Wireless Weekly, 6d. Net. Wednesday December 17th, 1924

Wireless Weekly

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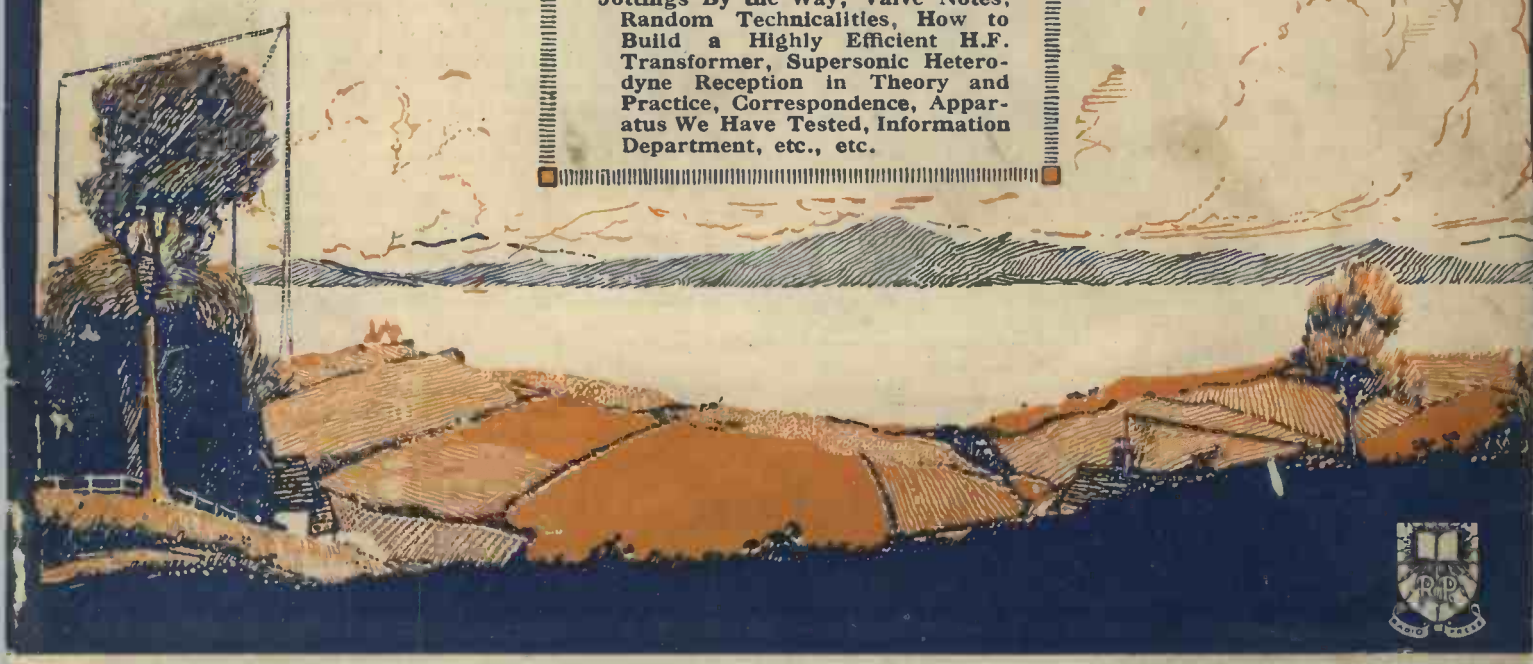

American Broadcasting: Time Table

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No. 162. Two Valves, type "R5," **£1 5s.**
No. 173. H. T. Battery, 45-60 volts, **13s. 6d.**
Coils for 300-500 metres, **8s. 6d.**
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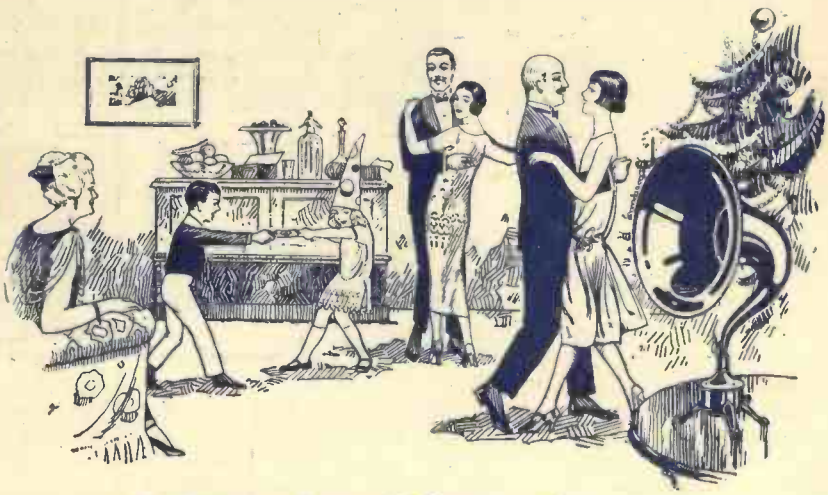

A Radio Christmas — and a Happy New Year

RADIO, besides playing a big part in Christmas festivities, will bring happiness to more homes than ever in the New Year. The wireless concerts will add a great deal to the enjoyment of thousands of happy revellers, and many people will choose radio apparatus for Christmas gifts.

Choose your radio presents from the extensive Burndept range. On this page is listed complete loud speaker equipment with which *all* your family can listen in the most convenient way.

There is the Ethophone-Duplex, a *five-guinea* two-valve set which will work a loud speaker about 20 miles from a main broadcast station and about 100 miles from the high-power station. It has several novel features. Without alteration of any kind, bright or dull-emitter valves may be used in the set.

The new Burndept Junior Loud Speaker is sweet and clear in tone and costs little more than the price of two pairs of good headphones. It has a neat crystalline finish.

The Balkite Battery Charger, if your electric supply is alternating, enables you to charge your accumulator simply and conveniently—you just plug it into the electric light socket. It is based on a new principle, the use of Balkite, a rare metal; has no vibrators, contact points, fragile bulbs or valves; and is absolutely noiseless in operation. It will charge a 6-volt 50-ampere accumulator in 20 hours for less than ½d. per hour, based on a cost of 6d. per unit.

The latest Burndept catalogue, containing full particulars of all our apparatus, which is fully guaranteed, will be sent free on receipt of a postcard. Demonstrations can be arranged.

Purchase Burndept by its name—substitutes are not the same.

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A Suggestion to the Radio Society

LEST it be thought that our constant references to the attitude taken up by the Post Office with regard to wireless is a mistaken one, we would like to draw attention to the fact that the Empire Press Union, a powerful organisation fully representative of the Press of the country, has recently been taking the Post Office to task for its laxity on the whole question of Imperial wireless. If in such matters as adequate wireless communication with the Dominions the Post Office is lax, it is not surprising that in experimental wireless they cannot see further than their nose. In the United States the Government, through more than one department, has publicly thanked the amateurs for their contribution to the science. In this country, far from thanking the experimenters for what they have done, the Post Office has seemingly placed every obstacle in their way, and has even humiliated them before amateurs abroad by imposing vexatious restrictions regarding communication with other countries. Incidentally, the position has not been helped by a slighting reference to the amateurs made by the chief engineer of the British Broadcasting Company in a recently published book, and which he has not yet satisfactorily explained away, although he has attempted to do so.

This brings us to the root of the whole trouble. The experimenters in this country are not sufficiently vocal, and although they have done a great deal of grumbling among themselves they have not been fully alive to the importance of a reasoned protest in the proper quarter. At the present time they have a magnificent opportunity which must not in any circumstances be allowed to pass by. Here we have a new administration with an adequate Parliamentary majority to assure really effective work for some time to come, with a new Postmaster-General possessing a reputation for handling affairs in an expeditious and businesslike manner, and who more than any previous Postmaster-General, is likely to cut out superfluous red tape. The Radio Society should lose no time in preparing a good case and sending a deputation to the Postmaster-General for the purpose of laying before him the grievances and injustices suffered by the experimental wireless community. Sanely and clearly put, the case cannot fail to impress the Government, and if the matter is handled well throughout, the Radio Society will undoubtedly receive a great influx of members from people who have at last realised the benefit of an organised body which really represents the views of the majority.

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"Wireless Weekly" Again Leads

Our readers will be most interested to see in the current issue the first regular time table for the American broadcasting stations. It is unnecessary to remind our readers that *Wireless Weekly* was the first journal to publish adequate and accurate tables giving the broadcasting times of the Continental stations. These tables, which appear regularly in our pages and in *Modern Wireless*, under the editorship of Capt. L. F. Plugge, are compiled, not from newspaper reports, but from actual observations and information received direct from the stations in question. They have been extensively imitated, but never equalled, and are always well ahead of all rivals. Now for the first time we are able to give a good sound guide to American broadcasting, which will save much useless efforts and vain searching for stations which may not be transmitting at all on the particular evening. As a matter of interest, the local times, as well as Greenwich mean time, have been given, together with wavelengths, call signs and locations. Other good features will be added in an early number.

The Discovery of the Oscillating Crystal

By Dr. GREENLEAF W. PICKARD, Inventor of the Crystal Detector.

The Oscillating Crystal is by no means new, as Dr. Pickard ably points out in this interesting history of the principle recently given wide publicity.

THE publication in *Wireless Weekly*, dated December 3, of the experiments of Lossev with the oscillating crystal, calls to mind some facts regarding the first demonstration of this peculiar quality in certain crystalline substances used as detectors of oscillations in radio circuits.

All credit for the discovery of and publication of the oscillating crystal must be given to Dr. W. H. Eccles, who in May, 1910, demonstrated before the Physical Society a galena crystal combination capable of generating oscillations. The circuit used is practically the same, in its fundamentals, as that used by Lossev in his work with the crystal. All of my latter work

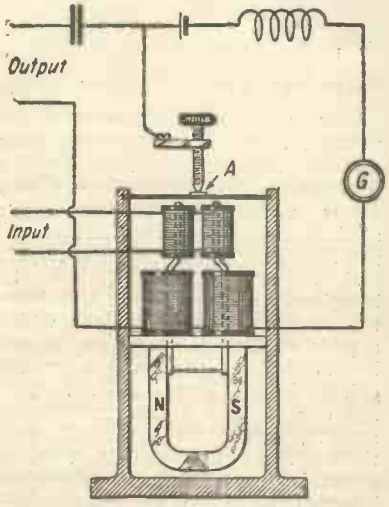


Fig. 1.—The patent drawing of S. G. Brown's microphone amplifier. The instrument Dr. Pickard found to be a sensitive detector of oscillations.

with this type of oscillator, as well as that done by Lossev, is implicit in the original discovery made by Dr. Eccles.

