin mica gaskets or washers, possessing stout "cornerless" round-edged plates and centrally disposed air dielectric, this condenser is, if not a "low loss" ideal, I consider a decided improvement on standard practice.

The model illustrated possesses a .00025 mfd. capacity, a distinctly useful value for a grid condenser, and, of course, it can be employed in other positions in H.F. circuits with advantage. The photographs re-

present the exact size of the little condenser and constructors will, therefore, find it a simple matter to cut their material to similar dimensions.

A variable condenser vane of fairly stout gauge can be cut up for the purpose of



The method of construction is made clear by the above photograph.

providing the three necessary plates. Brass or copper could be used, but aluminium is

SOME SUMMER HINTS.

NOW that the summer is coming on—according to the calendar, at any rate—listeners will be able to pay more attention to the outside portions of their wireless equipment. That aerial which has been giving poor results can be altered, and those leaning poles that look as if the slightest puff of wind would accomplish their destruction, but which have miraculously managed to withstand the winter storms, can be straightened up.

As signal strength will fall off during the next six months it would not be a bad plan if listeners were to either clean or renew their aerial wire. Bad corrosion will have taken place since last summer, and the removal of this often has the effect of enabling better results to be obtained.

Poor Earths.

The earth connections—if direct or outdoor leads are used—should be examined in the same way as the aerial wire, and all joints tested to make sure that firm contact is made. If dry weather is experienced, those with outdoor earths (sunk in the ground) will be well advised to water the spot above the earth plate or pin in order to keep the soil round about as moist as possible.

a nice light metal, besides being easily workable.

Cutting the two mica washers or gaskets is the most difficult task. In order to do this it is advisable to obtain some thick mica and cut it to shape, peeling off two single layers afterwards.

These two gaskets should then be lightly mounted one on each side of the central plate, a tiny smear of shellac being used, not so much for permanent fixing, but to hold them in position until the plates are assembled.

Efficient Results.

Two small bolts and four nuts should be employed to act as terminals; one terminal also holds the outer plates together at one end. Two small rivets, which can be small screws cut down, hold the outer plates at the other end. The assembled condenser should be tested for "shorts" before being placed in commission. During the course of assembly it is essential that not the slightest particle of dust be allowed to remain between the plates.

The construction of these little condensers is rather simpler, if anything, than that of the tinfoil and paper or mica type, and I trust amateur constructors will find them much more satisfactory from other points of view, too. I have some half-dozen under constant operation, and their conduct, so far, is exemplary.

Finally, I would like to add that I have experimented with very many other designs, but I am unable to obtain the same most noticeable high efficiency with any other type, and I await with confidence the judgment of my readers, who will, I trust, discover that indeed has the fixed condenser been neglected. G. V. D.

A dry earth is often a cause of poor reception, sometimes of complete failure, and not infrequently of peculiar cracking noises that are at first taken for atmospherics, later for a loose connection, and finally endured in disgust because they cannot be traced.

During Hot Weather.

A not unimportant point for those who have valve sets to remember is that H.T. batteries, or dry L.T. batteries, do not thrive in sunlight. Heat is probably more fatal to a dry battery than damp, though the latter is to be avoided as far as possible. But in avoiding the damp do not be led away by that sometimes misleading motto, "Keep in a dry place," for nothing, except a direct short, so damages an H.T. battery than an evening beside the fire, or a couple of days in a window facing the sun. So watch your H.T. batteries carefully this summer, and as far as possible keep them cool and dry. A little sun may not hurt the coils on a set, but beware of letting it get at the ebonite panel. Ebonite, like batteries, should be kept dry, but equally should it be kept cool, otherwise it will begin to warp and the panel will commence to curl up at the edges, or to twist in the centre, and I have seen several panels ruined by being exposed to the sun for a few hours. It is just as well to keep the sun away from all apparatus and then you will be sure that nothing untoward is happening to the set during your absence in the daytime. Wireless receivers are delicate instruments and you cannot take too much care of them.

K. D. R.



Artistes of the Aether

By "Ariel"

MUSIC TOO CLASSICAL—EASTER ITEMS—NEW PLAYS.



Miss Carrie Tubb.
(Photo, Lasalle).

the more intimate atmosphere of the smaller concert hall to be enjoyed by most, the performances heard recently with the Snow String and Catterall Quartettes have given the best impressions possible of this type of music.

To-night is announced also a newly-formed body of players at 2 L O, the London Piano Quartet, although the artistes themselves are familiar to concert-goer and listener-in—the two not being always synonymous—alike. It comprises Mr. Samuel Kutcher (violin), Mr. Harold Berly (viola), John Barbirolli (violoncello), and Miss Ethel Bartlett (piano). The three string players have been known for some time as the Kutcher String Quartet. In their scheme to-night is Mozart's No. 1 Quartet in G Minor, and Mr. Kutcher's solo is Vivaldi's "Chaconne," which ranks with virtuosi players for difficulty with that of Bach. All good stuff in itself, but I think for the vast public of listeners-in it will again be on the high-brow side.

Request Nights.

This does not mean that good music is not appreciated, for it is certain no dissentient opinion was raised a week or so back when Mr. Frederick Casano and his Octet gave interpretations of some of Wagner's best-known works in a manner worthy of Richter himself as to time and pace, while the tone was equally impeccable. Give us more of these performances and we shall have fewer grumblers.



Miss Mollie Seymour.

The test of this is to be found on "Request Nights," when we do not get demands with these genuine plebiscite programmes for the works of Bach, Brahms or Beethoven, great composers as they are. It is difficult to understand why so many directors insist upon giving

the public the very material it doesn't ask for.

A recent "request" programme at Cardiff resulted in hearing again those two clever artistes who have appeared both in duologue and as soloists, Frederic Lake and Miss Constance Wentworth. Miss Wentworth possesses a voice of fine quality and wide range, coupled with a clarity of diction that adds to its charm.

Popular Artistes.

The appearance of Miss Carrie Tubb on concert platform or before the microphone is always greeted with enthusiasm, for she is one of our greatest English sopranos. An ex-student of the Guildhall School of Music, she made her debut on the operatic stage at Covent Garden in 1910, during the Beecham season, and later she appeared, too, at His Majesty's Theatre. She is best loved perhaps on the concert platform, and we look forward to every Promenade Concert season at Queen's Hall for her special nights, which are generally speaking, the "Wagner" programmes, for Miss Tubb is recognised as one of the finest Wagnerian singers in the country.

It is a noteworthy fact that many artistes start in some other branch of work before they discover their particular musical facility. That fine singer, John Buckleigh, is amongst them. Coming to London to study art, and for some time even on the staff of a London Art School, luckily Mr. Buckleigh discovered the possession of a baritone voice of fine timbre and quality, and which developed into a bass of equal value. Heard recently at Aeolian Hall in a recital of British songs, some thoroughly artistic interpretations were given. Some of his most popular songs, such as "Simon the Cellarer" and "Up From Somerset," as well as the more difficult songs of Moussorgsky, have been recorded. Personally, I like him best in Easthope Martin's "Crown of the Year."

Eastertide Music.

Naturally, music of a more or less religious character abounded last week, Birmingham including Mendelssohn's "Overture to St. Paul" and excerpts from "Parsifal" (Wagner), and Beethoven's Pastoral Symphony; while 2 L O included the "Messiah," relayed from Manchester by the Hallé Concert Society, conducted by

Hamilton Harty.

Monday's programme at Manchester was especially attractive, as it included something for all people.

It included those two famous artistes, Miss Nellie Norway and her silver bells, with her partner, Miss Mollie Seymour. Together they have just recently had another successful season at Maskelyne's, St. George's Hall, London, and a wonderful American and Canadian tour, when Miss Seymour reckons that they covered 40 thousand miles in eleven months. They have broadcast, too, "each and severally," as the lawyers put it, and are at present on a broadcasting tour round the stations. Miss Norway concentrates on her bells, but Miss Seymour ranges from violin solos to humorous comedy songs, and speciality songs with her own violin obligato.



Miss Constance Wentworth.

The High Power Station.

Tuesday's programme at 5 X X included two plays especially written for broadcasting purposes. "Entertaining Mr. Waddington," by Vernon Bartlett, and the other, "The Dweller in the Darkness," by Reginald Barclay. The latter will be performed again to-night at 2 L O, and keen-eared listeners-in should be able to recognise one of the actors as the producer himself. This should prove another "Query" for you.

An Enjoyable Evening.

One of the best schemes for some time past was that framed for Thursday evening last, when the "Orchestral Evening" had the additional support of several first-class artistes in Miss Winifred Davis, Mr. John Turner (tenor), and Mr. Eric Ross and Ida Williams, two bright entertainers whom we should like to hear again, as well as Mr. Walter Todd.

Miss Winifred Davis is a mezzo-soprano, who has just been touring the Aberdeen, Glasgow and Newcastle Stations, where she has met with tremendous success by reason of her well-chosen and well-delivered songs. She has a facility of being able to turn from one branch of art to another. Just recently, she was at Drury Lane, playing the Lady Fiammetta in "Decameron Nights," and I hope she will come to 2 L O shortly.



Miss Winifred Davis.

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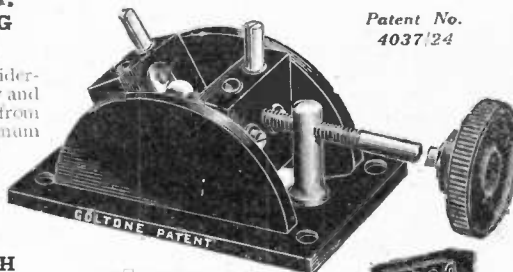
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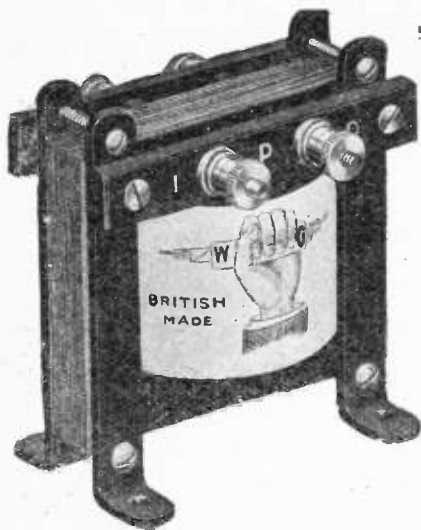
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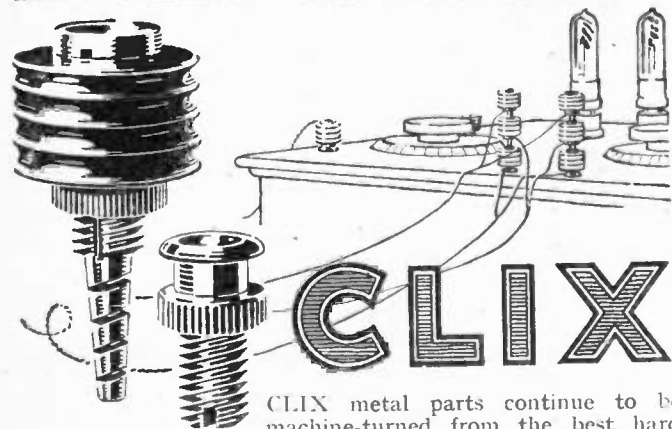
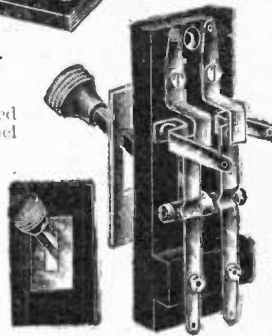


Address all communications to HEAD OFFICE & WORKS: PENDLETON, MANCHESTER. Stocks also held at GLASGOW DEPOT, 95, PITT ST.

"GÖLTONE" NO-CAPACITY SWITCH

Fitted with screwed front plate for Panel Mounting.

Its outstanding features are low price, easy fitting, small space occupied and sweet action. 2-Way Double Pole 3/6 4-Way Double Pole 5/6



CLIX

CLIX metal parts continue to be machine-turned from the best hard brass rod, but a special nickel-bathing process is now employed to increase CLIX high standard of efficiency, workmanship and finish.

The new skin of special nickel-silver alloy of high electrical conductivity ensures in CLIX a perfect fitting connection with a high frequency resistance of practically zero. This fact, in conjunction with the large area of contact surface provided with the minimum of capacitive metal in both plug and socket portions, gives CLIX its supremacy over every other form of plug, switch, or terminal.

Solder all connections! Where you can't, use CLIX!

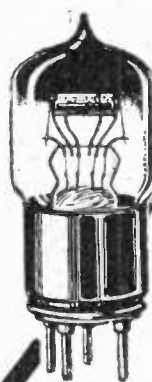
The Electro-Link with 159 Uses.

Retail Prices of the New

CLIX

- CLIX with Locknut 3d.
- CLIX Adapter with Locknut 2d.
- CLIX Insulators (6 colours) 1d. each.
- CLIX Bush (6 colours), 1d. pair.

AUTOVEYORS LTD., 84 VICTORIA STREET, LONDON, S.W.1



The Valve

that opens for you a road of unending possibilities. The C. & S. DULL EMITTER. We are receiving every day unsolicited testimonials from satisfied users, praising its CLEAR MUSICAL TONE.

LONG LIFE, LOW CURRENT CONSUMPTION, and RELIABILITY. The C. & S. DULL EMITTER 2 v. 0.2 amp. (227) which received NEW ZEALAND on a single valve, costs you only **12/-**

(Also made 0.06a (227L) 15/-)

GET YOURS NOW!

Special process dry batteries for these valves:—

227, 7/6 each. 227L, 5/- each.

Send for Illustrated Catalogue.

CRAIK & SMITH (Desk A)
Allen Street, Goswell Road,
London, Phone: Clerkenwell 7346 E.C.1.