In the summer of 1910, while working with a microphonic telephone and telegraph amplifier —the invention of S. G. Brown, shown in Fig. 1—consisting of a minute spark gap formed between osmium and irridium electrodes, I found that this gap constituted a fairly sensitive though erratic detector of oscillations. Shortly after reading Dr. Eccles' experiences with the

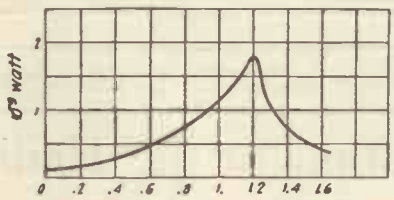


Fig. 2.—Characteristic curve of a galena crystal.

galena crystal combination, I shunted the Brown gap with a capacity-inductance circuit, and at once was successful in producing radio frequency oscillations.

After this preliminary success, I repeated the Eccles experiments with the galena detector (working the crystal on the portion of the curve shown in Fig. 2, which drops, or has the character of acting as a negative resistance similar to the electric arc), and then I used silicon, zincite, fused zinc, oxide and pyrite. In each case I was more or less successful in producing sustained oscillations. In all cases, of course, a condition of oscillation was obtained only after careful adjustment of the contact point on the detector and experimentation with the voltage applied across the crystal in order that it could be worked on the proper portion of the characteristic curve. As Eccles pointed out, the conditions under which the crystal produced sustained oscillation were practically the same as those necessary for the operation of the Poulsen arc.

Acting upon the correctness of this assumption, I placed a strong magnetic field around the detector. In the case of the Poulsen oscillating arc, this condition is extremely important if the arc is to remain stable in operation. However, I found that with the crystal, the magnetic field made not the slightest difference.

After hearing Nauen signals on a regenerative valve set in 1915, I attempted to duplicate that station with the use of a separate crystal oscillator used to heterodyne the signals, and a second crystal to act as a detector. After several hours' work I was rewarded by faint, though readable signals. Following up this experiment, a few days later I succeeded in receiving this station on an autodyne crystal circuit, that is, by using the same crystal as oscillator and detector. The circuit used in this experiment is shown in Fig. 3. It will be noted that this circuit is the same, in its essential characteristics, as that used by Eccles and later by Lossev.

In the course of these experiments I noted that the oscillations generated by the crystal were not constant in amplitude, or else were generated in sepa-

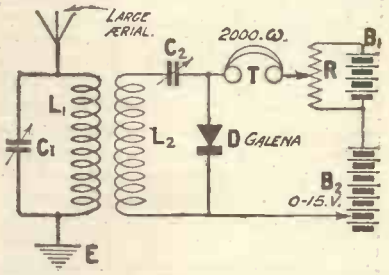


Fig. 3.—The circuit employed by Dr. Pickard in his successful attempts to receive C.W. signals on a crystal.

rate groups. This gave rise to a slight hiss in the 'phones when the crystal was generating radio frequency currents, which would obscure weak signals. It is needless to tell those who have experimented with such an oscillator that the adjustment re-

quired by the crystal is extremely delicate as compared with that necessary when it is to be used for detection.

My experience serves well to illustrate how easy it is for one to miss something that is literally under one's nose. For years prior to Dr. Eccles' experiments I had been experimenting with crystals shunted by a capacity inductance circuit; I was very familiar with their voltage-current characteristics, and I had found a marked increase in their sensitivity when a properly adjusted and poled E.M.F. was placed in circuit, but I had not looked for oscillations nor found them.

The circuit shown in Fig. 4 is a simplified arrangement of that used by Dr. Eccles in his demonstration before the Physical Society of London in May, 1910.

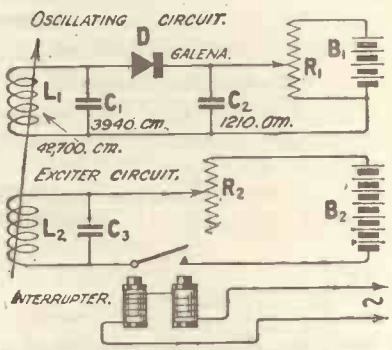


Fig. 4.—Simplified arrangement of the basic circuit developed by Dr. Eccles in 1910.

It will be noted that the circuit has a striking similarity to that used in conjunction with the oscillation arc. The discovery of the oscillation characteristic was quite by accident. The experiments were originally directed toward investigating the thermal characteristics of detectors, Dr. Eccles holding that the radio-frequency currents through a detector heated up slightly the contact surface, and that, when the crystal was shunted by an outside E.M.F., the heating effect materially changed the resistance of the circuit, so that an audible effect was produced in telephone receivers incorporated in the circuit. It was in plotting the curve of a crystal, showing the relation of current and voltage, that he found the negative resistance characteristic. One of the curves, showing this plainly, is given in Fig. 2. Up to approximately 1.2 volts the detector behaved properly. Passing that point, however, the drop in the curve showed plainly that, under certain conditions, the crystal had the property of negative resistance. Of this characteristic Dr. Eccles said: "As

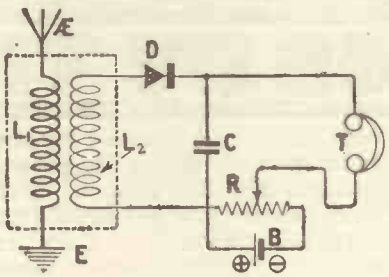


Fig. 5.—A copy of the circuit contained in a patent issued to Dr. Pickard on oscillating crystal circuits.

the current increases the curve bends toward the axis asymptotically. Along this latter part of the curve an increasing current is accompanied by a decreasing E.M.F., an unstable state of affairs. It resembles the oscillating arc. The latter portion of the curve, in fact, very closely resembles the falling characteristic of the arc."

From the foregoing evidence it is obvious that the credit for discovery of the oscillating crystal must be given to Dr. Eccles.

NOTES AND NEWS

Two new broadcasting stations will soon be erected in Chicago, Ill., one on top of the Wrigley building, to be constructed by ex-Mayor William Hale Thompson, the other to be erected on the Edison building by the Edison Company. The Edison station will displace station KYW now on the Edison building roof, and this will probably be removed to the suburbs of Chicago.

□ □ □

The American Trade Commissioner in Alexandria advises that the Egyptian Government recently discontinued the issuance of experimental radio licences. This action has aroused a rumour that the Government is contemplating granting a monopoly to a company to be formed in Egypt, which would be able to exploit wireless broadcasting in many ways, one of which would oblige would-be listeners to purchase their receiving sets from the company and pay a licence fee at the same time to the Government.

Assembling telephones at the B.T.H. works. Our photograph show the closing of the clips on the leather head-bands.

JOTTINGS BY THE WAY

By Wireless Wayfarer

WE at Little Puddleton are feeling perhaps a little hipped that we were not among those invited to transmit during the recent World Radio Week. Of course, one quite understands that it would never do for the professional broadcasting stations to be eclipsed by mere amateurs, even if these amateurs hail from Little Puddleton. We therefore quite appreciate the action of the authorities in not calling upon us. At the same time we feel that the progress of wireless must not be hampered by any kind of petty jealousy. You see my point? As a matter of fact, it is not of transmissions or of radio weeks that I want to tell you now. There is a subject of much greater import-

. . . My pockets bulging with Poddleby's components . . .

ance than this, as I am sure you will agree in a moment. The idea came to me whilst I was reading the other day one of the nobler of our morning papers.

An Entrancing Picture

Upon one of its pages was a picture on which my eyes dwelt entranced. It showed a group of Roberts, Peelers, Cops, Bobbies, or Slops—call them what you will. But these were not ordinary Roberts, etc., for beneath the picture was the thrilling information that this was England's handsomest police force. Now I have myself the greatest possible respect for the police. When, for example, I am returning from Poddleby's with my pockets bulging with components looted from his den I can never refrain from lowering my eyes before the gaze of Police Constable Bottlesworth if he and I should happen to meet on the way. The police, I think, are fine fellows. But quite between you and me, if that is the best that they can do in the way of a beauty chorus I think that they had better put away from them the vain thoughts with which they are apparently puffed up. There is no doubt that they are positively bristling with sterling qualities, but these unfortunately are things that cannot be photographed.

An Idea

Anyhow, the sight of that picture filled me with inspiration, and I promptly went round to talk to Gubbsworthy about it. Gubbsworthy, I am sorry to say, was not in one of his sunniest moods that morning. When I showed him the picture, saying brightly, "Just look at that," he replied, "Thank you, I did so at breakfast and could not eat my second egg." "Gubbsworthy," I said, "be quite frank with me. Tell me, have you ever seen a really beautiful policeman?"

Our Chances

Gubbsworthy admitted that he had not, and asked me to inform him without more ado what I was driving at. "If," said I, "the police, who have small pretensions to classical perfection of feature, are intent upon having a beauty competition why should not we take on the Bilgewater Magna Club on the same lines? So long as you do not appear in our photograph, I feel that we have an odds-on chance of winning. To make it quite a certainty for us you might, if you are a sport, go and buy a house in Bilgewater Magna, join their club, and be photographed with it." In the ensuing two or three minutes a scene of revolting apeman brutality was enacted in Gubbsworthy's study. He rushed upon me, flung me face downwards upon the hearthrug, and would, I think, have beaten in my head with the fire shovel if I had not had the presence of mind to seize the poker and thrust it between his legs, thus bringing him to earth. As I very much object to violence I contented myself with seizing his hair as he lay prostrate on the hearthrug and using it as a handle wherewith to bang his head on the fender half a dozen times. This sobered him down, and after he had cried "pax" we were able to resume our interrupted conversation.

We take the Plunge

We decided that the matter should duly be brought forward at the next meeting of the wireless club. It was agreed that I should lay the idea before the assembled

. . . I very much object to violence . . .

members, and that Gubbsworthy would support me to the best of his rather limited ability. When Poddleby had read the minutes of the meeting, General Blood Thunderby, our gallant chairman, said that there were no resolutions down, but that possibly some member had a point to raise. I rose gracefully to my feet, and in a few well-turned sentences outlined the scheme. I suggested that a challenge should be sent to the Bilgewater Magna Club forthwith, the terms of the competition being that teams of six should be selected and photographed. Six appeared to me to be a suitable number, because even at Little Puddleton we have one or two who are not perfect Adonises. After a lengthy discussion the proposal was agreed to, and Poddleby was instructed

to draft a letter. In a couple of days we had a reply accepting our challenge. And then, if I may say so, the fun began. It was agreed that the team should be selected at once, and that the club should pay all expenses incurred for face cream, massage, barbering, and so on, during the period of training.