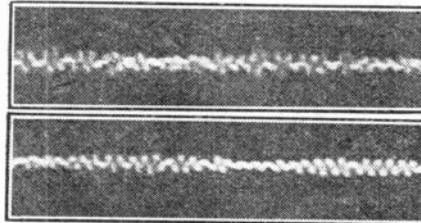


Traders and manufacturers are invited to submit wireless sets and component parts to the "P.W." Technical Dept. for test. All tests are carried out with strict impartiality in the "P.W." Test Room under the supervision of the Technical Editor, and the general reader is asked to note that this weekly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

MESSRS. The Edison Swan Electric Co., Ltd., have sent us a sample of their Ediswan variometer (W/L 439). We are always pleased to see Ediswan stuff, because it is invariably solid and good. Generally it errs, if at all, on the side of massiveness, but when this is accompanied by machine finish and absolute permanency of construction, together with 100 per cent efficiency in design from an electrical point of view, it would be criminal to criticise. And we really believe if this Ediswan variometer figured in the demonstration set at a wireless college for a century, its spindles would still be rigid—although its "big ends" might have loosened a trifle—and its rotor still able to rotate without fouling the stator.

Messrs. Edison Swan state that it has been

designed for efficient tuning between 205 and 634 metres, but in this respect it fails, in that Messrs. Edison Swan haven't designed the thousands of different aerials



The Low-Hilger Audiometer employs a diaphragm much thinner than an average soap-bubble. With this instrument Prof. A. M. Low recorded Mme. Tetrazzini's voice when she broadcast recently. The above is a section of the record which was taken with an Amplion loud speaker in use.

these variometers will be used on, but nevertheless, according to our observations, it will cover all normal broadcasting W/L's under varying conditions.

It is designed for one-hole fixing, and is provided with terminals and straps, so that the two windings can be used separately or together in series or parallel. It is supplied complete with ebonite knob and disc at 9s., and in comparison with cheaper unlabelled makes it is well worth it—a not-too-good variometer quickly becomes no-good-at-all junk.

By the way, we had nearly forgotten to give notice to an Ediswan earthing clip—obtainable at the insignificant cost of 6d. It is rather unique in that it is made of soft tinned copper, and is provided with a series of screw-hole positions, so that it can quickly be adjusted to varying diameters of pipes, and drawn round closely and tightly by means of a stout terminal screw. It is the best thing of its kind we have so far seen.

* * *

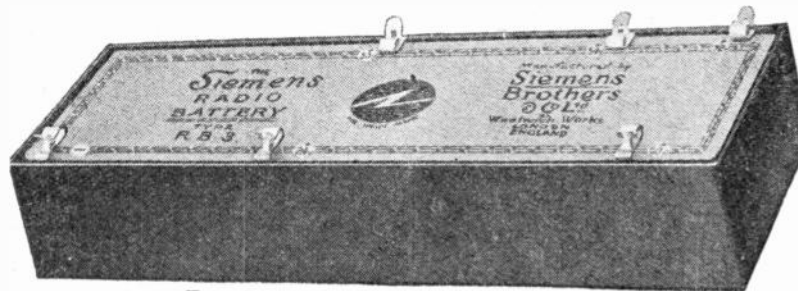
From Messrs. the Symplex Manufacturing Co., of 45, Harrow Road, Brisington, Bristol, we have received samples of "Ray-di-o" earth tubes and lead-in tapes. The earth tube is made from "Armeo" patent iron, and is filled with a hygroscopic material that retains a moist condition within the tube. It is a heavy, solid affair, consisting of two sections which screw together. Driven into sandy soil it formed an excellent earth, and compared well with a large copper earth plate of fairly large dimensions. At its retail price of 3s. 6d. it is decidedly a good investment.

(Continued on page 40.)

SIEMENS HIGH-TENSION RADIO BATTERIES

NEW TYPE—LARGE CAPACITY.

THE H.T. BATTERIES DE LUXE.



Type R.B.3 with lid removed. 72 volts.

In the designing of these batteries very careful attention has been paid to those details upon which the success of a H.T. Dry Battery is very largely dependent. The result is an article which will appeal to the technically-minded by reason of its special constructional features, and to the broadcast listener for the reliability and long life which are associated with the name.

Ample supplies are now available.

Descriptive Price Sheet 645 on application.

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

HARMONIOUS REPRODUCTION



LOUD SPEAKERS & HEAD RECEIVERS

HERE we illustrate our range of quality first Loud Speakers.

No matter what your requirements may be, there is a Loud Speaker here that will give you just the amount of power you require and, what is more important, absolute purity of tone without distortion.

No. 44002. The justly famous World Standard Loud Speaker, which gives a volume of tone suitable for a large dance hall. Price £8.0.0.

No. 44005. A Loud Speaker of medium size, operating on the balanced armature principle, which will give sufficient power for all ordinary purposes. Price £5.17.6.

No. 44004. Slightly smaller than No. 44005, fitted with adjustable diaphragm, an ideal Loud Speaker for the home. Price £2.17.6.

Western Electric Head Receivers are unequalled for general all-round efficiency and maintain their reputation of being the finest instruments procurable.

Price, complete with Adjustable Head-Pad, £1.0.0.

Western Electric Company Limited.

Connaught House, Aldwych, London, W.C.2.

Telephone: Central 7345 (9 lines).

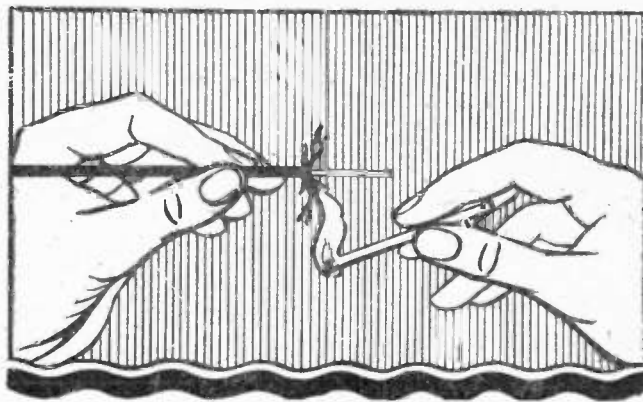
Branches: GLASGOW, LEEDS, BIRMINGHAM, MANCHESTER, NEWCASTLE, CARDIFF, SOUTHAMPTON, LIVERPOOL, DUBLIN.



Western Electric

MAKERS OF OVER HALF THE

:: WORLD'S TELEPHONES ::



To make a neat end, burn away the frayed cotton

You can quickly make a neat end to "Glazite"—the new coloured connecting wire—by burning off the frayed cotton with a match. The charred ends can be rubbed away with the fingers, leaving a perfectly clean finish.

"Glazite" consists of a tinned copper wire covered first with cotton and then with a film of heavy insulating material which makes it flame-proof and impervious to moisture. It has a high dielectric strength and is easily flexible.

"Glazite" is made in 4 colours—Red, Yellow, Blue and Black, so that you can at once distinguish the different parts of your circuit—making "shorting" practically impossible.

No insulating sleeving is necessary when "Glazite" is used. Price 1/6 per coil of 10 feet, at all dealers. Send P.C. for Glazite Leaflet.

GLAZITE

REGD.

The new coloured connecting wire

THE LONDON ELECTRIC WIRE CO.
& SMITHS, LTD.,

Playhouse Yard, Golden Lane, London, E.C.1.

Telegrams: Electric, London. Telephone: Clerkenwell 1388, 1389, 1390, 1391.

HULLO EVERYBODY!!

2 MORE PAGES

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NOTE ALL THESE GOODS post free U.K. except where stated. Foreign orders must include extra for packing and post.

- SUNDRIES**
- Aerial, 7 29, 100 ft. 2 6
 - 50 ft. ditto 1 8
 - Basket Holder and Plug 2 for 2 3
 - Ditto, best quality 2 for 2 3
 - Ditto, spike holder 2 for 2 3
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 - 3-way coil stands 4 6
 - 2-way nickel 3 8
 - 3-way nickel 3 8
 - 2-way gear 5 4
 - 2-way Slipton cam 6 6
 - 3-way Slipton cam 6 6
 - 2-way Polar cam 6 6
 - 3-way Polar cam vernier 9 6
 - 2-way cam vernier 3 8
 - Coil plugs, plain 2 for 1 3
 - Shaped wedge 2 for 1 6
 - Do. Edison Bell 2 for 2 2
 - Do. Nickel sides 2 for 2 2
 - Do. fitted fibre 2 for 1 8
 - Variometer knob 2 6
 - Ebonite knob 4 11
 - Igranite 10 6
 - Edison Bell 10 6
 - Fixed Condensers
 - Edison Bell, .001 1 3
 - .001 up to .0005 1 3
 - .002 up to .003 2 6
 - Grid leak and clips 1 6
 - .0003 and grid leak 2 6
 - Dubiliar
 - .001 to .0005 each 2 6
 - .001 to .003 each 3 6
 - 2 or 3 mag Grid Leak 2 6
 - Anode res. on stand 5 6
 - (50, 70, 80, 100, 000 ohms.)
 - Raymond Ebonite Base
 - .001 up to .0005 1 1
 - .001 up to .006 1 3
 - Grid leak and clips 1 3
 - .01 and .02 each 1 9
 - Mansbridge T.C.C. 4 6
 - 2 mfd. 3 10
 - 1 mfd. 3 10
 - 25 3 8
 - Flush panel sockets, with nuts, doz. 1 3
 - Spade terminals, doz. 1 6
 - Pin terminals, doz. 1 6
 - Spade tags, doz. 6d.
 - Studs, Nuts, and washers, doz. 9d.
 - Shorting plug, 12 ft. 8d.
 - Bus Bar, 12 sq. 12 ft. 1 6
 - Solid Rod Valve Holders 1 3
 - Murray Valve Holders 1 3
 - Bretwood 1 3
 - H.T.C. under panel 1 9
 - H.T.C. over panel 1 9
 - Barrie anti-cap 1 3
 - Burndept Detector 4 6
 - Dual Rheostat 7 6
 - Ormond Rheostat 2 6
 - Ormond L.F. 14 6
 - Rheostat C. & S. 1 3
 - Do. Raymond 1 6
 - R.I. Detector 6 6
 - Empire Tape 1 in. 1 6
 - 12 yds. 1 6
 - Twin Flex, 12 yds. 1 9
 - Red & Black, 12 yds. 2 6
 - 72 in. Phone Cords 1 11
 - Loud Speaker Cords 1 11
 - Easi Fix 3 6
 - Set of Drills (7) 1 9
 - Screwdrivers 8d.
 - Set of 5 Spanners 8d.
 - Soldering Iron 1 6
 - Soldo Tin 1 6
 - Hovimo Crystal Valve Coil Former, wood centre, 23 spokes each side 1 8
 - Glazite 1 6

- CRITERION CONCERT COILS**
- Low Self Capacity. Every turn and layer airspaced Perfect for Reaction. Mounted on Plug.
- | | | | |
|-----|-----|-----|-----|
| 25 | 2 | 50 | 2 6 |
| 30 | 2 3 | 60 | 2 9 |
| 35 | 2 3 | 75 | 2 9 |
| 40 | 2 6 | 100 | 3 6 |
| 150 | 5 | 250 | 6 6 |
| 200 | 6 | 300 | 7 6 |
- Razor sharp tuning
- ENERGO H.F.**
- | | |
|-------------------|------|
| No. 1 150 450 | 3 6 |
| No. 2 250 700 | 3 11 |
| No. 3 450 1 200 | 4 3 |
| No. 4 900 2 000 | 4 6 |
| No. 5 1 600 3 000 | 4 9 |
- EBONITE PANELS**
- 3-16th in.
- | | | | |
|-----|-----|----|--------|
| 6 6 | 1 8 | 10 | 8 3 6 |
| 7 5 | 1 8 | 12 | 9 5 5 |
| 8 0 | 2 6 | 12 | 12 5 9 |
| 9 6 | 2 9 | 14 | 10 5 9 |
- Cut to size in sq. inch.
- PANELS DRILLED FREE WITH ORDERS OVER 20/-** Please send diagram.
- VALVES**
- Bright Emitter
- B.T.H. "R." Ediswan, A.R., Marconi
- Osram "R." or "R5," Mullard
- ORA, Cossor L.F. Pl. Cossor H.F. P2, Mullard H.F., Mullard L.F. 11 6
- Dull Emitter
- B.T.H. B3, Ediswan A.R.D.E., Marconi
- D.E.R. Myers, each 18 6
- Dull Emitters
- B.T.H. B5, Ediswan A.R. "06," Mullard D.F. ORA 21 6
- D.E. Power Valves
- Marconi D.E. 6 22 6
- Power Valves (for .06) B.T.H. B6 30 6
- Marconi D.E. 4 26 6
- Mullard D.F.A. 28 6
- Power Valves, for E.E., B.T.H. B4, Marconi, Mullard 30 6
- (Posted buyer's risk.)
- LISSEN**
- | | |
|-----------------|------|
| Minor | 3 6 |
| Lissenstat | 7 6 |
| Universal | 10 6 |
| Switch 2-way | 2 9 |
| Series Parallel | 3 9 |
| Anode Res. | 2 6 |
| Var. Grid Leak | 2 6 |
| Choke | 10 6 |
| Lissen L.F. T.1 | 30 6 |
| Lissen L.F. T.2 | 25 6 |
| Lissen L.F. T.3 | 16 6 |
- Coils—
- | | | | | |
|-----|------|-----|----|------|
| 25 | 4 10 | 35 | 40 | 4 10 |
| 50 | 5 | 60 | 60 | 5 4 |
| 75 | 5 4 | 100 | 60 | 6 9 |
| 150 | 7 | 200 | 85 | 8 5 |
- LISSEN X**
- No. 60 Coil, 6/4
- TAPPED INDUCTANCED**
- for T.A.T. Sets, 6 6

- IMPORTANT**
- By arrangement with Messrs. Bower Electric I offer genuine **5-PIN**
- THORPE K 4 17 6**
- (Unidyne Valves)
- 5-pin valve holder 1 3
- Sets of parts supplied from **£3 15 0**
- QUALITY (GOSWELL) RADIO COILS**
- Far more efficient than honeycomb or any other type of coil. Exceedingly strong and rigid mounted on standard ebonite plugs. Brown finish, no wax, or shellac used. MOUNTED.
- | | |
|-----|-----|
| 25 | 1 6 |
| 35 | 1 9 |
| 50 | 2 0 |
| 75 | 2 3 |
| 100 | 2 9 |
| 150 | 3 0 |
| 175 | 3 6 |
| 200 | 3 9 |
- Post 3d. Coil.

- GOSWELL (QUALITY)**
- Valve Legs, Set 4 1 3
- Valve Holder 1 9
- 2-way Cam Vernier 9 6
- 3-way Cam Vernier 12 6
- 3-way Ordinary 7 8
- 2-way Panel 3 6
- 3-way Panel 5 6
- Basket Holders 1 4

- HEADPHONES**
- ERICSSON E.V. CONTINENTAL.**
- Your favourite phones. Entirely NEW MODEL. Most beautifully finished, exquisite tone. Ridiculous price per pair (4000 ohms)
- 12/11**

- "R.I." NEW MODEL IN SEALED BOX**
- Don't Buy Otherwise.
- Post 25/- Free.

- FERRANTI L.F. BETTER THAN THE BEST 17/6**

- WATES**
- "Supra" L.F. Transformers, 12 6
- NOTE OUR NEW ADDRESS**

- HEADPHONES.**
- Reduced Prices.
- British B.T.H. 20
- Brander Matched 20
- Tone 20
- General Radio 20
- Brown's F Type 20
- Sterling's 22 6
- All 4,000 ohms.
- Highest quality finish.
- Post free U.K.

- TELEFUNKEN PHONES**
- Adjustable. 4,000 ohms, only genuine when bearing No. EH 333 on each earpiece. These phones are lighter than a feather, and simply wonderful for reception. Post price U.K. 17 11 pair.

- "WONDER"**
- Aerial Wire, 49 strands. Special alloy Phosphor Bronze, for frame, indoor, or outdoor. Non-corroding. 110 ft. 3 3

- IGRANIC COILS**
- Coils: 25, 5; 35, 5; 50, 5 2; 75, 5 8; 100, 7 6; 150, 7 10; 200, 8 8; 250, 9 6; 300, 9 6; 400, 10 3; 500, 10 6
- Rheostat 4 6
- 30 ohms 7 6
- Potentiometer 7 6
- Variometer 10 6

- West End Stockist of Edison Bell, Igranite, Goswell (quality), Polar, Jackson Bros. (J.B.), Marconi, Cossor, Mullard, Ediswan Valves, Sterling, B.T.H., McMichael's Lissen, Dubiliar, T.C.B., Slipton parts.

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- C.A.V. Tom-Tit 30
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- Colvern 3 6
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- SUPER SELECTIVE SETS**
- Special 10,000 to 100,000 ohms anode resistance
- E.M.C. 4 6
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- PHONES SOLD HERE ARE GENUINE!
- BEWARE OF FRAUDULENT IMITATIONS!!**
- (Injunctions obtained)
- Adjustable diaphragm detachable receivers, double leather-covered head-springs, long flexible cords, nickel-plated parts. Very comfortable fitting to the head. Per Pair, **12 11** Post 3d. pair.

- POLAR**
- .001 Var. Condensers 10 6
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- Micrometer 5 6
- 2-way cam vernier 6 6
- Post Free U.K.

- RHEOSTATS**
- Slipton New Type Strip Rheostat, 7 ohms (with fuse) 3 6
- Slipton New Type Strip Rheostat, 30 ohms 3 6
- Slipton New Type Strip Rheostat, 60 ohms 3 6
- Slipton Potentiometer, 600 ohm 4 6

- "UTILITY" SWITCHES.**
- 2 Pole c o Knob 4 6
- 2 Pole c o Lever 5 6
- 4 Pole c o Knob 6 6
- 4 Pole c o Lever 7 6
- Post 3d. each.

- L.F. TRANSFORMERS**
- Eureka Concert Grand 30
- Eureka Second Stage 22 6
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- Portland 12 6
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- Var. Grid Leak 2 6
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- BREAST DRILLS**
- Double Pinion and Gear, Extra Handle.
- Fine Value 4 6
- Post 9d. each U.K.

- H.F. TRANSFORMERS**
- "Raymond"
- 300-600 2 10
- 1100-3000 3 6



6/6 all wave-lengths

GET THOSE DISTANT STATIONS WITH "STRADIO"

H.F. TRANSFORMERS

Wonderful Results.

also

VARIABLE CORE H.F.T.

9/- 150-300 9/-
each 300-600 550-1,200 each
1,100-3,000

NEUTRODYNE

Made by Stirlings Ltd.

This device simplifies Tuning, enables control of Multivalve H.F. circuits, matches pairs or threes of H.F. Transformers exactly. Eliminates self oscillation.

Post Free U.K.

"MICHROM" VERNIER CONDENSER

24 Turns of adjustment. Min. Cap. .00010001 mfd. Max. .00015 mfd. Can be used as a stabiliser in Neutrodyne circuits. **2 6.**

Post free U.K.

"LOTUS"

Large stocks of these Cam Verniers.

2-way 7/-
3-way 10 6

POST FREE U.K.

YOUR FARE PAID

on certain goods up to 2 - in the £ spent. (N.A.R.M. and fixed excluded.)

"Y.C." (Yellow Crystal)

Permanent Detector. Why Pay More? **3 9**

Post 2d.

BRETWOOD VARIABLE GRID LEAK or ANODE RESISTANCE 3 - each

"PORTLAND" L.F. TRANSFORMER 12/6

Highly recommended.

K. RAYMOND, 7, GRAPE STREET, SHAFTESBURY AVENUE, W.C.2

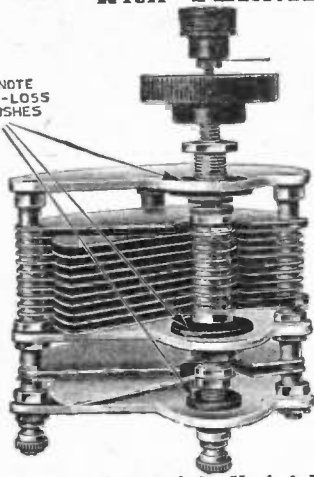
(NEW OXFORD STREET END.) (NEAR PRINCES THEATRE.)

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Wholesale and Retail

REVOLUTION IN VARIABLE CONDENSERS SQUARE LAW LOW-LOSS with VERNIER

NOTE
LO-LOSS
BUSHES



Electrical losses reduced to a minimum.

Full capacity as rated.

Exceptional low Capacity

The Condenser for short wavelengths.

Price includes Knob & Dial.

Aluminium Ends :	Ebonite Ends :
·0005 7/9	·0005 8/11
·0003 7/-	·0003 8/6

Post 6d. Set.

RAYMOND VARIABLE CONDENSERS SQUARE LAW.

One-hole fixing. Aluminium ends.	EBONITE Bushes. Highly recommended.
WITH VERNIER	WITHOUT VERNIER
·001 8/9	·001 7/7
·0005 7/9	·0005 5/9
·0003 7/-	·0003 & ·00025 - 5/3

Ebonite ends 1/- extra. Ebonite ends 1/- extra.
Post 6d. Set. Prices include Knob and Dial.

DE LUXE ORDINARY

Complete with Knob and Dial.	18, Bardolph Rd., Bungay.
·001 alum. ends 8/11	Goods more than satisfactory. I am convinced there is not a better instrument on the market than your variable condenser.
·0005 " " 5/6	G. BALDRY.
·0003 " " 4/11	
·0002 " " 4/6	

Post 3d. Set.

TWIN CONDENSERS.

Equal parts of ·0005, ·0003 and ·00025. With Knob and Dial. EBONITE ENDS.

·0005 18/11
·0003 12/6
·00025 12/6

GENUINE 'BRUNET'	'BRUNET' PHONES	RAYMOND
L.F. Transformers. 3-1, Primary 5000 Secondary 15,000 5-1, Primary 5000 Secondary 25,000 13/6 each	New Model, Black Cords. 4,000 ohms 16/6	Crystal Set. Sloping cabinet. Fitting for Chelmsford. Splendid results, 17 - including aerial wire, lead-in, and insulators. Post Free U.K.

TESTIMONIALS.

4, Albert Court, Kensington Grove, S.W.7
March 21st, 1925.

Should like to congratulate you on your new ·0005 Sq. Law and Vernier. It is very smooth and accurate in working, absolutely silent when tuning. It is easy to fix to panel, without upsetting the balance of the vanes. This latter point has not always sufficient attention paid to it. Mrs. TURNER.

Aldershot.
March 12th, 1925.

Your Condenser is a great success. Given me the finest of tuning I've ever had. P.O. for further orders.
W. FLINT.

- 7. Grid Leak & ·0003 . . . 2/2
- Edison Bell do. 2/0
- Dubilier do. 5/-
- Terminals complete.
- 9. Pillar doz. 1/3
- 10. " " " " " 1/-
- 11. W.O. " " " 1/3
- 12. "Phone " " " 1/1
- (Nickel 9d. doz. extra.)
- 14. Voltmeter each 5/6
- 15. Grid Leak & Clips . . . 1/4
- 16. Rheostat & Dial 2/3
- 20. Murray Valve Holder. . . 1/3
- 21. C. & S. Rheostat 1/4
- 23. D.P.D.T. Nickel (panel) 1/3
- 24. S.P.D.T. " " " 1/-
- 27. Headphones. " See lists.
- 28. Sterling Square Law & Vernier : ·001, 30 6 ·0005, 25 6 ; ·00025, 23 6
- 29. Shaped Coil Plug 2 for 1/9
- 30. On or Off Switch 1/3
- 31. Igranic Rheostat 4/6
- 33. Energo H.F. all W.L. See Lists elsewhere.
- 34. Wates Microstat 2/9 (For D.E. or R valves)
- 35. Ebonite Tumbler Switch 1/3
- 36. Real Ebonite Dials 1/3
- 41. Loud Speakers. See List.
- 43. 2-way Basket Stand 5/6
- 44. Bretwood Valve Holder 1/9
- 45. One-hole fixing Brass. 10d. Ditto Nickel 1/2
- 46. Solid Rod Valve Holder 1/3
- 48. L.F. Transformer 5-1. 9/11
- 49. Formo Shrouded 18/-
- 51. Enclosed Detector (large) 1/6
- Also Micrometer movement 2/3
- 54. Variometer & Dial 3/11
- 55. Rheostat, one-hole fixing . . 1 8, 1/4
- 57. Manchester "Powquip" . . 15/6
- 58. Standard "Powquip" . . . 14/6
- 59. Shrouded "Powquip" . . . 18/-
- 60. Ormond 14/6
- 61. Igranic L.F. 21/-
- 62. 3-way Stand 4 3, 4 11
- 63. Lissen L.F. T 3 16/6
- 64. Lissen Pull and Push . . . 2/9
- 65. Lissen, 5 point. 4/-
- 66. Lissen Minor 3/6
- 67. Lissen Grid Leak 2/6
- 68. Screw Spades doz. 1/-
- 69. Legless Valve Holder. . . 1/3
- 70. Goswell, do. 1/6
- 71. 3-way Coil Stand 5/6
- 71. Valve Holder 1/3
- 72. T.C.C. Mansbridge 15/-
- 73. Energo L.F. 30/-
- 74. Eureka Grand 7/6
- 75. 3-Way Cam Vernier 7/6
- 76. Utility Switch See List.
- 77. Success Super. 21/-
- 78. T.C.B. 6 or 30 ohms. . . . 4/-
- Potentiometer 300 ohms 5/-

London's Largest Stockist of

JACKSON BROS.

"J.B." Condensers, Square Law with Vernier.

·0005 12/6
·0003 11/6

SQUARE LAW

·001 9/6
·0005 8/-
·0003 and ·00025 6/9
·0002 5/6

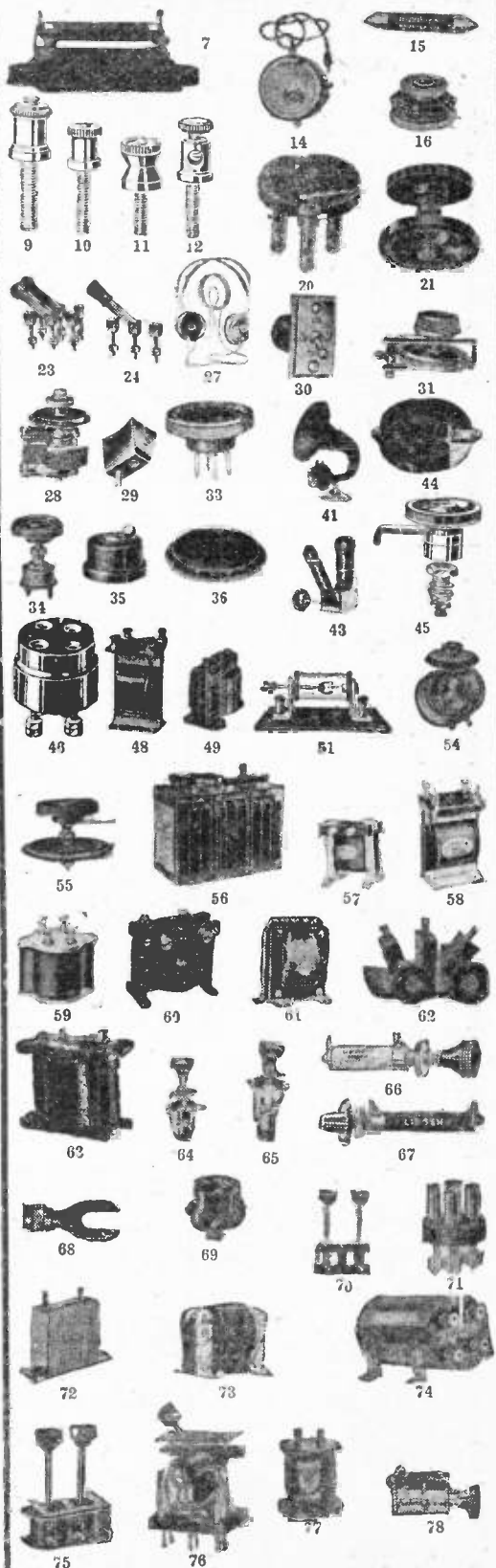
STANDARD

·001 8/6
·0005 7/-
·0003 5/9
·0002 5/-

With Knob & Dial. Post 4d. All Models Stocked.