Not so Easy

At first sight it would appear to be simple to pick out the half dozen handsomest men in the club, but when you get down to it grave difficulties arise. No one, you see, likes being left out. A reference to the picture of the members of the club, which acts as a heading of this article, will show you at once that there were three certainties—the General, the Admiral, and, I think that I need hardly mention the third, though I would like to say that I do not look my best when in the act of yawning. The remaining three ought really to have been Bumpleby-Brown, Snaggsby, and Poddleby.

Poddleby Eliminated

We had almost decided upon putting this lot into training when Breadsnapp pointed out that he was the owner of the club house, and that he was thinking of resigning from the club and giving us notice to quit. In the circumstances it was felt to be wise to ask him to join the selected few, though this meant turning out Snaggsby, who was not at all nice about it. We pacified him, however, by appointing him seventh man, and eventually fate intervened to straighten things out for us. She gave Poddleby the idea of purchasing a motor bicycle, and also arranged that Mr. Bugsnipp's donkey cart laden with the produce of his allotment should turn suddenly out of a lane into the main road along which Poddleby was making his trial trip. When the doctor had done with him nothing but the tip of Poddleby's nose protruded from the bandages about his head, and it was felt by all of us that even the beauty of this feature was not sufficient in itself to warrant his inclusion. Poddleby therefore stood down and Snaggsby, our erstwhile seventh man, obtained his heart's desire.

Training

The period of training was a strenuous time. No member of the team was allowed to work or even think, for fear that rude toil should roughen his hands or that undue cerebration should produce lines upon the forehead or crows'-feet round the eyes. Each of us spent long hours in hot towels in the establishment of Mr. Snipscrape, our local coiffeur, who manipulated our countenances even as a carpenter thumbs his

. . . *Poddleby met Mr. Bugsnipp's donkey* . . .

putty. The General took to carrying a vanity bag from which from time to time he would produce a small mirror and a powder puff wherewith to dab his proboscis. Admiral Whiskerton Cuttle was reported, on good authority, to have been seen using a lip stick, whilst Snaggsby appeared every day with his parting in a fresh place, asking each of us in turn to tell him whether it was more becoming than his usual style of hair-planning. The only person who disdained all artificial aids to beauty was myself. It is true that I ceased either to work or to think, but these things came quite naturally and required no effort. I know, it is true, I used a little hair oil to begin with, but I soon gave this up on finding that owing to its sticky properties I required a

. . . *The General's hair stood straight on end* . . .

shoehorn to enable me to remove my hat.

A Shock

At length the great day came. It was arranged that each team should be photographed by the camera man of its local paper, and that the picture should appear respectively in the *Little Puddleton Gazette* and the *Bilgewater Magna Advertiser*. We of the Little Puddleton Club formed, I think I may say, about as attractive a group as any camera man had ever had the good fortune to snap his shutter at. When I say that we were all trained to a hair you will understand what I mean.

Anxiety

The photograph was taken, and we waited in suspense for Thursday, on which day both the *Gazette* and the *Advertiser* appear. It had been agreed that copies of the papers should be sent to Captain Chuckersley and Mr. Wrecks Calmer, of the B.B.C., who had kindly consented to act as judges. I was at the time in General Blood Thunderby's study. The maid entered and offered him the folded paper on a silver salver. The General said, "Ha!" and proceeded to open its pages. When he got to the middle a sudden transformation scene occurred. His hair stood straight up on end, his face became bright purple, whilst his eyes simply goggled. At the end of a minute or so he found voice, and the remarks that he made so charred the *Gazette* that the group became entirely invisible. Leaving him hastily I dashed round to Poddleby, whom I found prone on his study floor biting pieces out of the carpet. "Poddleby, Poddleby," I cried. "Why this terrible and most uneconomical display of emotion? Tell me, tell me what has happened." Poddleby, quite incapable of uttering any remark, merely pointed a fat finger to the open pages of the *Gazette*. I looked. I looked again. I joined Poddleby on the carpet. What met my gaze on that page was a group, but what a group! Printed letters said, "Little Puddleton Team in the Inter-Club Beauty Competition." So far so good. But the picture itself, reader! The group was the Bilgewater Magna Club, and in their *Advertiser* appeared the Little Puddleton beauty team. It appears that they had bribed some scoundrel to steal the block from the *Gazette* Office and to substitute their own horrid thing for it. We are now challenging Bilgewater Magna to a more serious duel, axes being the weapon suggested, and we feel that when the strife is over they will never be able to compete, by fair means or foul, in any other beauty competition.

WIRELESS WAYFARER.

Terminal Adapters

IT happens not infrequently that when a friend brings his set round to try at your house you find that your aerial, earth and battery connections are not suitable for the terminals on his set. Everyone has his own idea on the subject of these connections; my own, for example, are shown in Fig. 1. Now it is obvious that there will be some little difficulty

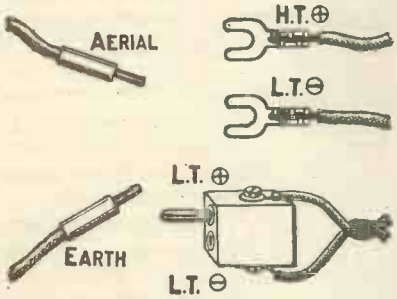


Fig. 1.—The terminal connections favoured by the author.

in connecting these to a set, for example, fitted throughout with either screw-down or "telephone" terminals. For this reason I use a series of terminal adapters which enable any kind of connection to be made without any trouble at all. Fig. 2 shows the device used to enable connections provided with rod-shaped tags to be attached to a set whose terminals are of the screw-down pattern. It consists of a piece of sheet brass ½ inch in width and about 1½ inches in length. In this are drilled two 4 B.A. clearance holes, into one of which a telephone terminal is fixed permanently. The other hole is for the shank of any screw-down ter-

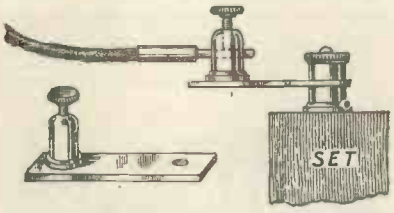


Fig. 2.—A suggested arrangement for screw-down terminals and rod-shaped tags.

minal to which it is desired to make connection.

Fig. 3 shows an adapter which enables tagged leads to be fixed easily to "push in" terminals. This is a piece of sheet brass ½ in. wide and 1 in. in length. A single 4 B.A. hole is made

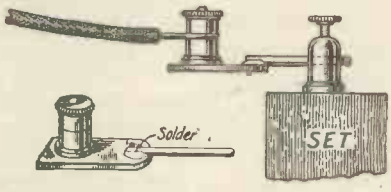


Fig. 3.—An adapter for use with telephone terminals.

quite close to one end and the corners of the other are turned up with pliers. A short piece of ⅛-in. round brass rod is then soldered in as shown, whilst a screw-down terminal is fixed permanently into the hole.

Fig. 4 shows how an adapter may be made to enable plug and socket low-tension connections to be used with any set. This is simply a second plug and socket mounting fitted with a pair of terminals. To do this 4 B.A. tapped holes are made from the surface of the mounting into both plug and socket. Short pieces of studding are screwed into these, and they are provided with terminal nuts.

Adapters of many other kinds, all of them trouble savers, will probably occur to the constructor. For example, should the high-tension battery connection be provided with Clix terminals, an adapter can be made readily from a small piece of sheet brass, close to one end of which

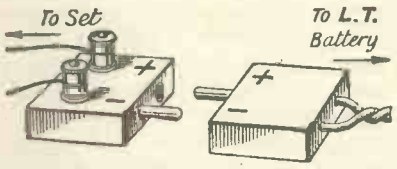


Fig. 4.—A useful safety adapter for L.T. connections.

a Clix is mounted without insulator or bush. In the other end a slot is cut about 3-16 in. wide, so as to enable it to be attached readily to a screw-down terminal. If the arms of the slot are filed down so that their width does not exceed ⅛ in., this adapter can be used just as easily with a telephone terminal, one of the arms being pushed into it, and fixed in place with the setscrew. It greatly simplifies testing in experimental work to keep a number of adapters of various kinds in the drawer of the wireless table, for with their help there is hardly any kind of set, either bought or home-made, which cannot be connected up in a minute or two.

□

A Low-Loss Tuner for Short Waves

SIR,—I have recently built a low-loss tuner for short waves as per Mr. Percy Harris's article in *Wireless Weekly* of November 19. Using stock components with the exception of the valve-holders, which I purchased specially, and utilising a .00025 metal variable condenser with vernier by substituting the metal ends with ebonite ones, I am able to receive KDKA nightly at loud crystal strength, perfectly clearly and no atmospherics. The L.F. transformer is an old R.I., and I am using Cossor valves. I am very much obliged to Mr. Harris for his very excellent article, which has enabled me to hear America when I like, and effectively. This is only one of many splendid sets I have constructed from articles in your publications; in fact, I have in use for general reception a 3-valve tri-coil set as per Fig. 17, page 350, September *Modern Wireless*, and which I consider is the most powerful and selective circuit, using ordinary components, I have yet tried. In conclusion, I think it would be a good idea if you could give readers an idea of KDKA's times of operation, also particulars of any other short-wave transmissions as they come to hand. It is imperative that this short-wave set is kept from oscillation, as reception is utterly spoiled if this occurs.

Thanking you, and all good wishes.—Yours faithfully,

M. R. HORNSBY.

Higher Broughton, Manchester.

A Reader's Results

It should be noted that in connection with Mr. Devoran's letter appearing in our December 3 issue the receiver with which he has obtained such excellent results is the "Three-Valve Dual Receiver" described in the April number of *Modern Wireless* of this year.

A New Short Wave Station

THE first commercial short-wave, low-powered trans-oceanic radio station has been licensed, indicating the recognition of this means of communication by the commercial radio interests, following the successful long-distance experiments of engineers and amateurs.