7, GRAPE ST.,
Shaftesbury Avenue, W.C.2.
New Oxford St. End

SEE OVERLEAF →



SPECIAL BARGAINS OVERLEAF →

CALLERS—THESE 7 COLUMNS FOR YOU!

No Post Orders.

Thousands of Bargains.

SENT BY POST

WEEK'S BEST BARGAINS

GENUINE "N & K" HEADPHONES

Guard against inferior imitations which are "cleverly" got up to deceive. Make sure of the genuine article, the original "N & K," and avoid dissatisfaction.

See that the letters "N & K"—and no other—are stamped. 4,000 ohms. 12 11 Post 6d. pair.

TELEFUNKEN LOUD SPEAKER

Splendid Tone. THE PRICE!

19/11

DON'T FORGET TO NOTE

Extension of Business.

New address:

7, GRAPE STREET, Shaftesbury Avenue, W.C.2. (New Oxford St. end.) Near Princes Theatre.

"HARLIE" DETECTOR.

Fool proof 5/6

EUREKA GRAVITY DETECTOR.

As advertised 6/6

R.I. PERMANENT DETECTOR

6/-

"MOVIMO" CRYSTAL VALVE.

A wonderful detector 3/6

"P.W." SUPER-SELECTIVE CIRCUIT.

"E.M.C." 10,000 to 100,000 anode. Res. 4/-

Wamel ditto. 3/6

Loud Speakers. 15/9
4,000 ohm. 'phones 6/6
3-way coil stands 3/6
Special rheostats 1/-
Crystals, best 6d.
Enclosed detectors 8d.
Extra large detectors 1/-
Nickel switch arms 9d.
Brass switch arms 6d.
(One hole fixing)
2 v. 40 accumulator 7/6
H.T. Batteries, 60 volt 5/6

VARIO-METER
250/700 metres inside winding, worth 10/- 50 at 4/11

"Popular Wireless" (Limited number) Free to callers.

ENGLISH 4*5 BATTERIES 4/- doz.

A FEW ITEMS OF INTEREST
Terminals, 1d.; doz. 10d.
Nickel, 2d.; doz. 1/8
Valve sockets, 4 for 3d.
Stop or valve pins, each 1d.
Washers 12 a 1d.
Nuts 6 a 1d.
Spade tags 6 a 1d.
Spade terminals, 2 for 1d.
Pin terminals, 2 for 1d.
Above, red and black, 2 for 3d.
Copper foil, foot 2d.
Bell wire, 10 yds. 5d.
Empire tape, 12 yds. 6d.
Red and black flex, 12 yards 1/6
Aerial 7 22-00 ft. 1/10
Battery clips, 3 a 1d.
Sleeving, 3 yds. 6d.
Wander plugs, pair 2d.
Contact studs complete 2 a 1d.
'Phone cords, 6 ft. 1/3

EXIDE
D.T. 9 type, 2 volts. For '06, 5- and 10-.

RUBBER 'PHONE EARCAPS
1- and 13 pr.

MICROMETER
Crystal Detector. Enclosed 1/8

CRYSTAL SETS
with 'phones, 4,000 ohms, aerial, and lead-in. 15/6 and 19/6

DON'T READ THIS!

EBONITE
Stock sizes 3 16th. 6 x 6 7 x 5 each 12
8 x 6, 9 x 6 " 10
10 x 8, 12 x 6, " 3-
12 x 9 " 4/3
12 x 12 " 5/6
14 x 10 " 5/8
1/2 in. also stocked.

H.F. TRANSFORMERS
B.R.C. 2/6
5XX 2/11
"Stradio" (Barrel) 6/6

ACCUMULATORS
(well-known makes)
2v. 40a. 7/6, 8/6
4v. 40a. 13/11, 15/11
4v. 60a. 17/6, 18/3
4v. 80a. 22/6, 23/6
6v. 60a. 25/11, 27/6
6v. 80a. 33/-
6v. 100a. 38/6
Harts & Rotas stocked

D.C.C. WIRE
1/2 lb. reels
18 or 20 g. 9d.
22 g. 10d.
24 g. 11d.
26 g. 1-
28 g. 12
16 g., per lb. 2/4

COIL FORMERS
Double 1/3

Ericsson E.V. Con-
ditional 4,000-ohm
'phones, worth much
more. Caller's price,
11/9 pair.

Ebonite Coil Plugs
Fitted fibre. 7d.
Plain. 4d.
Shaped. 6d. & 7d.
Edison Bell. 11d.

The set used by Miss
Evelyn Lave in her
dressing-room is made
of Raymond parts.

To celebrate the opening of our
new premises, **many gifts
GIVEN AWAY.** (See windows for
particulars.)
B.B.C. 60-v. Batteries 8/6
B.B.C. 36-v. Batteries 5/4
B.B.C. 8-v. (grid bias) 2/3
Eveready, Siemens, Hellenens. All makes
stocked.

SPECIAL OFFERS!

SQUARE LAW
Variable Condensers
-0005 5/-
Including knob &
dial. Ebonite ends
1/- extra.

Square Law
Variable Condensers
-0005 4/6
Including knob &
dial. Ebonite ends
1/- extra.

Wonder Aerial
Phosphor bronze.
49 strands. Not
cheap imitation.
110 ft. 3/6

Criterion Coils
25, 35, 50, 75, 100.
Set of 5. 8/11.
Sold separately.
Very special offer.
150 5/- 200 6/-
250 6/6 300 7/-
Razor-sharp tuning.
Mounted on plug

SPECIALS IN COIL STANDS

2-way, extra quality 1/11
2-way cam vernier 3/3
2-way geared. 5/3
Few to clear at 1/-

DUPLEX WAXLESS

Extra air space. Set of 5 coils, 25, 35, 50, 75, 100. 1/8.

SWITCH ARM

12 studs, 12 nuts, 12 washers. The lot: Brass, 10d., Nickel 1/3.

SHAW'S GENUINE HERTZITE

Only genuine if with W. J. Shaw facsimile signature on seal box. Price 8d.

D.P.D.T. SWITCHES

Panel, 1-; on china base 1/3
S.P.D.T. Ditto. Panel, 10d.; on china base, 8d.

ALLEN VAR GRID LEAK, 1/3.

1,000-ohm bobbing 10d.
Tumbler switches 11d.
Shorting plug 3d.
Egg insulators 4 for 3d.

A FEW MORE BARGAINS RHEOSTATS

Ebonite basket holders, 6d., 7d., 8d., 9d., 10d., 1-
Valve windings 4d.
Screws and nuts 2 a 1d.
'Phone connectors 1d.
Pliers, good make 10d., 1-
Mansbridge 3/9
Mansbridge 3/3
Ditto. 25 2/9
Climax earth tubes 5-
Twin silk flex, 6 yds. 6d.
Gold whisker 3d.
Silver 2d.
4 (one gold) 1/1d.

SPECIAL!

H.T. Batteries

60 v. - 4/11
5/11, 6/11

All Best quality

"BEST WAY" BOOKS.

Crystal Sets. Valve Sets. Wireless Coils, Special Sets. 6d. each. We offer you special prices for various parts in above. Radio Press Books. Post Free.

50 only. L.F. Transformers

5/11

£1 Weekly

given for best photograph of any set made with our parts. Ask for particulars.

Come and be snapped on Saturday, April 18th, at 3.30. It may be worth 10/- to you.

K. RAYMOND

7, GRAPE STREET, SHAFTESBURY AVENUE.

(New Oxford Street end.)

Near Princes Theatre.

HOURS OF BUSINESS
9-30 to 8.
SUNDAYS, 10 to 1

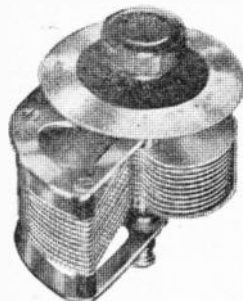
APPARATUS TESTED

(Continued from page 404.)

The lead-in tape is a strong flexible article, that can be clamped between a window or door and its jamb without fear of damage occurring.

Readers are asked to note that the price of the new R.I. dual rheostat is 7s. 6d., and not 7s. 3d., as stated in a recent advertisement.

Messrs. the Edison Swan Electric Co., Ltd., have also sent us samples of the four new Ediswan valves which have recently appeared on the market, viz., A.R.D.E. H.F., A.R.D.E. L.F., P.V.5 D.E. and P.V.6 D.E. All of these valves are dull emitters, and their specifications are as follows: the A.R.D.E.'s, fil. volts 1.8-2.0, fil. amps. .3; plate volts, H.F. 20-100, L.F. 30-100; L.F. grid bias 1.3 volts neg., price 18s. each; P.V.5 D.E. dull emitter power valve, fil. volts 5, fil. amps. .25; plate volts 50-150, price 30s.; P.V.6 D.E. dull emitter power valve, fil. volts 1.8-2.0, fil. amps. .4; plate volts 60-120, price 22s. 6d.



The new "Atlas" square law variable condenser.

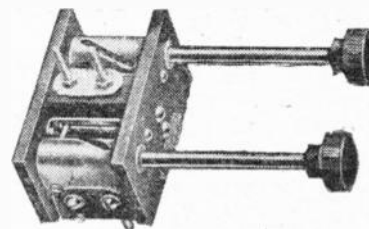
Of these four valves the one which appealed to us most was the P.V.6 D.E. It is one of the best L.F. amplifiers we have tested, and, as a power valve, it provides wonderful volume with surprising mellowness and purity of tone. For its filament consumption, it handles well-developed grid voltages in a manner expected only of abnormal current-eating valves; its filament emission, conservatively approximated at 15 milliamps. by Messrs. "Ediswan's," is a revelation of modern valve development.

The A.R.D.E.'s are distinctly good. The H.F. type is distinguished by a red line and the L.F. by a green line which runs down the side of the bulb.

Now it is often quite a "toss up" whether an "H.F." valve will really H.F. in an efficient manner, but the Ediswan product does, and it also detects with credit. The L.F. A.R.D.E. also fails to disgrace the good name it bears, and operates excellently in first and second stages. The A.R.D.E.'s make an excellent team with the P.V.6 D.E. bringing up the rear, as it were, in the last L.F. stage, and form a combination of sufficient excellence to challenge the world. The P.V.5 D.E. is distinctly good, but although it is undoubtedly capable of handling even greater volume than the P.V.6 D.E. most creditably careful comparative tests lead us to believe we have a decided preference for that excellent little P.V.6 D.E., although, of course, they are designed for working with different types of "preceding" valves.

The new A.C. valve sockets, of which Messrs. Sparks Radio Supplies, of 43, Great Portland Street, W.1, are sole

distributors, are an ingenious "line." For 1s. 3d. four are supplied, with a metal drilling jig and a good metal drill of suitable size. This is a cheap outfit, and, of course, the jig and drill can form permanent additions to the constructor's tool-box; while sets of four sockets are obtainable separately at 6d. per set. The sockets, when mounted, do not protrude above the surface of the panel, and are quite short in length, while holes and screws are provided to render soldering unnecessary. The A.C. indicates "Anti-Capacity," and as such these sockets can be styled without



An "Atlas" coil holder. A very definite "vernier" action is provided.

exaggeration. Supplying them with jig and drill at the low price of 1s. 3d. is a distinct commercial brain-wave which deserves success.

Sulphuric acid will not attack celluloid or lead pencil marks, so that celluloid labels for accumulators have nothing against them. Messrs. Rico Patents, of 97, Cowper Street, Hove, Sussex, can supply these at the rate of 50 for 2s. 9d., 100 for 5s., and 500 for 20s. We have examined samples, and can attest that they are quite suitable for the purpose.

WHAT "POPULAR WIRELESS" THINKS OF

The "BRETWOOD" Variable Resistance.

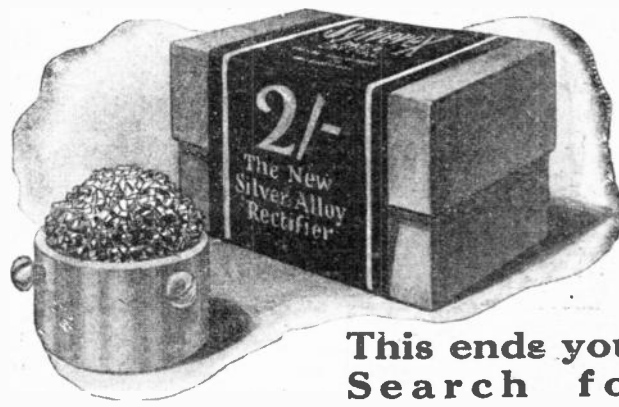
Messrs. Radio Improvements, Ltd. (now Bretwood Ltd.) have placed a "Bretwood" variable resistance rating from 10,000 ohms upwards on the market at 3s. This will be good news to readers who are building the famous "Super Selective" receiver, as the "Bretwood" is undoubtedly a good variable resistance; in fact, the "Bretwood" variable grid leak is one of the all-too-few satisfactory components of this nature on the market. We have tested the new "Bretwood" resistance in the "Super Selective" circuit "on aerial" and find it to be perfectly suitable for the purpose.

PRICE 3/6
Post Free.

Extract from
"POPULAR
WIRELESS"
March 7th, 1925.

BRETWOOD LTD.

12-18, London Mews, Maple St.,
LONDON, W.1.



This ends your Search for Sensitive Spots

SYLVEREX ends your search for full sensitivity in a Crystal: it is sensitive *all over and right through*; and in addition it carries the fullest possible guarantee, which is made possible by our exceedingly stringent methods of selecting, testing and re-testing. You can rely upon it that whenever you see the distinctive hand-and-crystal Trade Mark, the crystal packed under it is fully efficient and already tried out on actual Broadcasting before being sealed in its air-tight container.

Sylverex

RADIO CRYSTAL

Silver-Toned Silver-Alloy.

In air-tight container, with Special Cats-whisker and full directions. If you cannot obtain Sylverex from your Radio Dealer, send P.O. 2/- direct, with your Dealer's name and address, and we send the Crystal by return, post free. Remember, whether you buy Sylverex from your Dealer or

direct, you test it at our expense: if you are not satisfied in every way your money is returned. Produced by SYLVEX LTD. (Dept. B), 25, Victoria Street, London, S.W.1. Phone: Franklin 6003. TRADE ENQUIRIES INVITED.

Radiotorial

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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 contributions to be addressed to The Editor, POPULAR WIRELESS and WIRELESS REVIEW, The Fleetway House, Farringdon Street,

London, E.C.4. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lub, Ltd., 4, Ludgate Circus, London, E.C.4.

The Editor desires to direct the attention of his readers to the fact that, as much of the information given in the columns of this paper is of a technical nature and 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 trader would be well advised to obtain permission of the patentees to use the patents before doing so.

TECHNICAL QUERIES.

Letters should be addressed to:

Technical Query Dept.,
 "Popular Wireless,"

The Fleetway House,
 Farringdon Street,
 London, E.C.4.

They should be written on one side of the paper only, and MUST be accompanied by a stamped addressed envelope.

Queries should be asked in the form of the numbered questions: (1), (2), (3), etc., but may be accompanied by a short letter giving any necessary additional particulars as briefly as possible.

For every question asked a fee of 6d. should be enclosed. A copy of the numbered questions should

be kept, so that the replies may be given under the numbers. (It is not possible to reproduce the question in the answer.)

IMPORTANT.—If a wiring diagram or panel lay-out or list of point-to-point connections is required an additional fee of 1/- must be enclosed.

Wiring diagrams of commercial apparatus, such as sets of any particular manufacturer, etc., cannot be supplied. (Such particulars can only be obtained from the makers.)

Readers may submit their own diagrams, etc., for correction or for criticism. The fee is 1/- per diagram, and these should be large, and as clear as possible.

No questions can be answered by 'phone.
 Remittances should be in the form of Postal Orders.

Questions and Answers

T. S. J. (Green Lanes, London, N.)—I have recently added an amplifier to my Unidyne set, and as I could not obtain any special L.F. amplifying valves for Unidyne work, I used an ordinary L.F. amplifier (employing two valves, the second one being a power valve). Although great volume can be obtained, the quality of signals is completely spoilt on two amplifying valves, and even when the first one only is used there is a noticeable distortion compared with the Unidyne alone. What is the cause of this, and how can it be cured?

Your real trouble is disclosed by the sketch you sent, which shows that there is no grid bias on your amplifier, and that you are using the same H.T. for both the L.F. valves, although one is a power valve. A grid bias battery should be connected between the secondary of the L.F. transformer and the L.T. minus lead.

(Continued on page 411.)

FREE! 1, 2 or 3 Valve Set 'FREE!' WATSON'S SEE BELOW.

For 'SERVICE' & 'SATISFACTION' READERS! By SERVICE we mean the fullest interpretation of the word.

TO YOU It Means—Assistance, Advice, and Attention. Your enquiry no matter how small will receive the above and thereby ensure **SATISFACTION.**

NOTES

- 1 We are as pleased to advise as to supply.
- 2 When we have supplied we are equally pleased.
- 3 When we are both pleased WE are satisfied.
- 4 State your requirements and we will supply to your satisfaction.
- 5 We build what you want or supply for you to build.
- 6 Lastly, "Bring Your Troubles to Us."

Our Special Offer of Super 2v. Loud Speaker Set

[Parts £3 17 6—Complete Instrument £5 17 6—is still available.
 Other prices please write for Free Catalogue.

BEST WAY SERIES No. 173 "ULTRA CRYSTAL,"
 Complete Sets of Part for "THE BEGINNER'S SUPER,"
 "ULTRA ONE VALVE,"
 "ALL STATIONS, 2 VALVE"
 Write for List "Post Free"

EXTRA SPECIAL OFFER
1, 2, or 3 VALVE SET FREE.
 FULL PARTICULARS OF THIS ASTOUNDING OFFER POST FREE

The address is—
DON'T MISS THIS
WATSON'S, Dept. P.W., Cromwell House, High Holborn, W.C.1
 'Phone: Chancery 705415. Telegrams: "Jamarker," London.
 No responsibility accepted for Post orders unless Cheques and P.O.'s are crossed and made payable to the firm. Money must be registered.

Stop that leak!



HIGH-FREQUENCY currents have a habit of leaking away just where they are not wanted. A spot of moisture—a bit of surplus fluxite—a surface polished by metallic methods—these are some of the causes of leaky panels. Even an expert cannot tell by looking at an ebonite panel whether it is leaky or not—what chance, therefore, have you?

The only safe way of knowing that your next Set won't lose signal strength is to see that you are using a **guaranteed leak-proof ebonite** such as "Red Triangle" Brand.

Every sheet is tested by us for leaks with special electrical measuring instruments, and every one not coming up to our standard is rejected.

Special Sizes:

All Concert-de-Luxe, 16 x 8 x 1/2 ...	8/-	S.T. 100, 12 1/2 x 9 1/2 x 1 ...	7/-
Transatlantic V., 22 x 11 x 1/2 ...	15/-	Puriflex, 14 x 10 1/2 x 1 1/2 ...	9/2
All Britain, 16 x 9 x 1/2 ...	9/-	Transatlantic IV., 16 x 8 x 1/2 ...	8/-
Resistoflex, 12 x 8 x 1/2 ...	6/-	Anglo-American, 36 x 9 x 1/2 ...	20/-
		P.W. Ultra Crystal Set, 10 x 8 x 1/2 ...	5/-
		P.W. Continental Set, 15 x 6 1/2 x 1 ...	5/-
		Neutrodyne Tuner, 12 x 10 x 1/2 ...	7/6
		Neutrodyne Receiver, 12 x 10 x 1/2 ...	7/6
		3-Valve Dual, 24 x 10 x 1/2 ...	15/-
		Harris Crystal Set, 9 x 5 1/2 x 1/2 ...	4/4

Use



Red Triangle Ebonite

Any Special Size Cut per return at 1d. per square inch.
PETO-SCOTT Co., Ltd.,
 Registered Offices, Mail Order & Showroom:
77, CITY ROAD, LONDON, E.C.1.
 Branches: LONDON-62, High Holborn, W.C.1.
 WALTHAMSTOW-250, Wood Street.
 PLYMOUTH-4, Bank of England Place.
 LIVERPOOL-4, Manchester Street.
 CARDIFF-94, Queen Street.

RADIOTORIAL QUESTIONS & ANSWERS.

(Continued from page 410.)

To introduce this battery, disconnect each secondary from minus L.T., and connect it instead to a flexible lead and negative (black) wander plug, which can be tapped into the grid bias battery. (The latter should be of the special type now available, having sockets for tapping at every one and a half volts).

The positive end of the grid bias battery is connected to L.T. minus. By tapping in the black plugs to different values the best point to work them can easily be found, and then they need only occasional adjustment as the battery deteriorates, etc.

The other trouble (lack of separate H.T. supply to the power valve) is also remedied quite easily.

Your best plan is to increase the voltage of the H.T. battery, leaving the connections of the power valve alone, and altering instead the connections to the first amplifying valve, so that it can be tapped at a lower point along the new H.T. battery.

The separate tapping is made as follows: Trace the lead from plate of first amplifying valve to switch, and through the switch to primary of L.F. transformer. The other side of primary is at present connected to H.T. plus, but break this lead and connect a flexible lead in place of it, terminating in a red wander plug. Then tap this plug into the H.T. battery about half-way along, and adjust in accordance with the valve-makers' suggestions, or until the desired results are obtained.

Clarity of tone should be excellent, and the volume obtainable will probably be increased very considerably.

* * *

M. J. N. (Hornsey).—I have a loud speaker with a metallic horn which, when certain notes are reached, vibrates and sounds very tinny. Can this be overcome?

This is due usually to the overloading of the loud speaker, and is generally more marked when using a metal horn. This can, however, be minimised by fitting a .006 fixed condenser across the loud speaker, and a variable resistance 50,000 to 100,000 ohms, across the secondary of the last L.F. transformer. This will tend to suppress the high notes and give the loud speaker a more mellow tone.

* * *

"LANDLORD AND TENANT" (London).—I should like your advice through your columns upon the position of listeners' aerials and landlords who object to aerials being affixed to their property. I erected an aerial from the roof of the house to the end of the garden, which is of limited space. I found on coming home from business that the landlord's son had been to repair a neighbour's roof and saw this aerial of mine, and took the liberty of removing it by throwing it into the garden. I sent a letter of protest, with the result that I received a letter to the effect that they would not permit an aerial to be put up on their property, only on the conditions that I insured the house for £500 against likely damage of lightning, also a deposit of £1 10s. for damage to property by erection of the said aerial, which would be returned to me on leaving the house in the event of no damage. As these appear to be impossible terms, can you outline the position for the benefit of all listeners in similar circumstances?

The landlord is acting within his strict legal rights in refusing to allow you to fix the aerial to the house unless you indemnify him against possible damage to the property. At the same time the landlord appears to be desirous of imposing somewhat harsh terms. Insurance against risks of lightning can be effected very cheaply, and if you agree to this the landlord should withdraw his claim that you should make a deposit of £1 10s. That request is most unreasonable.

* * *

"FNSIGN" (Portsmouth).—My son, aged 16, is very clever with wireless, and has built a two-valve set by himself without help. We want him to use his talent in the right direction; can you give us any information as to how he can be employed as a wireless engineer?

In the first place we must point out that the capability to assemble an ordinary valve set does not prove the possession of abnormal talent. It may sound hard to parents, but the plain fact remains that hundreds of thousands of young fellows have successfully built wireless sets. Keenness and

(Continued on page 412.)

A.J.S.

for

RADIO PERFECTION

THE "Unitop" 4-valve Cabinet plus the A.J.S. Loud Speaker forms the most perfect wireless receiving combination possible to possess.

With them you can pick up and enjoy at will any broadcast concert you please, while the compact form of the "Unitop" makes it easily portable to outdoor functions. Both the "Unitop" and the A.J.S. Loud Speaker are instruments of unusually fine appearance—made and guaranteed by a British firm of world-wide repute.

N.B. The letters A.J.S. are engraved on every genuine A.J.S. Receiver.

THE A.J.S. "UNITOP" CABINET

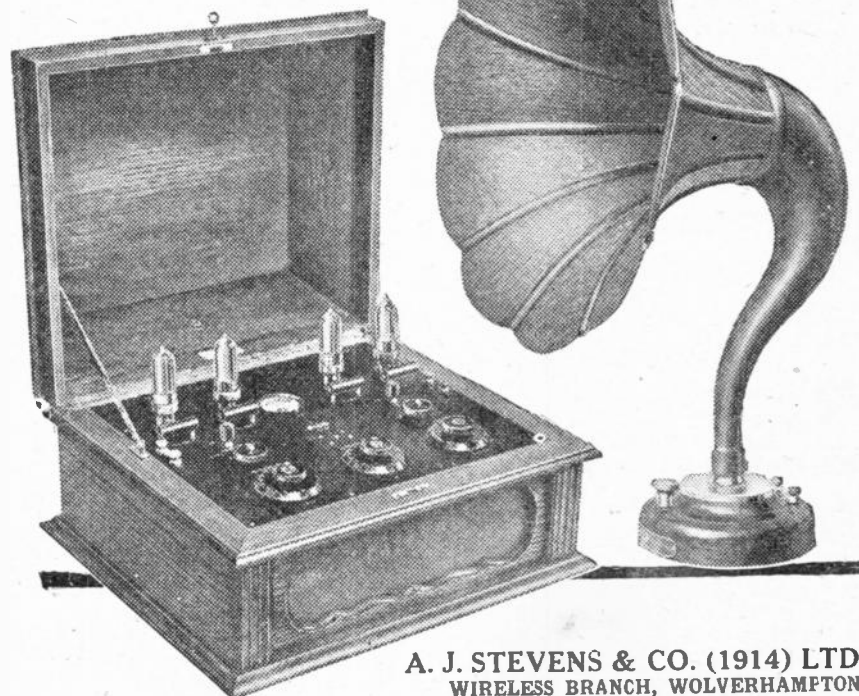
forms top section of "Unit System" Cabinet and contains A. J. S. 4-valve Receiver. Complete in itself, it may be converted into a beautiful pedestal cabinet by subsequent purchase of first, a centre section to contain both batteries and then base section containing special A.J.S. Loud Speaker. Used alone, the "Unitop" is a compact and attractive piece of furniture and a highly efficient Receiver, easily portable for outdoor functions. In Mahogany, or Light, Dark, or Wax-polished Oak. Complete with all accessories.

including four specially designed Mullard Valves giving stronger signals, and double capacity H.T. Battery yielding twice the usual service. Ready for instant use, **30 guineas** (without accessories, **£24 10 0**).

THE A.J.S. LOUD SPEAKER

Accurately proportioned non-resonant horn giving correct acoustic properties. True reproduction and extreme sensitivity without distortion. With Metal horn and-plated fittings, **£4 15 0**. With Oak or Mahogany horn, and plated fittings, **£5 10 0**.

Ask the nearest A.J.S. Dealer to show you these and other A.J.S. Wireless Instruments, including the "Unit System" 4-valve Cabinet, the "Standard" 2, 3, and 4 valve Receivers, and the A.J.S. 4-valve Pedestal Cabinet.

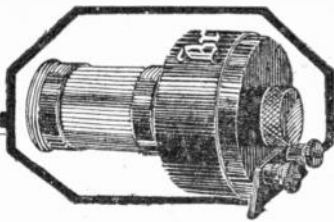


A. J. STEVENS & CO. (1914) LTD.
WIRELESS BRANCH, WOLVERHAMPTON

'Phone : 1550.

Wireless Call Sign : 5 R I.

'Grams : " Reception, Wolverhampton."



Have you a Gramophone

—then why not use it as a Loud Speaker?

MANY wireless enthusiasts have overlooked the fact that any good Gramophone can be readily converted into a first-class Loud Speaker by the attachment of a BROWN Gramophone Wireless Adaptor (in either of its two types).

No alterations are necessary, merely remove the Sound box and fit the Adaptor. A rubber connection ensures that it will fit practically every type of Gramophone.

You will be surprised at the volume of mellow tone that either of these Adaptors can produce—with a good Gramophone the results should be practically indistinguishable from a standard BROWN Loud Speaker.