Station WGH of the Radio Corporation of America at Tuckerton, N.J., has been licensed provisionally to operate on 90, 93, 97, 100 and 103 metres by the Department of Commerce. With this new transmitter rated at 20 kw., the Corporation expects to establish auxiliary long-distance commercial services with Buenos Aires, Berlin and Paris, in addition to their seven high-powered, long-wave services operated from New York City.

WGG

When compared with the power and wavelength of the main transmitter WGG, at Tuckerton, which are respectively 200 kw. and 15,900 metres, the radical step is obvious; only one-tenth the power is to be used. It is possible, if this service operates successfully, that short-wave low-power stations may eventually supersede the expensive high-powered stations previously believed essential in long transmission services.

The range of WGG is approximately 4,500 miles, carrying to Buenos Aires, and, if WGH is to establish such a service, it must also function over great distances, at least at night, when the peak of the traffic to the Corporation's radio central station New York is reached.

Commercial Prospects

Radio experts believe this commercial step is especially significant, and that, with the development of short-wave transmitters and receivers, sufficient short-wave channels will be found for additional services of this type. Within the band, 90 to 103 metres, the assigned wavelengths may be placed much closer together than within longer wave bands. Whether the Corporation will also receive on short waves is not known, but it is pointed out that it will probably have no trouble in spanning the Atlantic or reaching South America, receiving on the longer wavelengths until foreign short-wave stations are established. Dr. Taylor, of the Naval Radio Research Laboratory, stated recently that with his 1½ kw. short-wave transmitter at Bellevue, D.C., he has been heard in Argentine, Chile and Brazil. Westinghouse experiments have been quite successful in short-wave transmission, and abroad considerable progress has been made.

□ □ □

A H.T. BATTERY TIP.

It often happens that a high-tension battery will give out while some interesting item is being received, and to all appearances the rest of the evening's programme must be missed. The battery may, however, be made to carry on for some time if the following tip be applied.

The battery, as a whole, is probably not run completely down, the whole trouble being due to one or two cells which have gone completely dead. These dead cells introduce a very high resistance indeed into the circuit, and thus render the voltage available at the poles of the battery very small. If these cells can be picked out and shorted, the high resistances will be partly reduced, and we may then be able to carry on with the programme.

A simple way is to run over each cell with a high-resistance voltmeter, and to short, by means of a piece of wire, each cell that shows less than 75 per cent. of its normal voltage. In the case of ordinary H.T. batteries the minimum will be about one volt.

In the case of the "block" type of battery, which is tapped at each six or so volts, the task resolves itself into finding out which section contains dead cells, and shorting the whole section. Another method (rather messy, however) is to remove the wax from the top of the battery, and run over each cell in turn, as before. R. G.

The Radio Society of Great Britain

The eleventh annual general meeting of the Radio Society of Great Britain will be held at the Institution of Electrical Engineers, Savoy Place, W.C.2, at 6 p.m., on Wednesday, December 17, and will be the occasion of a lecture entitled "Photo-electrics," by Mr. C. F. Elwell, M.I.E.E., Fellow I.R.E. Tea at 5.30 p.m.

The cabin on board the ss. "Mulbera," in which the Duke and Duchess of York recently sailed for Kenya Colony. Note the loud speaker.

The Aerial Counterpoise

By A. D. COWPER, M.Sc., Staff Editor.

WHILST the use of a counterpoise "earth," arranged under the actual aerial and insulated from the earth itself, is often advocated, and in transmission experiments figures are sometimes obtained from the reading of the aerial H.F. ammeter indicating an increased efficiency resulting from its use—compared with the ordinary earthing system—the writer has not seen anywhere reliable observations recorded on the actual *quantitative* increase in efficiency obtained with a counterpoise "earth" *in reception.*

Valve Reception

With valve reception with reaction (either direct, or concealed under the name of tuned high-frequency coupling, with or without reaction on this coupling) the results obtained are so very variable, depending on the exact degree of fineness of tuning, accuracy of reaction adjustment, toleration of incipient distortion, presence of oscillation hysteresis, or overlap, etc., that few useful observations can be made of a quantitative nature; only the relative degree of freedom from interference and mush, and the observed ease of oscillation (other things being kept as uniform as possible), can be roughly recorded, i.e., unless a long, steady U.R.S.I. signal be available, together with an elaborate equipment of measuring instruments. Even then the question of permissible reaction-distortion will leave considerable margin for error. It is evident, also, that the change in capacity when shifting from counterpoise to direct earth introduces a further complication.

Measurements

But by measuring the *crystal* signal-strength, with the optimum setting of a good sensitive galena and a tuner of really low H.F. losses, figures can be obtained with surprising accuracy and uniformity by the simplest equipment, which are independent of many of these sources of irregularity. By taking the reading of a microammeter put in series with the 'phones, when tuned sharply and with the best available setting of the crystal, a precise quantitative measure is obtained of the variable factor, the "earth" efficiency, by switching quickly from the one to the other whilst the (very uniform) total carrier-wave of one of the B.B.C. stations is rectified by the crystal. This is practically independent of the actual audio-signal-strength modulating the carrier-wave at the moment; yet it is obviously a measure of the average audio-signal-strength obtainable from that station, as the degree of modulation is fixed at the transmitting station. This is the regular routine method of testing the quantitative efficiency of tuning devices, etc.; and, if other things are kept constant whilst the earth connection alone is varied, it is an accurate measure of the relative efficiency of the latter, subject to the relatively small effect of moderate changes of aerial capacity on crystal reception.

Fig. 1.—Illustrating the current paths in earth, and partly conducting objects.

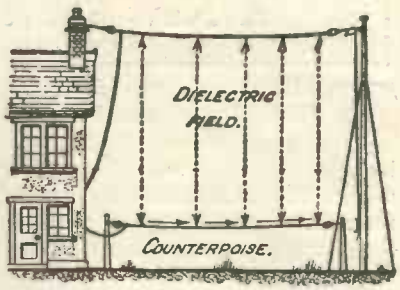
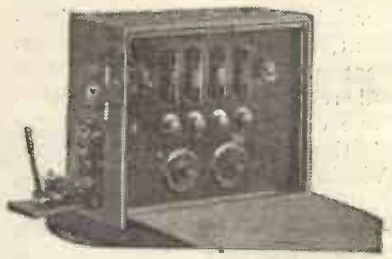


Fig. 2.—The effect of insulated counterpoise.

As suggested in Figs. 1 and 2, the effect of the insulated counterpoise of good-conducting metal wires stretched on short poles under the aerial, and between it and a possibly badly-conducting top layer of earth under it, together with any poor conductors in the form of bushes, out-buildings, etc., of damp wood, will be to screen the latter effectively from playing any considerable part in the oscillating circuit. As a result, sharper tuning and a higher signal-voltage may be expected. The apparent loss of height is of little moment, for the few feet here are of little use in any case.

Circuit for Making Measurements

By fitting up simple switching gear, as indicated in Fig. 3, the measurements are greatly facilitated. The optimum settings for the tuning device (in this case a thick-wire variometer) are first determined, with a good setting of the crystal. It will be found that the tuning on the microammeter is very much sharper than with the 'phones alone, which is a good object lesson to incautious experimenters who trust to casual aural observations as relevant evidence. Then the



A compact 4-valve receiver made by a "Wireless Weekly" reader.

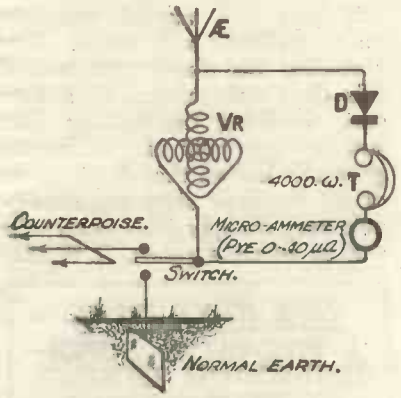


Fig. 3.—The circuit used for measuring the effect of counterpoise.

measurements are made in the two positions of the switch, with the proper tuning adjustment, as rapidly as possible, and with several repetitions.

Actual results obtained on an exceptionally good high single-wire aerial, of all 100 feet in length and 35-40 feet high, of 7-22's, situated on high ground (though with some local screening), 35 miles north of London and the same distance from 5XX, may be of interest. The counterpoise was of "Electron" wire, three strands being stretched over very rough and broken ground under the aerial proper on short poles, etc., 10 feet apart and some 8 feet above the ground at the nearer lower end. Walls and bushes, with small fruit trees, intervened, and were partly screened in this way from taking much part in the oscillating circuit.

The Counterpoise

The wire was suspended from single porcelain insulators, except where it lightly touched the branches of fruit-trees, when the light insulation on the wire was relied upon. The normal earth was a large zinc tub well sunk into damp clay and filled in with cinders in the usual way, and had proved quite satisfactory for ordinary reception, all main British and nearer Continental stations being regularly received at least at moderate L.S. strength on two valves and at night.

The interior of the 4-valve receiver shown on opposite page is as neat as the outside.

In the following article Mr. Cowper tells how, thirty-five miles north of London, he obtained loud-speaker signals from 2LO on a crystal set. He also gives quantitative measurements of increased efficiency obtained with a counterpoise "earth" in reception.

Crystal Results

With a special low-loss air-core variometer of section-spaced No. 18 S.W.G. d.c.c. wire, London gave 5 micro-amperes with the ordinary earth, and no less than 9 microamperes with the counterpoise. With a Grelco loud-speaker the transmission was clearly audible to three people at once standing near in a large room, in daylight, which contrasts rather humorously with the official estimate of 15 miles for the outside limit of comfortable crystal reception on head-'phones! With a tuner wound with No. 22 d.c.c. wire, in the form of a large tapped inductance with parallel condenser tuning, and giving therefore dead-end effects, the figures were 4 microamperes with the ordinary earth, and only 4.5 with the counterpoise. The relatively much heavier losses in the tuner had overshadowed the diminution in aerial losses. On the longer waves, rather unexpectedly, the use of the counterpoise proved unfavourable; from 5XX the crystal-strength was 28 microamperes with the counterpoise, but rose to no less than 36 microamperes with the ordinary earth.

Results in Valve Reception

In valve reception, though for the reasons stated no attempts were made to take actual measurements, it was noted that while the counterpoise produced no improvement with the long-wave station, nor with a semi-aperiodic primary type of loose-coupling on the short B.B.C. waves, with either a direct-coupled circuit with small series condenser in aerial, or with a loose coupled set with tuned primary and secondary, a very noticeable improvement in reception resulted from the use of the counterpoise. Selectivity was sharpened up considerable, and reaction demands were much decreased; it was altogether a much more lively and sensitive set. Thus, after the B.B.C. had one evening given us their much improved version of KDKA, during the two hours from midnight to 2 a.m. five American broadcast stations were tuned in, using the counterpoise, two of these on the loud-speaker, with two Gerrard .06 type D.E. valves as detector and L.F. amplifier, and occasionally a Penton low-consumption as second note-magnifier. Conditions were, of course, particularly favourable that night.

Short Waves

Accordingly, for crystal-reception on the short waves with an efficient low-loss tuner; or for short-wave reception with tuned primary circuit, a counterpoise earth may actually produce a very marked improvement in reception, and is well worth the trouble and quite moderate expense of erecting it. That mentioned here took two people but half a day of strenuous work to erect, although the bushes and fruit-trees, etc., complicated the work considerably. The cost of 300 feet of "Electron" wire and a dozen small insulators, etc., is a small matter.

Adjusting the Loud-Speaker

MANY of those who complain that loud-speaker reception is not so pure as it should be, owe the poorness of their results to their failure to adjust the instrument properly. In the first place it is advisable to place it at some distance from the receiving set. If it is too close, the air vibrations set up by loud signals may be sufficient to cause microphonic noises from the valves, particularly if these are of the "06" type, whose filaments are susceptible to the slightest shaking. Placing the loud-speaker well away from the set involves the use of long leads, but it need not be feared that this will in any way detract from the quality of its output, so long as only a reasonable length is maintained. On the contrary, they will probably improve the quality, owing to the added capacity which they place in shunt with its windings.

The Diaphragm

But the most important thing of all is to get the distance between the diaphragm and the magnets exactly right. Most good makes of loud-speaker are fitted with adjustable magnets moved to and fro by a screw with a milled head. You will find that if you turn this screw in such a way as to reduce the distance between the two there comes a point when a sudden click is heard, after which speech and music are hopelessly indistinct and tinny. The usual advice given is to turn back from this point until a further click is heard and then to leave things alone. This is all very well if signals are not very strong, but if a considerable amount of amplification is being used, very loud passages in either speech or music, and especially certain highly pitched notes in music, may give rise to a most unpleasant noise which I can only describe as a "zizz." This is caused by the movement of the diaphragm being so great that it comes into contact with the poles of the magnets. If this occurs, the screw should be turned further in the direction which removes the magnets from the diaphragm. Do not turn too far or signal strength will fall off, but always keep your diaphragm so well away from the poles that no signal, no matter how loud it may be, produces this hateful noise. When a loud-speaker has been in use for some time, the diaphragm may become bent, so that it is concave. In this case no adjustment will get rid of the noise described, and it will probably be found that signal strength, on the average, is rather weak. The cure is *not* to endeavour to bend the diaphragm straight. If you try this you will almost certainly make matters much worse. Try reversing the diaphragm, and if this does not answer, fit a new one, obtaining the lightest that you can get hold of. It is not generally known that diaphragms of all standard sizes are obtainable very cheaply from firms who deal in wireless goods. R.W.H.

RECEIVING PICTURES BY RADIO

We reproduce above a photograph of the general transmitting apparatus used in transmitting pictures by wireless at the recent Marconi demonstration.

Valve Notes

By

JOHN SCOTT-TAGGART,

F.Inst.P., A.M.I.E.E.

Wavelength Ranges

IT is rather extraordinary that really reputable manufacturers of wireless apparatus omit to state what size of condenser gives a certain range of wavelength with a particular coil or transformer.

We sometimes see these transformers stamped 300-500 or 250-600, or something of that sort, without any indication of the condenser which will give these particular ranges.

One sometimes wonders whether the managers of concerns of this kind have any knowledge of wireless needs, or whether they regard the production of a transformer as merely a mechanical piece of work.

Large Condensers

Another case which calls for comment is the placing on the market of coils with a table of wavelengths covered with a variable condenser having a maximum capacity of .002 μF. Such condensers, of course, are never employed for broadcast reception, the tendency rather being towards condensers of small capacities. For an aerial circuit .0005 μF is the most that is ordinarily used, while for transformers and tuned anodes the tendency is to adopt .0003 μF.

In the case of a beginner, of course, a larger condenser and weaker signals will often suit him better, because if too small a condenser is used the tendency is for the beginner not to tune in to his signals correctly.

Self-Capacity

The minimum capacity of a variable condenser, of course, is a vital matter whenever giving tables of ranges. It would be a little strong to say that some of the tables of the coils were faked, but they are, at least, misleading. Each coil manufacturer wishes to get as big a range with a given variable condenser as possible, the reason being, not only a matter of convenience to the experimenter, but also because there is an implied tribute to the small self-capacity of the coils.

The coil with small self-capacity will give a much wider range of wavelength with a given condenser than a coil wound, for example, on an ordinary bobbin. The tendency, consequently, is to give the appearance of a small self-capacity by getting as big a wavelength range as possible.

Misleading

One method of doing this is to disconnect the variable condenser altogether from the coil on the lowest range of wavelength. For example, the coil with its own self-capacity resonates to a certain wavelength with no condenser at all connected in parallel with it. This wavelength is regarded as the lowest wavelength obtainable with, say, a .0005 μF variable condenser. The condenser is then connected in parallel with the coil, and the maximum wavelength is taken. This latter figure, of course, is in order, but the minimum figure is an entirely erroneous one. There is a very big difference between the natural wavelength of a coil and the wavelength of the circuit formed by the coil and a condenser set at zero. This, of course, is because the condenser, even when set to zero, has a very appreciable capacity in comparison with the self-capacity of the coil. The correct way of stating a wavelength range would be to indicate the minimum capacity of the variable condenser and the maximum capacity.

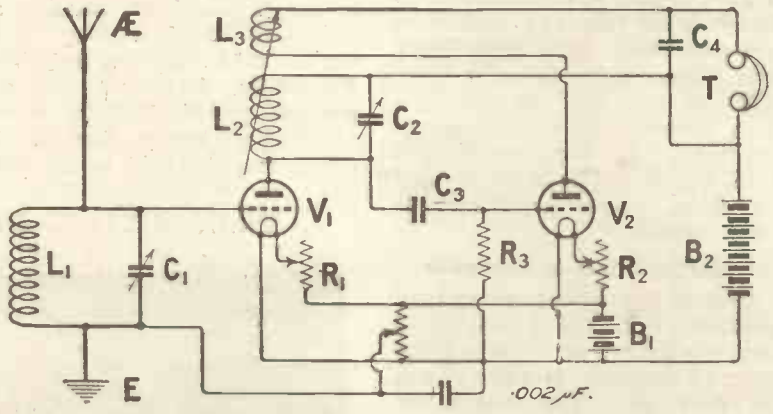


Fig. 1.—A well-known arrangement to illustrate the position of C3 and R3 in relation to one another.

Wavelength Tables

A certain inductance may resonate on its own accord for a wavelength of 200 metres, and yet when it has in parallel with it a variable condenser set at zero, the wavelength may be 300 metres. Experimenters are therefore warned to take with a grain of salt the lower values in the average wavelength table of coil manufacturers, because these conditions are never existent.

The longer wavelength, of course, may be treated as accurate, although, of course, the capacity of the condenser should always be stated on the coil table.

Incidental Capacities

The question becomes still more important when working on very low values of condensers in grid circuits and anode circuits. It must always be remembered that the incidental capacities and the capacities between the filament and anode or filament and grid, and other capacities inside the valve, affect the wavelength range, and this, of course, is liable to fluctuate seriously according to the type of valve used, the wiring of the circuit, etc. It is quite possible that one experimenter may state that he receives a station on so-and-so a wavelength with a certain coil and a certain value of condenser, but if this condenser value is small, it is extremely probable that another experimenter will require a different size coil. The beginner, therefore, should always beware of tables of results in which low values of condensers are described. It is quite likely that when he builds up a set a different coil will be required. This warning, of course, is not necessary to the experienced man, but should be borne in mind by those whose experience is more limited.

Damping Effect of Gridleaks

One of the values of variable gridleaks is that it is possible to obtain stability, or a fine adjustment of reaction, in some cases, by their use. The reason for this, although not often appreciated by the experimenter, is that in reality the grid leak is connected in parallel with an oscillatory circuit, and consequently introduces damping, energy being expended in heating the leak (imperceptibly, of course).

If we look, for example, at Fig. 1, which is a very well-known arrangement nowadays, it will be seen that there is a grid condenser C_3 and a grid leak R_3. If it is remembered that the high-tension battery B_2 may be substantially ignored, from the high-frequency point of view, it will be seen that the grid condenser C_3 and the leak R_3 are, in reality, connected in parallel with the inductance L_2.

I have reproduced in Fig. 2 the arrangement showing the altered position of the grid leak. The only reason why the grid leak is put into the position shown in Fig. 1 is because, if the Fig. 2 arrangement were adopted and the grid of the second valve were connected to the point X, the grid of this second valve would become too positive, owing to the high-tension voltage being communicated through the grid leak R_3. I have known cases where the connection of the leak in this position has improved results, although the leak usually requires to be of a very much higher value, say, 10 megohms. Personally, I cannot see any possible technical merit in any advantage being derived by connecting the grid to the positive terminal of the high-tension battery through the grid leak, except perhaps that it may possibly be that by doing this a more accurate adjustment of the second valve, as a detector, is possible by working the valve on the bend of the grid current characteristic curve.