Prices

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Gilbert Ad. 2679.

RADIOTORIAL QUESTIONS & ANSWERS.

(Continued from page 411.)

enthusiasm also seem to be evinced in the case of a hobby that shows such immediate, useful and entertaining results by every youngster who dabbles in it and is able to master the more elementary principles involved. Apart from this the wireless engineering profession does not exist independently, as it were: it is professionally regarded as a branch of electrical engineering, and entry must be made to it through the recognised channels. Workshop apprenticeship and institutional training are essential factors. The Marconi and other marine "operating" services are open to suitable candidates, but engineering positions are only obtained through those mediums by means of promotion from operating ranks following meritorious service.

D. R. M. (Swansea).—I am building a reflex set that needs an H.F. choke and as I have a large quantity of 36 S.W.G. enamelled wire I should be glad if you would give me the dimensions of the former and number of turns necessary if that wire can be used satisfactorily.

Several types of former can be used for this choke, one of the best being the ordinary coil former with two rows of spokes. The coil is then wound lattice fashion; that is, one turn zig-zag across the former, and then enough to fill the space between the two rows of spokes for one layer wound on solenoid fashion. This is followed by a zig-zag turn and then another layer of solenoid and so on. This is continued until about 400-500 turns have been wound on. Another type of coil that is often very satisfactory is wound on a wooden or ebonite former 6 in. long by 2 in. diameter with 10 slots 1 in. wide and 1 in. deep. The 400 or 500 turns are distributed equally among these slots so that between 40 and 50 turns lie in each slot. The wire, of course, is wound on continuously, no break being made between slots, though tapping points may be taken every 40 or 50 turns if desired.

M. G. R. (St. Albans).—I shall be obliged if you will let me know the ratio of transformer to use in the third stage of an L.F. amplifier I am building. I have a good first and second stage transformer for first and second valves respectively. What value would be best for the last stage?

We are afraid you will find three stages of L.F. amplification rather troublesome if you use transformer coupling, and we suggest that the last stage should be of resistance-capacity coupling. As a matter of fact, we would prefer the last two stages to be coupled by this method, but if you decide to use a third transformer we advise one with a ratio of 1-1. The valve should be chosen to suit your L.F. supply and to correspond with the other valves but if resistance coupling is employed the value should be one with a high amplification factor. Without knowing further details as to the values you are now using we cannot advise any one type of valve, but suggest you see the "P.W." Valve Guide, published in our issue of March 21st (No. 147), and look under L.F. values, picking out one that is suitable for second or third stage, and one suitable for resistance coupling.

I. T. M. (Swindon).—How is it that very often before eight o'clock I get a great deal of whistling (not local oscillation) with the broadcast programmes, but that after eight the noises cease?

The trouble is probably due to the heterodyning of your programmes by harmonics from either of the large C.W. stations at Devezes or Leafeld (Oxford). They may be operating simultaneously just before eight, and thus increase the interference. More likely, however, the interference is due to some local interference from either an unauthorised transmitter or else from some power mains in the near neighbourhood.

S. I. H. (Ilkley).—I am troubled with serious interference from a charging motor near the free end of my aerial. The motor sparks a little at the brushes, and I think this is the cause of the trouble, but no one here can help me or suggest a remedy. Needless to say, when the motor is not running—which is not very frequently—I get beautiful reception.

Details of a remedy for the trouble you are experiencing were published on page 240 of our issue of March 28th, but for the benefit of those who cannot obtain this copy and who have similar troubles we are reproducing the details here. A loose-coupled aerial and a counterpoise earth very often assist, but

the best plan is to tackle the trouble at the source—namely, the motor itself. Probably a partial if not complete cure will be effected by connecting large fixed condensers of the Mansbridge type across the brushes, two condensers being employed and connected in series. The centre point between the two condensers should be taken to the frame of the machine, while a fuse should be incorporated between the brushes and the condensers in case the latter should break down at any time. If the condensers have a capacity of 2 mfd. each the sparking should be eliminated, though if this is excessive larger condensers can be used with good effect.

Correspondence

WAVE-LENGTH OF AERIALS.

The Editor, POPULAR WIRELESS.

Dear Sir,—For some time past I have been doing mathematical wireless work, and have made what I believe is a discovery working along these lines. The formula, which I believe to be new, is:

$$\text{Antilogarithm} \left(\frac{\text{Length of Aerial in feet}}{1000} \right) = \frac{10}{\text{Natural wave-length in metres}}$$

Thus an 80 ft. aerial has a natural wave-length of

$$\text{Antilog.} \left(\frac{80}{1000} \right) = \text{Antilog. } .08 = 10 \times \frac{\text{Natural wave-length}}{10} = 1202 \text{ metres}$$

$$\text{Natural wave-length} = \frac{1202}{10} = 120.2 \text{ metres.}$$

This formula has to be modified for aerials of over 100 ft., thus:

$$\text{Logarithm} \left(\frac{\text{Length of aerial in feet}}{10} \right) = \frac{10}{\text{Natural wave-length}}$$

Thus a 200 ft. aerial has a natural wave-length of

$$\text{Log.} \left(\frac{200}{10} \right) = \text{Log. } 20 = 10 \times \frac{\text{Natural wave-length}}{3010}$$

$$\text{Natural wave-length} = \frac{3010}{10} = 301 \text{ metres.}$$

It is important to note that the characteristic of the logarithm is ignored and only the mantissa considered, and those mathematically inclined will soon see that the formulae are useless for aerials more than 999.9 ft. long. But as this is above most amateurs' scope, I think that no worry may ensue on this score.

It is essential that four-figure logarithms to the base 10 are used.

What I am waiting for in your journal are more Mathematical-Wireless articles, very few of which have been published. A few such articles were given in the past by Mr. Blake, A.M.I.E.E.

Hoping to see more development along these lines and more articles of a similar nature in your journal.

Your sincere reader,
L. TOMKINS.

238, Drakefell Road, Brockley, London, S.E.4.

DX SHORT-WAVE RECEPTION.

The Editor, POPULAR WIRELESS.

Dear Sir,—In your Notes and News columns of the current issue of "P.W." you give a reception record of Mr. J. A. Partridge (2 K P). This record was, I believe, for the morning of February 8th, between seven and eight a.m.

The following is a record from my log of stations (amateur) received from countries mentioned below:

S. A. W. J. S. Rice Expedition on Amazon, Mexico, New Zealand, Morocco, all districts of U.S.A., except 6 and 7. On evening of same date, Australia and Mosul.

Re reception of H V A reported in Correspondence column by Messrs. F. C. and T. A. Studley, I also received this station, calling O C D J on February 23rd, at 9.55 p.m.

On Friday, February 27th, at 10.35 p.m., I picked up station A N E, the Laboratory Government Radio Service Station, Bandoeng, Java, Dutch East India.

Yours faithfully,
J. ROYERS,
(G J O).

13, Arvenack Street, Falmouth, Cornwall.

DX RECEPTION.

The Editor, POPULAR WIRELESS.

Dear Sir,—Just a few lines to let you know that your paper is sure appreciated in this part of the world, and long may it prosper.

By the way, could you tell me what station in London carries out wireless telephone tests on a wave-length about 5,000 or between 4,000 and 5,000 metres?

I was carrying out some experiments with a small single-valve receiver (that can be placed in your coat pocket) on December 15th, 1924, when on a wave-

(Continued on page 412.)

CORRESPONDENCE.

(Continued from page 412)

length somewhere between 4,000 and 5,000 metres I heard telephony very loud, no distortion, and excellent. I was troubled with atmospherics, but some of the words I managed to get.

This occurred on Monday morning, December 15th, at 04:21 to 04:28 G.M.T. Again on Monday morning about the same time (January 12th, 1925). New York Wireless Station (W.S.C.) informed me that it was a station in London, England, testing.

Yours sincerely,
JOSEPH T. TASKER.

12, New North Road,
Georgetown, Demerara, British Guiana,
S. America.

NOTES ON DRY CELLS.

To the Editor, POPULAR WIRELESS.
Sir,—I was much interested in an article in "P.W." of January 31st, page 1321, on the above subject, in which the writer pointed out the advantages of employing a series of 4½ volt units in forming an H.T. battery. Some time previously a very keen wireless friend was showing me one constructed on these lines which had worked to his perfect satisfaction. Encouraged by his report and the recommendation above noted, I obtained a dozen cells and constructed a battery on these lines, the performance of which quite justified the experiment.

Another point of importance is touched upon by the writer of the above article when he makes the statement that dry batteries "go dead" from the drying of the electrolytic paste with which the cells are filled. With a view of delaying as far as possible this drying process, I made a zinc tray to hold the battery box. When I finish up at night I place the battery in this tray and deposit it in the damp stone sink in my dark room, where it lies for about twenty out of the twenty-four hours.

This method should have the effect of prolonging the life of the battery to a considerable extent. As a rule, the rooms in which we fit up our sets are warm and dry both day and night, and the drying process is continuous and unchecked.

I claim no credit for this idea, which may not even be original, but I claim that it will prove quite worth the slight trouble it entails.

Loyton, F. 11.

G. E. Cox.

"SUPER-HET." RESULTS.

The Editor, POPULAR WIRELESS.
Dear Sir,—With reference to the note on Super-Heterodynes in the "Radio Notes" of POPULAR WIRELESS of February 28th. You mention the fact that a Harrow reader has received eight American stations on his super-het.

I thought that it may interest you to know that I have received 25 American and Canadian stations on my set. I have received several others that I have not been able to make sure of.

They are as follow (American):
K D K A, W G Y, W B Z, W H A Z, W O R, W J Y, W N A C, W J Z—Good loud speaker strength.
W O O, W D A N, W B A V, K D P M, W A B R, W B E R, W O A G, W E A R, W T A W, W B G, W M H A, W S A J, K L X, K G O. Phone strength.
Canadian: U N R A. Good loud speaker strength.
C K L C, C K A C. Phone strength.

Trusting this may be of some interest to you, and wishing your most excellent paper all success.

Yours faithfully,
HAROLD L. BENN.

63, Hoole Road, Chester.

RECEPTION OF K D K A.

The Editor, POPULAR WIRELESS.
Dear Sir,—After reading the two articles in Nos. 110 and 141 of POPULAR WIRELESS on short-wave reception, by K. D. Rogers, I wound a set of three basket coils, aerial five turns, secondary 16, and reaction 25. I found reaction a little too big.

On February 25th, at 11:15 p.m., I picked up K D K A as the dinner concert started, and I listened till 11:45 p.m. He came in very well, and very free from fading. My set is one which I built for B.E.C. reception, detector, and 1 L.F., with a 27-plate variable condenser and 3-plate vernier in parallel. When I picked up K D K A large condenser was at 0, and vernier 40. Aerial is about 98 ft. long and 25 ft. high.

Yours faithfully,
A. E. W.

Wedmore, Somerset.

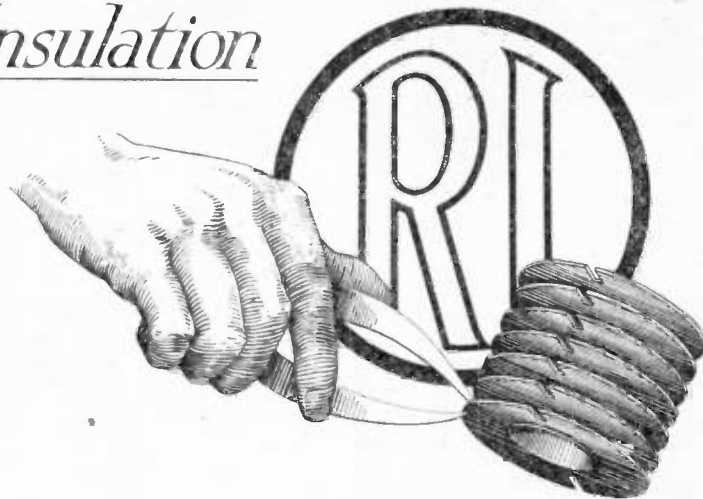
"DX" CRYSTAL RECEPTION. MR. ARNOLD'S LETTER.

The Editor, POPULAR WIRELESS.
Dear Sir,—I was very glad to see this reply, and I like Mr. Arnold's style in pointing out that humility and modesty is the correct frame of mind in which to approach all matters of a scientific nature. It is one of the first lessons that one has to learn if any real progress is to be made.

It may be of interest to add that I am inclined to think, also, with Mr. Arnold, that the proximity of large areas of water are very favourable to reception of signals over long distances.

(Continued on page 414.)

Insulation



Here is another feature of the World's Transformer that emphasises

THE CONSTRUCTION THAT COUNTS

Note the heavy walls of insulation that separate the sections of both primary and secondary windings. Each compartment is electrically fortified against breakdown or leakage, and the ratio of insulation, to wire in this construction is greater than that of any other transformer on the market, giving as a result the remarkably low self-capacity of **ONLY 18 micro-microfarads**. In addition the sectionalising of the winding results in a distribution of the voltage which greatly reduces the possibility of breakdown.

We can afford to guarantee R.I. productions. Thousands have found the claims of R.I. to be genuine. Make sure of

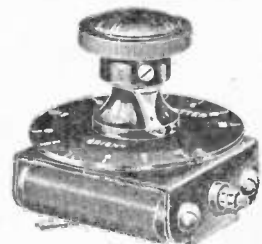
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THE NEW R.I. DUAL RHEOSTAT.

The R.I. Dual Rheostat, for both bright and dull filament valves, permits sensitive adjustment to be made in the filament current of both types of valves to the highest degree, giving as a result longer life and smoother action.

The Rheostat is secured to the panel by a one-hole fixing, which is absolutely independent of the brush contact.

The coils of high resistance wire are wound on hard, insulated cylinders of larger radiating area than any other similar type of rheostat. A large black circular scale affords a visual adjustment in the operation of the set, affording a safeguard against excessive current being applied to the filament of the valve.



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CORRESPONDENCE.

(Continued from page 413.)



You buy brains when you choose the Eureka

PEDRO LOPEZ—the famous painter—was once asked his fee for painting the portrait of a nobleman. “Five hundred crowns, Sire,” he answered. “What! Such a fabulous sum for a few days’ work!” exclaimed the astonished grandee. “No, Sire, but a just reward for a lifetime’s study,” gently replied the artist.

IT’S the “knowing how” that counts in Transformer building, too. A Eureka is very much more than a few thousand turns of wire wound around an iron core. Back of every Eureka is the skill and experience gained from ceaseless and costly experiment. Even to-day—eighteen months after the first Eureka Transformer was issued—the search for improvement continually goes on. A better method of winding—an electrical test even more searching and critical than before—the discovery of new methods of insulation—all these new ideas now incorporated in the 1925 Eureka demonstrate effectively a tireless quest for efficiency.

Yet in spite of its seemingly high cost the Eureka Concert Grand is one of the most economical Transformers you can buy. For instance, a Eureka Concert Grand used in conjunction with one of the now popular Power Valves will give more volume than two stages of amplification using cheap Transformers. Again, owing to its unique construction, the Eureka is a long-life Transformer. It can never break down through dampness—the arch-fiend of signal strength—for its stout steel case is a sure protection against the atmosphere.

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No. 2
For second stage

Gilbert Ad. 2681.

Concert Grand 30/-

During the summer of 1923, whilst staying at Pevensey, on the south coast, I assisted at some experiments with a kite aerial and a crystal set. The aerial consisted of 100 ft. of 7.22 copper, and was suspended vertically by the kite string flying from the beach.

The earth wire was to an iron waterpipe. We heard 2 L.O. clearly in the daylight, and could clearly hear the words of the announcer.

We have all heard of reception of 2 L.O. by ships lying in harbour across the North Sea with crystal receivers; here, again, good “earth” connections were assured by water connection.

Here in Croydon, with quite a good aerial, I have the utmost difficulty to get anything but 2 L.O., which comes in strongly. I have heard Radiola, but hardly audible, and most erratic.

Yours faithfully,
E. J. TARDREW.

91, Lansdowne Road,
Croydon.

THE ULTRA COIL.

The Editor, POPULAR WIRELESS.
Dear Sir,—It may be of interest to you to know that on Saturday evening, March 21st, using an “Ultra” coil constructed as per diagram, and a piece of “Neutron” crystal, I received the Manchester broadcasting station, 2 Z V, speech and music being faint, though quite readable when 2 L.O. was not working. 2 L.O. is readable 10-15 ft. from the ‘phones in a quiet room.

Yours truly,
N. BROWNING,
(Member Radio Assoc.)
19, Herne Place, Herne Hill, S.E.24.

SHORT-WAVE RECEPTION.

The Editor, POPULAR WIRELESS.
Dear Sir,—As this locality is supposed to be a bad one for the receiving of wireless signals, and having read with interest your article re Mr. F. W. Reeves, of Wood Green, on “Short Wave Reception,” I think that this short letter might be of interest to you.

I, too, have found that it is very easy to tune down to the low wave-lengths. My set is similar, it seems, to Mr. Reeves, being 2 H.F., det., 2 L.F., and yet I have no difficulty in receiving K D K A. The coils I use are primary 3 turns No. 18 D.C.C., secondary 6 turns No. 18 D.C.C. tuned with .0005 V.C., and reaction 20 turns No. 24 D.C.C. on a seven-slot former 3 in. in diameter, 1 1/2 in. centre. Valves used are Mullard-Master H.F. for detector, Cossor P.1 1st L.F., 2nd L.F. Marconi, but it is not necessary to use this last stage; in fact, I can turn off both stages of L.F. when I have K D K A tuned in, and still hear, although it is faint. Voltage used is 24 volts d.c., 60 volts L.F., 4-volt accumulator, and 1 1/2 volts grid-bias. Aerial used is 60 ft. the whole length, and is 28 ft. high, with the lead-in pointing N.E., and is well screened.

I might add that the P. and S. coils are wound the same way as Mr. Reeves has wound his, and are quite roughly made.

Yours faithfully,
VICTOR E. GOOD,
164, Belgrave Road, Walthamstow, E.17.

A BATTERY CONNECTING PLUG.

The Editor, POPULAR WIRELESS.
Dear Sir,—Here is a convenient method for making battery connections to a receiving set.

One can easily procure a burned-out valve and remove the glass bulb, leaving the legs and ebony intact. Leads from the H.T. plus and negative can be soldered to the wires attached to the anode and grid valve legs respectively, and leads from the L.T. to the filament legs. Four valve legs, or better still, a safety valve holder, from which the internal connections can be made, can be fitted to the panel. If there are two H.T. positive leads, this device can still be used by connecting H.T. minus and L.T. plus or negative to one valve leg, leaving three legs available for the two H.T. and one L.T. leads. Both batteries can thus be connected by one simple operation, and there is no reasonable excuse for leaving them connected for eighteen or twenty hours per day.

Wishing “P.W.” every success.
Yours sincerely,
(Rev.) T. R. GRIFFITH.
Drimarone, Letterbarrow, Donegal.

GETTING UNIDYNE RESULTS.

The Editor, POPULAR WIRELESS.
Dear Sir,—Some time ago I wrote to you for advice about a one-valve Unidyne which refused to work. After receiving same I still got no results, and had it looked over by a distant friend, who wrote me that he could get exceptionally good results with it. When I got it back it was the same as ever—dumb. Just a week last night I had been sitting at it for one and a half hours with no results, and was on the point of putting it away when I heard faint strains of music, and in my endeavours to strengthen them I turned up the valve a bit. I then heard it quite clearly.

(Continued on page 415.)

CORRESPONDENCE.

(Continued from page 414)

That had been my trouble all along—I may have been stupid—but it occurred to me that there may be some like myself experiencing failure through not using enough voltage. I knew nothing whatever about wireless except what I had read in POPULAR WIRELESS, and knew nothing of how bright the valve should appear. I was using a 6-volt battery, and was frightened to use it enough (having read keep valve low). During this last week I have been able to get most of the B.B.C. stations.

Blairgowrie is about 20 miles north-west of Dundee, which comes in very strong, but it seems strange to me that I should get Manchester also very good.

At different times when I have had Manchester there is a foreign station coming in, and it is always speech that I get. I cannot make it out, but there is repeated what sounds like AH-LO, AH-LO, and Sunday night at 11 p.m. there seemed to be the same AH-LO repeated, followed by a sentence finishing like "Good luck," "Good luck."

I must add my thanks to the many sent to the inventors of the "Unidyne," which has after seeming disappointment far exceeded my most sanguine expectations.

Yours truly, JOHN STEWART.

7, Grange Place, Perth St., Blairgowrie, Perthshire.

ONE AND TWO VALVE UNIDYNES.

The Editor, POPULAR WIRELESS.

Dear Sir,—Having been a "Unidyne" enthusiast from the very beginning, I now give some of the results of the various circuits which I have tried after giving them a thorough good test. One-valve Unidyne, all British main stations except Cardiff, and all relays except Hull and Swansea, Vienna, Brussels (Radio Paris, S.F.R.), P.T.T., Le Petit Parisien, Berlin, Hamburg, Hanover, Münster, Rome, Madrid, K D K A, and W B Zee. I have also had three others on the Continent, but could not make their call signs out. Two-valve D. and L.F., all the above, also Cardiff, Munich, Stuttgart, and Frankfurt-on-Main. I get on loud speaker the local station, 2 Z Y, 6 L V, 5 I T, 5 S C, 2 B D. On H.F. and D. I have had the same as the above, all at very good 'phone strength, but only 2 Z Y, 6 L V, and 5 I T on loud speaker, and the only other stations besides the above, Hilversum and W G Y. Two-valve crystal reflex, stronger on nearby stations but not as good on distance. H.F., D., and L.F. very good on distance, and also most main stations on loud speaker, and a few relays also. Too much stress cannot be made upon the importance of grid leak, and I find the only good one is the "Bretwood." One Sunday, on D. and L.F. I got W G Y and W B Zee. I had W B Zee on the loud speaker, and there was hardly any fading at all. At 2 a.m. a "cell" solo, "Melody in F," by Ruitstein, filled a small room with its pleasant sounds, followed by Mrs. Richard Donovan singing a group of songs. I wish to add my thanks to Messrs. Bowdler and Rogers and hoping for more circuits to come. I would also like to thank the Bower Electric Co. for their kindness and courtesy, and also for the replacing of K.4 valve. I might add that the above results were obtained with K.4 valves. Wishing "P.W." the best of success.

Yours faithfully, M. A. CONWAY

28, Swan St., Gt. Por. wood St., Stockport.

AMERICA ON ONE-VALVE UNIDYNE.

The Editor, POPULAR WIRELESS.

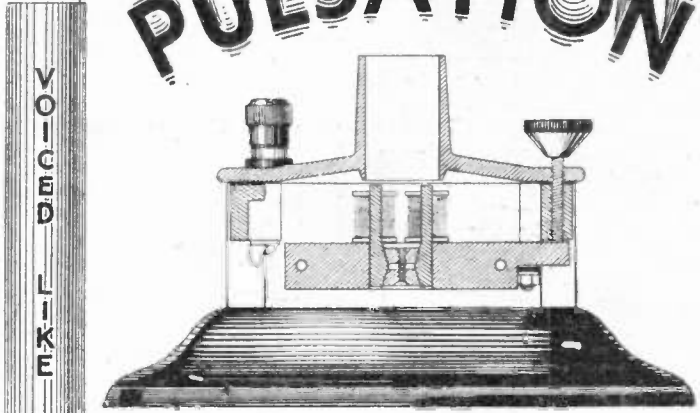
Dear Sir,—I feel that I must report results that I have achieved with a one-valve Unidyne. The set is wire-l-up on a glass panel, no joints have been soldered whatsoever, for I wished to be sure that everything was all right before undertaking same. On test I found that I could get all main stations, besides half a dozen relays; but to get farther afield, I have heard, and at good 'phone strength, Frankfurt, Vox Haus, Petit Parisien, P.T.T., and Brussels, and several other Continental stations that I have been unable to make out. Furthermore, at 1.45 a.m. on Sunday, March 29th, I successfully picked up W B Z on 337 metres, music and speech being heard quite distinctly. The various items were easily followed, there was no fading or atmospheric present. I was able to keep this station until 2.30 a.m. K D K A was also heard, though not so well as W B Z. Tuning I found very critical, and hand-capacity very bad. It being impossible to take hand away from condenser knob whilst keeping these stations, as the set was on point of oscillation. If anyone about me should doubt these claims as to the capabilities of a Unidyne, I shall be only too pleased to set their minds at rest by giving a demonstration. I must admit that I was very dubious at one time about building the set, as many H.T. fans would have it that without using H.T. the set could neither have range nor power. Anyhow, I think the foregoing will prove that it is equal if not better than a set using H.T., possessing all H.T. advantages without its disadvantages. The parts in use are: Philips' valve, 12 G, Ormond V. condenser, Bretwood leak, Wates' microstat, and reaction coils. In conclusion, I should like to offer thanks to the inventors of the Unidyne, for it is due to Messrs. Bowdler and Rogers' invention that I now possess a set capable of feeling out and at the same time bringing it in with crystal clarity as heretofore. I have no use now for a crystal set, and I shall never crave for an H.T. set. Hats off to "P.W." and the Unidyne.

Wishing your paper every success.

Yours faithfully, ARTHUR R. MURDEN.

287, Heath End Road, Nuneaton, Warwickshire.

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THE WONDERFUL DIFFERENCE
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RADIO SUN LOUDSPEAKERS

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PERFECT RANGE,
and STRONG CARRYING POWER.**

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Replace the trumpet, and note that the purity of tone is reproduced in the mouth of the horn and not the box.

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AFA SPECIAL DUROS
ESTD 1887.
ACCUMULATORS
of all Wireless Dealers.
Trade, A.F.A. DIANA PLACE, EUSTON RD, LONDON, N.W.1.

RADIO PANELS

Will stand 5,000 volts, will not fracture. 6" x 6", 9d.; 9" x 6" x 1/2", 13; 10" x 9", 2-; 12" x 10", 2 6; 14" x 12", 4 6. Post paid.

RADIO PANEL CO. (Dept. P), 143, Fetter Lane, E.C.4

HEADPHONE REPAIRS

Rewound, re-magnetised and re-adjusted. Lowest prices quoted on receipt of telephone. Delivery three days.—**THE VARLEY MAGNET CO., London, S.E.18.** Phone 888-9 Woolwich. Est. 26 years.

ACCUMULATOR BARGAINS.

C.A.V. & Fuller's, sealed, but guaranteed 12 months. Sent on approval against cash.

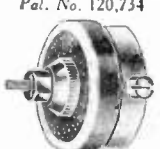
2v-40a ... 9 6	4v-80a ... 27 6	6v-60a ... 32 6
4v-40a ... 17 6	4v-100a ... 32 6	6v-50a ... 40 -
4v-60a ... 21 9	6v-40a ... 25 -	6v-100a ... 46 -

MAUDE RUBBER CO., 58, PRAED ST., W.

3 in 1 SET—
CRYSTAL, CRYSTAL & VALVE, or AMPLIFIER

25/6 Purest Reception in the World.
Stamped envelope for particulars.
Post Free U.K. **J. GAUNT, 25, All Saints St., Bolton.**

THE SKINDERVIKEN MICROPHONE BUTTON
Pat. No. 120,734

5/-  **5/-**

Will enable you to work a loud speaker off a crystal set. Enables you to use up your old and worn gramophone records. Fit up an efficient house telephone. Transmit piano, violin or gramophone music anywhere. Magnify sounds otherwise inaudible, etc.

Everyone interested in sound transmission should write to-day for the "Marvels of the Microphone." Price 6/d. (P.O. not stamps). Post free from Mikro Ltd.

MIKRO Ltd., 32c, Craven St., Charing Cross, W.C.2

TECHNICAL NOTES.
(Continued from page 394.)

example, when stalloy is used for the magnetic circuit, are about half of those with soft iron. Experimenters who like to make up their own audio-frequency or other transformers may be interested to know that stalloy stampings, exactly similar to those used in many of the commercial inter-valve transformers, are obtainable from Messrs. Joseph Sankey & Co., Bilston, Staffs., or inquiries may be made to the London offices, 168, Regent Street, W.1.