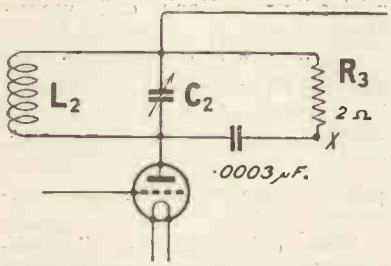
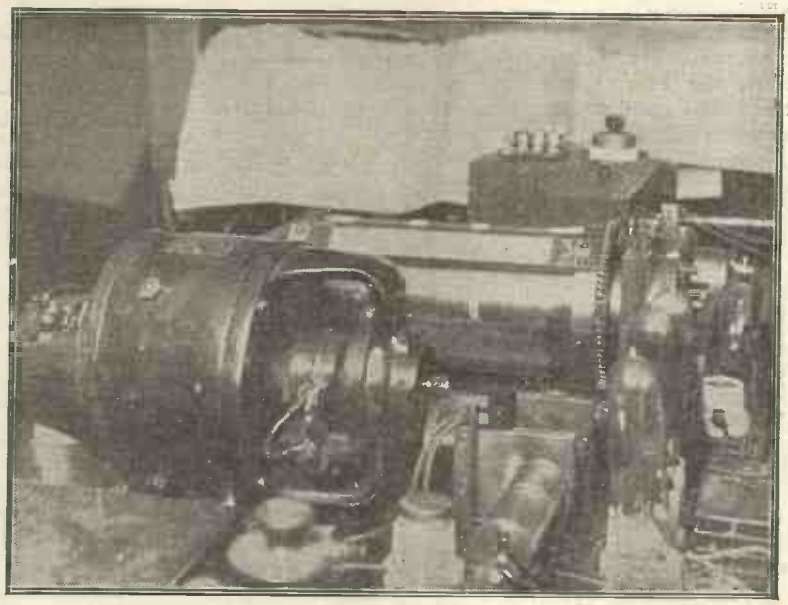


Fig. 2.—Showing that R3 is virtually in parallel with L2 C2.

The reason I am giving the Fig. 2 arrangement, however, is to show that the resistance R_3 is virtually in parallel with the circuit L_2 C_2, and will consequently absorb energy from it, and so introduce damping into it. The use of grid leaks of smaller value will consequently cause greater damping and greater stability, but anything less than 1 megohm will usually begin to affect signal strength.

TRANSMITTING PICTURES BY WIRELESS



In our last issue we published an article dealing with the transmission of photographs by wireless. Our present photograph shows a close-up of the cylinder round which the prepared film is wrapped.

Regular Programmes from American Broadcasting Stations

Hours of transmission given in Greenwich mean time and in local time prevailing.
Telephony only. Corrected up to December 13th.
Edited by Captain L. F. PLUGGE, B.Sc., F.R.Ae.S., F.R.Met.S. *Copyright.*

WEEKDAYS.

Ref. No.	Greenwich Mean Time.	Local Time prevailing.	Name of Company owning station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Approx. duration of Transmission.
A. 1	11. 0 p.m.	6. 0 p.m.	Willard Storage Battery Co.	WTAM 390 m.	Cleveland, Ohio.	Dance Music, Concert, Orchestra.	1 hr.
A. 2	11. 0 p.m.	6. 0 p.m.	Westinghouse Electric & Mfg. Co.	WBZ 337 m.	Springfield, Mass.	Dinner Concert.	—
A. 3	11.15 p.m.	6.15 p.m.	L. Bamberger & Co.	WOR 405 m.	Newark, New Jersey.	Orchestra.	—
A. 4	11.30 p.m.	6.30 p.m.	Westinghouse Electric & Mfg. Co.	KDKA 326 m.	Pittsburgh.	Dinner Concert or Organ Recital.	—
A. 5	11.50 p.m.	5.50 p.m.	"Kansas City Star"	WDAF 411 m.	Kansas City, Mo.	Market, Weather Report, Time Signal, Road Report.	10.0 p.m.
A. 6	midnight	6. 0 p.m.	"Kansas City Star"	WDAF 411 m.	Kansas City, Mo.	Talks, Story, Music.	1 hr.
A. 7	midnight	7. 0 p.m.	Westinghouse Electric & Mfg. Co.	WBZ 337 m.	Springfield, Mass.	Market Report, Talks, Children's Stories.	15 m.
A. 8	12. 2 a.m.	6. 2 p.m.	Westinghouse Electric & Mfg. Co.	KYW 536 m.	Chicago, Ill.	News, Financial Markets.	16 m.
A. 9	12.15 a.m.	7.15 p.m.	L. Bamberger & Co.	WOR 405 m.	Newark, New Jersey.	Sports News.	—
A. 10	12.15 a.m.	7.15 p.m.	Westinghouse Electric & Mfg. Co.	KDKA 326 m.	Pittsburgh, Pa.	Children's Period.	—
A. 11	12.15 a.m.	7.15 p.m.	Westinghouse Electric & Mfg. Co.	WBZ 337 m.	Springfield, Mass.	Talks followed by Concert or other Musical Programme.	—
A. 12	12.30 a.m.	6.30 p.m.	Woodmen of the World.	WOAW 526 m.	Omaha, Nebraska.	Concert or Orchestra.	—
A. 13	12.30 a.m.	7.30 p.m.	Westinghouse Electric & Mfg. Co.	KDKA 326 m.	Pittsburgh, Pa.	News, Talks, Market Reports, Talks or Concert.	45 min.
A. 14	12.35 a.m.	6.35 p.m.	Westinghouse Electric & Mfg. Co.	KYW 536 m.	Chicago, Ill.	Children's Period.	25 m.
A. 15	12.45 a.m.	7.45 p.m.	General Electric Co.	WGY 380 m.	Schenectady, New York.	Musical Programme and/or talks (except Wed. and Sat.)	—
A. 16	1. 0 a.m.	7. 0 p.m.	Westinghouse Electric & Mfg. Co.	KYW 536 m.	Chicago, Ill.	Talks, Dinner Concerts, Musical Programmes. (Mondays excepted)	2½ hrs.
A. 17	1. 0 a.m.	7. 0 p.m.	Sears-Roebuck & Co.	WLS 345 m.	Chicago, Ill.	Children's Period.	45 m.
A. 18	1.30 a.m.	8.30 p.m.	Westinghouse Electric & Mfg. Co.	KDKA 326 m.	Pittsburgh, Pa.	Concert and Musical Programme	—
A. 19	1.30 a.m.	7.30 p.m.	"Fort Worth Star Telegram"	WBAP 476 m.	Fort Worth, Texas	Musical Programme (except Sat.)	1 hr.
A. 20	2. 0 a.m.	8. 0 p.m.	"Kansas City Star"	WDAF 411 m.	Kansas City, Mo.	Musical Programme	1½ hrs.

WEEKDAYS—*continued.*

Ref. No.	Greenwich Mean Time.	Local Time prevailing.	Name of Company owning station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Approx. duration of Trans-mission.
A. 21	2.55 a.m.	9.55 p.m.	John Wanamaker	WOO 509 m.	Philadelphia, Ill.	U.S. Naval Observatory Time Signal followed by U.S. Weather forecast.	—
A. 22	2.55 a.m.	9.55 p.m.	Westinghouse Electric & Mfg. Co.	KDKA 326 m.	Pittsburgh, Pa.	Do. do.	—
A. 23	2.55 a.m.	9.55 p.m.	Westinghouse Electric & Mfg. Co.	WBZ 337 m.	Springfield, Mass.	Do. do.	—
A. 24	3. 0 a.m.	9. 0 p.m.	Woodmen of the World.	WOAW 526 m.	Omaha, Nebraska	Concert (except Wednesdays).	—
A. 25	3. 0 a.m.	10. 0 p.m.	Westinghouse Electric &Mfg. Co.	WBZ 337 m.	Springfield, Mass.	Musical Programme (except Tuesdays).	1 hr. or 2 hrs.
A. 26	3.15 a.m.	7.15 p.m.	"Morning Oregonian"	KGW 492 m.	Portland, Oregon.	Markets, Weather Report, News, Police Reports. (Saturdays excepted)	—
A. 27	3.30 a.m.	9.30 p.m.	"Fort Worth Star-Telegram."	WBAP 476 m.	Fort Worth, Texas.	Musical Programme (except Saturday).	1½ hr.
A. 28	4. 0 a.m.	10. 0 p.m.	Westinghouse Electric & Mfg. Co.	KYW 536 m.	Chicago, Ill.	Musical Entertainment (except Mondays). Sometimes begins 9.30 p.m.	1 hr. or 2 hrs.
A. 29	5.45 a.m.	11.45 p.m.	"Kansas City Star"	WDAF 411 m.	Kansas City, Mo.	Musical Entertainment.	1½ hr.

SUNDAYS.

Ref. No.	Greenwich Mean Time.	Local Time prevailing.	Name of Company owning station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Approx. duration of Trans-mission.
A. 30	11.30 p.m.	6.30 p.m.	Westinghouse Electric & Mfg. Co.	KDKA 326 m.	Pittsburgh, Pa.	Dinner Concert	—
A. 31	12. 0 p.m.	6. 0 p.m.	Woodmen of the World Radio	WOAW 526 m.	Omaha, Nebraska.	Bible Study Hour	1 hr.
A. 32	12.30 a.m.	7.30 p.m.	Strawbridge and Clothier.	WFI 395 m.	Philadelphia.	Church Service	—
A. 33	12.30 a.m.	7.30 p.m.	General Electric Co.	WGY 380 m.	Schenectady, New York.	Church Service	—
A. 34	12.30 a.m.	7.30 p.m.	Westinghouse Electric & Mfg. Co.	KDKA 325 m.	Pittsburgh, Pa.	Church Service	—
A. 35	12.45 a.m.	7.45 p.m.	John Wanamaker	WOO. 509 m.	Philadelphia, Pa.	Church Service. (Occasionally at 10.45 a.m. instead)	—
A. 36	1. 0 a.m.	7. 0 a.m.	Westinghouse Electric & Mfg. Co.	KYW 536 m.	Chicago, Ill.	Service & Musical programme.	—
A. 37	1.30 a.m.	8.30 p.m.	Westinghouse Electric & Mfg. Co.	WBZ 337 m.	Springfield, Mass.	Concert or Music, etc.	—
A. 38	2. 0 a.m.	6. 0 p.m.	"Morning Oregonian"	KGW 492 m.	Portland, Oregon	Church Service	—
A. 39	2. 0 a.m.	9. 0 p.m	General Electric Co.	WGY 380 m.	Schenectady, New York.	Hotel Orchestra, relayed.	—
A. 40	2.30 a.m.	9.30 p.m.	Westinghouse Electric & Mfg. Co.	WBZ 337 m.	Springfield, Mass.	Concert or Music, etc.	—
A. 41	3. 0 a.m.	7. 0 p.m.	"Morning Oregonian"	KGW 492 m.	Portland, Oregon.	Hotel Orchestra, relayed.	—
A. 42	3. 0 a.m.	9. 0 p.m.	Woodmen of the World.	WOAW 526 m.	Omaha, Nebraska.	Church Service	—
A. 43	7. 0 a.m.	11. 0 p.m.	"Fort Worth Star-Telegram."	WBAP 476 m.	Fort Worth, Texas."	Dance Orchestra	1 hr.

SPECIAL DAYS.