Messrs. Sankey issue a leaflet giving full scale photographic representations of the various kinds of stalloy stampings which they carry in stock. These are properly designed so that when assembled together with alternate laminations reversed, the junctions of the stampings overlap to form a good magnetic joint. I may mention that semi-circular vanes for variable condensers are also carried in stock in the same material.

The Science of Listening.

In the April issue of the "Nineteenth Century and After Review," published by Messrs. Constable & Co., Ltd., is a long and valuable article entitled "The Science of Listening," by Major W. S. Tucker, the well-known authority on the subject of acoustics.

The article is too long for me to give anything in the nature of a résumé in these notes, but it is one which all my readers who may be interested in what one may call the physical and physiological nature of sound and hearing will find most fascinating.

Adaptability of the Ear.

One of the interesting points dealt with by Major Tucker is the curious power of accommodation possessed by the organs of hearing so that we can automatically render ourselves largely insensitive to very loud sounds as well as preserving, as occasion requires, the power of hearing and analysing the faintest sounds.

Another curious fact, which is closely associated with the foregoing, is that extremely intense sources of vibration have been found to be incapable of producing any very marked increase in the loudness as perceived at a considerable distance, or, as the author puts it, "although very intense sources of vibration can be produced, the atmosphere shows itself incapable of conveying these vibrations away in the form of sound without great losses of energy."

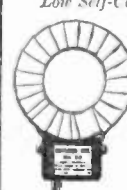
"The multiplication of horse-power in a sound-producing installation gives little

advantage. The atmosphere, therefore, protects us from extreme discomfort."

Hearing for the Deaf.

In this connection there is a very interesting and important article in "Popular Radio," for April, 1925, entitled "How a Loud Speaker Device Gives Hearing to the Deaf," by Dr. Byron Eldred. In this article the well-known American physicist announces his discovery that deaf persons, in a large number of cases, are enabled to hear ordinary speech sounds if there is present, in addition, a fairly powerful vibration of a frequency just above the upper limit of audibility, or just below the lower limit—preferably the latter. He has made observations upon a large number of subjects, and has employed a device similar to a wireless loud speaker for generating infra-audio vibrations, and in these circumstances has obtained some most remarkable results in the revival of the hearing of the subjects in question. In many cases the effect persists for a period varying from one hour to two or three days, so that a person ordinarily deaf, after being subjected to these low-frequency atmospheric vibrations, may be enabled to hear for some considerable period afterwards. It is well known that deaf people are often able to hear—to a greater or less extent—when there is a considerable noise, such as the roar of traffic or machinery, which to a person of normal hearing would be very distracting. It appears quite possible that Dr. Eldred may have come upon a discovery of great importance, and the further development of his work will be followed with extreme interest.

CRITERION COILS
AS PERFECT AS ANY COIL ON THE MARKET.
Low Self-Capacity. Low H.F. Resistance.
Razor-Sharp Tuning.



Perfect for Reaction.
NO WAX. NO SHELLAC.

REVOLUTIONARY PRICES.

No. 25 2	No. 50 2 6	No. 150 5 -
" 30 2 3	" 60 2 9	" 200 6 -
" 35 2 3	" 75 2 9	" 250 6 6
" 40 2 6	" 100 3 -	" 300 7 -

FACTORS AND TRADERS SUPPLIED.

Obtainable at all Halford Branches, and Traders in all districts, or direct from the Manufacturers.

**Criterion Wireless Co. (Wilfrid Works) 79
69-70, CHALK FARM ROAD, LONDON, N.W.1.**

SINCE DRAFTING THE ABOVE ADVERTISEMENT,
We have received the following entirely unsolicited testimonial:—

"Dear Sirs,—You will be pleased to hear that I received W.G.Y. and several other American stations one night last week, using your **Criterion Coils**. The set used was an ordinary attract one-valve. —Yours truly, E. WARD, 58, New Street, Sandwich, Kent, April 6, 1925."

Money returned if you are not satisfied.

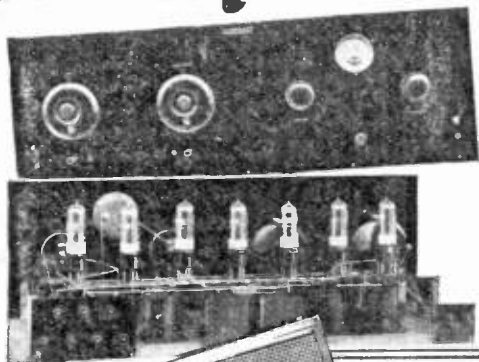
USE YOUR GRAMOPHONE AS A LOUD SPEAKER!!!

The Gramovox Senior, specially designed to produce faithful reproduction when attached to any gramophone or horn, is fitted with four-inch Stalloy Diaphragm. Exclusive Graduated Magnet Adjustment, and carries the usual Miller Guarantee. Write for prospectus, Post Free. Price, 30/-, 5,120, 2,600 or 1,000 ohms. Heavy windings (will withstand 1,000 v. H.T.)

TELEPHONE: **RADIO CENTRAL 1925**

MILLERS IMPROVEMENTS
68, FARRINGTON STREET, E.C.4.

Learn FREE - how to make this better Super-Heterodyne



It is within the power of every keen amateur to make a successful Super Heterodyne Set now that Bowyer-Lowe Intermediate Transformer Units are available. These Units are built for use with British Valves and have less internal capacity and more stability than foreign units, so that high efficiency and quiet functioning are obtained with increased selectivity and power. Complete instructions for building a remarkably simple and effective Seven Valve Receiver are given with every set. Bowyer-Lowe Super Heterodyne Transformer Units are all matched in complete series each guaranteed to function at a uniform peak frequency. Each set is tested at 500 volts between windings to eliminate all chance of short circuiting. The transformers are contained in cases of Grade "A" Ebonite, and sold in complete sets of four (Dubilier Fixed Condenser '0005 included) at £4 the set. A special oscillator Coupler Unit uniform with the transformers in size and shape to cover the broadcast band with a '0005 Variable Condenser is also made and costs £1.

COMPLETE SERIES comprising 1 Input Filter and 3 Interstage Transformers with Dubilier '0005 Fixed Condenser for tuning primary of Filter; each set individually matched and sold in boxes with Instruction Booklet for making Seven Valve Receiver shown. Price £4. The Set as above, but with Oscillator Coupler Unit £5.

This book given FREE with every complete set

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

Bowyer-Lowe INTERMEDIATE WAVELENGTH H.F. TRANSFORMERS

BOWYER-LOWE CO LTD LETCHWORTH



FLETCHER AD.

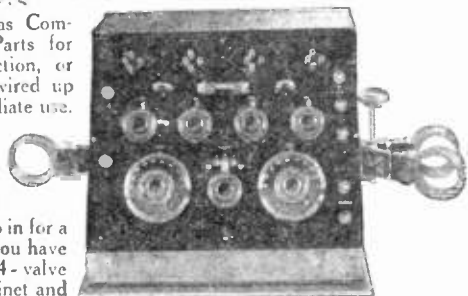
Chakophone REGD

No. 2 Constructors' Wireless Sets.

Supplied either as Complete Sets of Parts for Home Construction, or assembled and wired up ready for immediate use.

THE GREAT POINTS about these sets are:

- (1) If you can go in for a 2-valve set you have a potential 4-valve set—the cabinet and panel being large enough and designed to ultimately make up into a 4-valve Receiver.
- (2) The cost is really exceptionally reasonable.
- (3) The instructions for assembling and wiring up are exceedingly simple, so much so that we have instances where youths of 10 and 12 years of age have successfully built up these sets.



	Set of Parts including Coils.	Receiver only and Coils. Assembled and Wired Up.	Set Complete Ready to Operate.
FOR 2 VALVE	£5 17 6	£6 17 6	£11 3 6
FOR 3 VALVE	£7 12 6	£8 17 6	£14 4 6
FOR 4 VALVE	£9 7 6	£10 17 6	£17 16 0

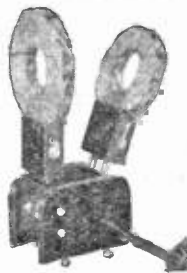
Coils for the reception of the High Power and Radiola Paris transmissions, extra per set of three ... £1 6 3
The above prices include Marconi royalty.

Write for particulars of this Really Good Proposition!

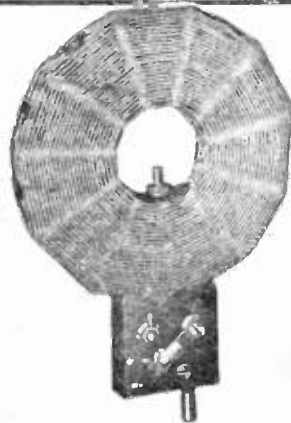
Makers: **EAGLE ENGINEERING CO., LTD., WARWICK.**

London Depot:—THE EAGLE WIRELESS SUPPLY, 8, Great Russell Street, W.C.1. Phone: Museum 2848.

Quality RADIO DUPLEX BASKET COILS.



The most efficient inductance coil made for short waves, mounted on standard plugs. No wax or varnish used.



Number	Mounted	Mounted with Re-action Reverse Switch.	Unmounted.	Number
25	1 6	3 0	0 9	25
35	1 9	3 3	1 0	35
50	2 0	3 6	1 3	50
75	2 3	3 9	1 9	75
100	2 9	4 3	2 3	100
150	3 0	4 6	2 6	150
175	3 6	5 0	2 9	175
200	3 9	5 3	3 0	200

Postage: 3d. each. Set of eight coils post free.

If your dealer cannot supply, we send post free if you mention his name and address.

GOSWELL ENGINEERING CO., LTD., 12a, PENTONVILLE ROAD, LONDON, N.1.

Liberal Trade Terms.

LIST FREE.

Phone: North 3051.

LISSENIUM

Wealth of Tone—

The user of a LISSEN Transformer is rewarded by reproduction of surpassing purity. Rightly, purity of tone should come first in any consideration of transformer amplification—volume should always be secondary.

LISSEN RECOMMENDATIONS FOR L.F. AMPLIFICATION.

Many disagreed with us when we first introduced the LISSEN type Tr. Transformer and recommended its use as a first stage transformer. American practice, for instance, had been to use a high ratio transformer for the first stage and a low ratio for the last stage. But a high ratio transformer for ordinary radio receivers means a low primary impedance and a high step-up, and VERY OFTEN A SATURATION OF THE MAGNETIC CIRCUIT.

THE FIRST STAGE TRANSFORMER SHOULD RIGHTLY HAVE A HIGHER PRIMARY IMPEDANCE THAN THE SECOND AND THIRD STAGE TRANSFORMER BECAUSE POWER OUTPUT AND DISTORTIONLESS AMPLIFICATION DEPEND UPON THE IMPEDANCE OF THE TRANSFORMER APPROXIMATING THE INTERNAL IMPEDANCE OF THE VALVE BEFORE IT.

FOR SUPERLATIVE AMPLIFICATION.

If you contemplate buying an expensive transformer, be sure there is none to equal the LISSEN Tr. It should always be used immediately behind the detector valve. It has the most valuable coil of any transformer.

30/-

FOR REFLEX CIRCUITS.

To follow the LISSEN Tr. where the latter is not used throughout. Particularly recommended also for reflex circuits, where it will yield pure and powerful amplification.

25/-

A POPULAR TRANSFORMER.

Money cannot buy better transformer value than the LISSEN Tr. Because of its skilfully balanced design, this transformer actually compares with many sold at nearly twice the price.

16/6

Fit a LISSEN TRANSFORMER—and MAKE SURE.

Economical L.F. Amplification

An interesting and economical method of L.F. amplification is the LISSEN L.F. CHOKE. This is becoming very popular. Not quite so much volume as transformer coupled valves, but all the purity of best resistance capacity coupling, without the disadvantage of needing the high H.T. voltage inseparable from the latter. Make up an extra stage of L.F. with a Lissen Choke coupled up to your last transformer. Price

10/-

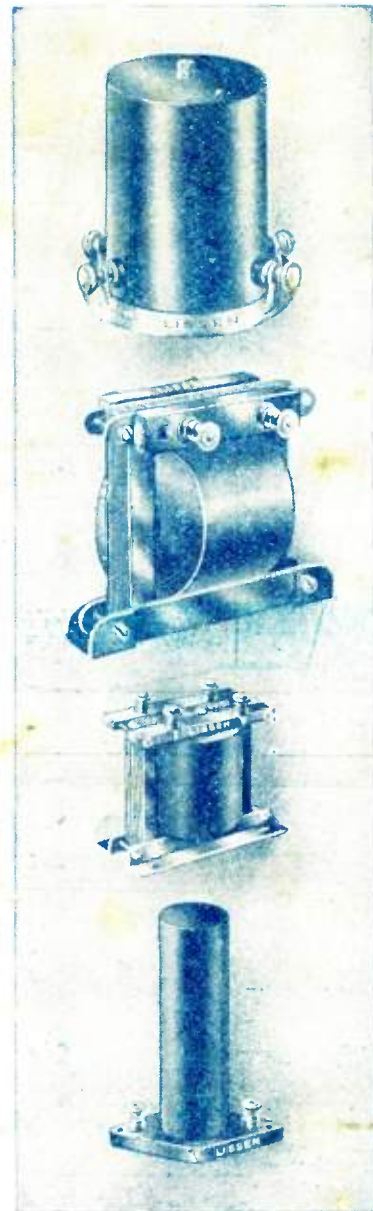
Send for the TEXT BOOK OF LISSEN PARTS—tells you how to connect a LISSEN CHOKE amplifier—FREE TO READERS OF THIS PAPER.

LISSEN LIMITED

8-16, WOODGER RD., GOLDHAWK RD., SHEPHERD'S BUSH, LONDON, W.12

Telephones—3380, 3381, 3382, 1072 Riverside Telegrams—"LISSENIUM, LONDON"

LISSEN PARTS—WELL THOUGHT OUT, THEN WELL MADE



PARTS THAT PULL TOGETHER—

When you know that every part in your receiver is pulling strongly with each other, you have a set which will give results never possible with mixed parts.

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