Ref. No.	Greenwich Mean Time.	Local Time prevailing.	Name of Company owning station.	Call Sign and Wave-length.	Situation.	Nature of Transmission and day of week on which occuring.	Approx. duration of Trans-mission.
A. 44	11.30 p.m.	6.30 p.m.	General Electric Co.	WGY 380 m.	Schenectady, New York.	Tues. & Thurs.—Hotel Music re-layed.	—
						Wed.—Children's story.	—
A. 45	11.30 p.m.	6.30 p.m.	Strawbridge and Clothier.	WFI 395 m.	Philadelphia.	Mon. & Sat.—Hotel Concert Orchestra followed by Children's period at 7.0 p.m.	—
A. 46	midnight	6. 0 p.m.	Woodmen of the World.	WOAW 526 m.	Omaha, Nebraska.	Mon. & Tues.—Lecture.	—
						Thurs. & Fri.—Children's Hour.	—
						Sat.—Concert.	—
A. 47	12.30 a.m.	7.30 p.m.	John Wanamaker	WOO 509 m.	Philadelphia, Pa.	Mon., Wed., Fri.—Organ or Orchestral Concerts, Talks.	3½ hrs.
A. 48	1. 0 a.m.	8. 0 p.m.	Strawbridge and Clothier.	WFI 395 m.	Philadelphia, Pa.	Thurs.—Boy Scout Programme, followed by Concert at 8.30 p.m.	2½ hrs.
						Tues. and Sat.—Concert.	2½ hrs.
A. 49	1. 0 a.m.	8. 0 p.m.	L. Bamberger & Co.	WOR 405 m.	Newark, New Jersey.	Mon., Wed., Sat.—Musical Programme, Talks.	3 or 4 hrs.
A. 50	1. 0 a.m.	8. 0 p.m.	Willard Storage Battery Co.	WTAM 390 m.	Cleveland, Ohio.	Mon. & Wed.—Concert.	2 hrs.
A. 51	2. 0 a.m.	9. 0 p.m.	Willard Storage Battery Co.	WTAM 390 m. or 361. m.	Cleveland, Ohio.	Sat.—Dance Programme.	3. hrs.
A. 52	2.30 a.m.	9.30 p.m.	General Electric Co.	WGY 380 m.	Schenectady, New York.	Sat.—Dance Music.	—
A. 53	3. 0 a.m.	8. 0 p.m.	"Morning Oregonian."	KGW 492. m.	Portland, Oregon.	Mon. & Wed.—Concert.	—
						Tues. & Fri.—Talk.	—
A. 54	3.30 a.m.	10.30 p.m.	Willard Storage Battery Co.	WTAM 390 m.	Cleveland, Ohio.	Mon.—Dance Programme.	2½ hrs.
A. 55	3.30 a.m.	10.30 p.m.	General Electric Co.	WGY 380 m.	Schenectady, New York.	Fri.—Musical programme.	—
A. 56	4.30 a.m.	11.30 p.m.	General Electric Co.	WGY 380 m.	Schenectady, New York.	Tues. & Thurs.—Organ Recital.	—
A. 57	4.30 a.m.	10.30 p.m.	Woodmen of the World.	WOAW 526 m.	Omaha, Nebraska.	Tues. or Thurs.—Entertainment.	—
						Fri.—Relayed Orchestra.	—
A. 58	4.30 a.m.	11.30 p.m.	Westinghouse Electric & Mfg. Co.	WBZ 337 m.	Springfield, Mass.	Tues.—Organ Recital.	—
A. 59	5.15 a.m.	11.15 p.m.	Woodmen of the World.	WOAW 526 m.	Omaha, Nebraska.	Sat.—Entertainment.	—
A. 59a	6. 0 a.m.	10. 0 p.m.	"Morning, Oregonian."	KGW 492 m.	Portland, Oregon.	Wed. & Sat.—Dance Music.	—
A. 60	6. 0 a.m.	midnight	Westinghouse Electric & Mfg. Co.	KYW 536 m.	Chicago, Ill.	Sat.—Hotel Band Relayed.	2 hrs.

BADGES FOR GOOD BOYS

SIR,—Having taken considerable interest in your editorial, published on November 24, I should feel gratified if you would be good enough to publish my opinion.

In the first place, I personally should imagine that the badge would merely be worn at exhibitions and similar functions. If this is the intention of the Radio Society of Great Britain I see no point in your editorial, as even such a notable body as the Institution of Mechanical Engineers have a special badge for this purpose.—Yours faithfully,

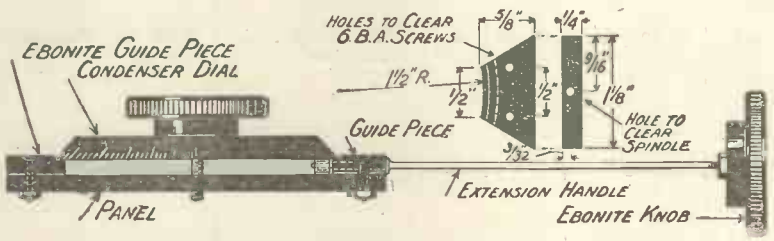
VAUGHAN S. DOLBY.

London, S.W.

[*Other letters on this subject appear in our Correspondence columns.*]

A Useful Vernier Extension Handle

AN efficient extension handle, giving a vernier movement to a variable condenser dial, may easily be constructed as shown in the following diagram. First make two ebonite pieces, as shown in the inset. These two pieces are exactly the same with the exception that in one a spindle hole is drilled. The dimensions are given in the diagram. The edge with the radius is made to suit a 3-in. diameter ebonite condenser dial, but this would be varied with dials of a different diameter. The spindle is made of a piece of ⅛-in. diameter round brass bar. One end is turned down to 1-16-in. diameter, this portion passing through a 1-16-in. clearing hole drilled in the ebonite guide piece. To the projecting portion is screwed or sweated a small brass cap. This should be adjusted to allow free movement of the spindle in the ebonite guide piece. Around the brass cap is secured a thick rubber band. The other end of the spindle is equipped with an ebonite knob and lock nut. The extension handle itself may be made any desired length. The whole is now secured to the panel by means of two 6 B.A. screws passing through two corresponding clearing holes in the ebonite guide piece in the position indicated. At the opposite side of the condenser dial the other ebonite guide piece is secured in a similar manner. It will be seen that the dial is now secured perfectly horizontally by means of "V" cuts in the two ebonite pieces, resulting in a horizontal movement. The rubber band pressing upwards against the under-side of the condenser dial rotates the condenser spindle when the knob of the extension handle is turned.



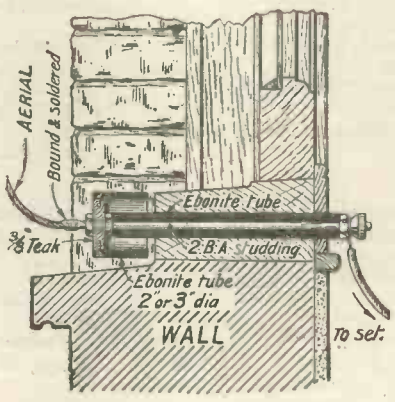
Constructional details of the extension handle and its guides.

H. B.

An All-Weather Lead-in

ALTHOUGH it is increasingly becoming recognised that the aerial and earth system is of vital importance to good reception, and numbers of insulators are often seen strung in series on the aerial, the very vital point where the aerial is actually brought into the house often receives scant attention. In many cases seen lately only a piece of rubber-covered flex has been used, merely twisted on to the aerial wire and taken through a slightly open window. As a temporary arrangement in dry weather this may answer fairly well, but when rain comes the joint corrodes and moisture collecting runs down the wire to the window, forming a serious leakage path to earth.

To obviate this trouble the lead-in insulator illustrated has been designed. Only easily obtainable material has been used, and its construction is well within the scope of any amateur. From the sectional sketch shown the application is apparent. A length of 2 B.A. studding, about 6 in. to 1 ft. in length, as decided by the window size, is passed through ebonite tubing of the usual type used for lead-in insulators and of suitable length decided as above. On one end a 2 B.A. nut is screwed, leaving about an inch of studing projecting. This nut is either secured by soldering or locked by another nut, and serves to make the inside terminal connection in conjunction with the usual head of a 2 B.A. W.D. type terminal. So much for the indoor connection.



The weather-proof lead-in.

The arrangement to keep the outdoor connection dry is as follows:—

A 3 to 6-in. length of 2 or 3-in. diameter ebonite tube is taken, and a circular piece of ⅜-in. thick teak, or any hard wood, is cut and fitted into one end and secured by four wood screws. In the centre of the latter a hole of suitable diameter to take the 2 B.A. studding is drilled, and the arrangement is held to the studding by two nuts as shown, one on either side of the wood. When in position the wood may be given a coating of black enamel or treated with paraffin wax or shellac, to render it proof against the weather.

The lead-in is fixed as in the diagram, being taken through the window sill in the usual manner and arranged so as to come just above the window ledge, so that the actual ebonite tube going through the wood is protected from the weather, thus remaining dry and affording really good insulation under all conditions. The actual connection to the aerial is made by binding the aerial wire to the projecting end of the studding outside with twined copper wire and then sweating or soldering, so that a good joint is obtained.

This arrangement will be found to give excellent insulation in all weathers, and is well worth the slight trouble of making.

Supersonic Heterodyne Reception in Theory and Practice

By JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

Part IX.

We can avoid the use of a grid condenser and leak in a rather different way by using a circuit of the kind shown in Fig. 30. Instead of having one single coil L1, as in the case of Fig. 28, we use a split coil composed of two inductances, L1 and L2; the anode battery B2 is connected so as to come in the anode circuit of the valve and yet to be clear of the grid circuit. Across the grid and anode is a variable condenser C1, and the whole oscillatory circuit consists of the inductances L1 and L2 in series and the variable condenser C1 shunted across the two coils.

Oscillatory Currents

As far as oscillatory currents are concerned, the battery B2 and the by-path condenser C2 might just as well be connected at the point X; we would then have the circuit of Fig. 28. By connecting the battery B2 in the position shown, however, we get it next to the filament, an arrangement which has several advantages. In the Fig. 30 arrangement a condenser C2 is used to shunt the anode battery, because the latter always has some resistance which would be a disadvantage if connected in the oscillatory circuit. As a general principle, all anode batteries should be preferably shunted by a fixed condenser having a capacity of not less than 0.002 μF.

It must be pointed out, in connection with Fig. 30, that the operation of the circuit is entirely independent of any magnetic coupling between L1 and L2; this also applies to the circuits of Figs. 28 and 29. The two halves of the inductance above and below the point M may be entirely separate, so as to have no inductive effect on each other.

Grid Potentials

It must be remembered that the grid potentials required to maintain oscillations are obtained through the flow of oscillatory current through the lower portion of the inductance between M and Y (Figs. 28 and 29). In all these circuits, of course, the inductance, or inductances, may be variable.

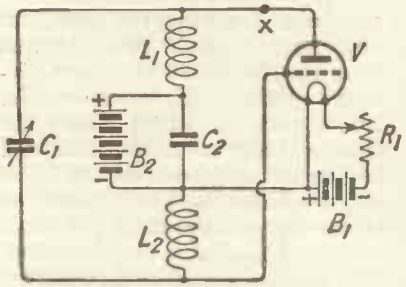


Fig. 30.—A single circuit oscillator using two separate inductances in series.

There is still another general method of obtaining a reaction effect using a single circuit. One form of this is shown in Fig. 31. The single oscillatory circuit consists of an inductance L1 shunted by two condensers C2 and C3 in series with each other.

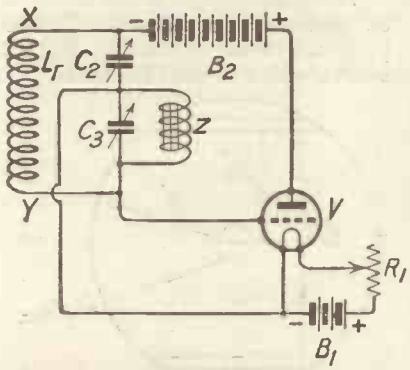


Fig. 31.—A single valve regenerative circuit using two condensers in series.

The middle point between these two condensers is connected to the filament negative, while the top end of L1 is connected to the anode through the anode battery B2, while the bottom end Y of L1 is connected to the grid.

Another Method

It will be seen that when oscillations are flowing in the circuit L1 C2 C3, the anode will be positive when the grid is negative, and *vice versa;* these potentials, of course, are with respect to the filament. Putting it another way, any oscillatory current in L1 C2 C3 (and therefore through C3) will produce grid potentials which will produce changes of anode current which will energise the oscillatory circuit so as to maintain the original oscillations or to strengthen them. Since the midway point between the condensers C2 and C3 is connected to the filament, we would ordinarily be unable to obtain the necessary steady direct anode current. To obtain this we connect a choke coil Z across the condenser C3, and the steady anode current now flows from the anode, through B2, through L1 and through Z, and so down to the filament. When the grid potential varies, the varying currents pass through the inductance L1 and energise the oscillatory circuit L1 C2 C3. This energising and building up of oscillations in this circuit produce high-frequency electromotive forces across the condenser C3. In other words, high-frequency potentials are set up across the grid and the filament. These potentials are such as to produce a reaction effect on the oscillations in L1 C2 C3.

The Choke Coil

Although the choke coil Z serves as a direct current path, it may be considered as non-existent when we are dealing with the high-frequency current circuits, since the choke prevents the passage of any high-frequency currents.

The circuit of Fig. 31 may be modified by connecting the anode battery next to the filament. A

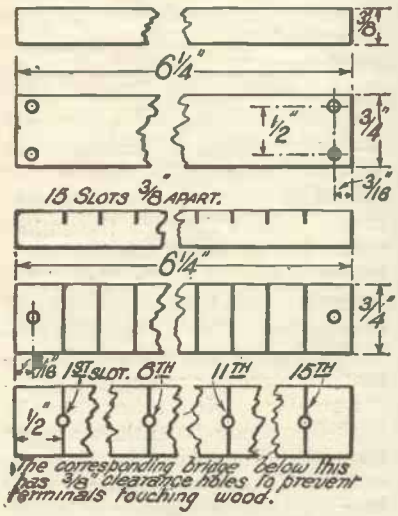
grid condenser and leak would then be necessary, as in the case of Fig. 29.

I now propose to deal with a practical five-valve supersonic heterodyne receiver, which I have designed and used with considerable success, and this will be followed by the description of a seven- or eight-valve supersonic receiver where greater volume or longer range is desired.

In order to ensure the same results being obtained by different readers, I propose to give below a description which has been prepared by Mr. W. H. Fuller of the frame aerial which he constructed for me for the purpose of supersonic heterodyne experiments.

THE FRAME AERIAL

The frame aerial, or "loop" as it is often called, described herein, is shown in the photograph taken on the roof of Bush House.



Figs. 1, 2, 3, illustrating the wood strips, the ebonite bridges and position of terminals.

The main features of this frame are simplicity of construction, efficiency, cheapness, and the ability to turn the loop in any direction without moving the stand.

The frame itself is made by spacing two hoops, as used by children, by strips of wood upon which are mounted ebonite strips suitably slotted to receive the wire. The list of parts required to build the loop portion of the frame is as follows:—

2 children's hoops, 2 ft. 9 ins. diameter.

6 pieces of wood 6¼ ins. long by ¾ in. wide by ⅜ in. thick.

6 pieces of ebonite 6¼ ins. long by ⅜ in. wide by ¼ in. thick.

3 doz. ½ in. No. 4 wood screws.

48 yards rubber-covered flex.

A bottle of varnish stain.

The Hoops

The children's hoops may be purchased from any toy shop, but take care to obtain two hoops as near as possible of the same diameter. Should this be impossible, lay a piece of string round the smaller hoop on the outside and find its exact circumference. The larger hoop is then taken to pieces by withdrawing the nails at one of the joints in the hoop. The piece of string is then passed round the edge of the hoop and the overlapping strips marked. These pieces are then cut off and the hoop rejoined. The piece of string is then equally divided into six lengths, and six pencil marks made round the edges of both hoops with the aid of one of these lengths of string. These measurements should be checked carefully. If the constructor has a steel tape measure, the operation can be much simplified by actual measurement.

The Wood Strips

The six pieces of wood are then cut and sandpapered and drilled to pass the wood screws. Fig. 1 shows where to drill the holes.

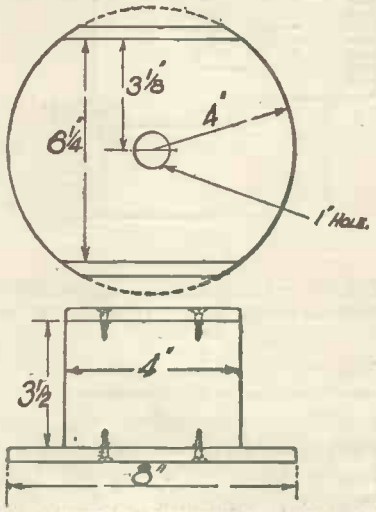
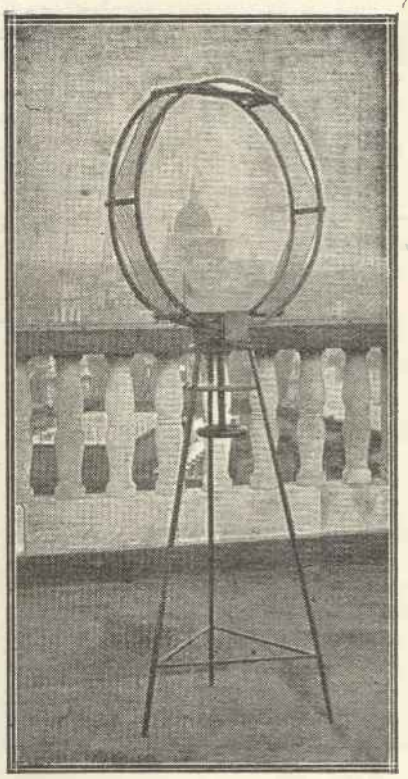


Fig. 4.—Constructional details of the disc and side pieces.



A photograph of the frame aerial taken on the roof of Bush House. St. Paul's may be clearly seen through the loop.

These pieces are then fixed to the hoops, taking care to see that the centre of the end of the bridges coincide with the pencil marks made on the edges of the hoops. It is advisable to fix two bridges on one hoop, one at each side, then fix the other hoop to these. The other bridges are then secured in order round the hoops. At this stage give the loop a good coat of the varnish stain, which will be drying while the other parts of the loop can be proceeded with.

The Ebonite Bridge

Next cut the ebonite bridge pieces, correct to size, and drill as shown in Fig. 2. The slots should be carefully cut with a hacksaw, and made a little wider with a ward file. These files can be purchased at any ironmonger's for a few pence. These ebonite pieces are then secured to the wooden bridge pieces by screws.

It will be noticed that one of the ebonite pieces carries three terminal tappings from the loop, and Fig. 3 shows where these holes for the terminals are drilled. These holes should, of course, be drilled before fixing to the bridge piece. The bridge piece to which

this is fitted will need to have three ⅜ in. holes drilled into it to clear the ends of the terminals.

The next step is to make the cradle. This is simply a box to which the frame is fitted, and its construction should offer no difficulty.

Materials for Disc

The materials required for this are as follows :—

1 disc of wood ⅜ in. thick, 8 in. diameter.

2 pieces of wood 4 in. by 3½ in. by ⅜ in. thick.

1 piece of wood 4 in. by 7 in. by ⅜ in. thick.

A few 1 in. No. 4 wood screws.

In the middle of the disc a 1-in. hole is cut with a centre bit. The two side pieces are then secured to the disc by means of screws, as shown in Fig. 4. The overlapping pieces may be cut off, as in the writer's model, but it is not essential to do so. The top piece should then be temporarily secured and the whole given a coat of varnish stain.

Winding the Turns

At this stage, if the loop is dry, the wire may be put on. The beginning of the wire is bared and placed under the first terminal, which is tightened down. The wire is then laid round the loop in the slots, a slight tension being applied to the wire, until the second terminal is reached, and here the wire is bared and turned round the terminal, which is then tightened up. Proceed in this manner until the loop is filled up, thus making a total of 14 turns.

The frame is then secured to the cradle. First remove the top, place the loop between the sides, and then replace the top. Four screws hold the loop to the cradle, and their position is shown in Fig. 5. The loop can now be used if it is wanted urgently.

The Stand

The stand requires the following pieces of wood :—

1 disc 9 in. diameter.

1 disc 10 in. diameter.

3 pieces ½ in. by ½ in. by 4 ft. 3 in. long.

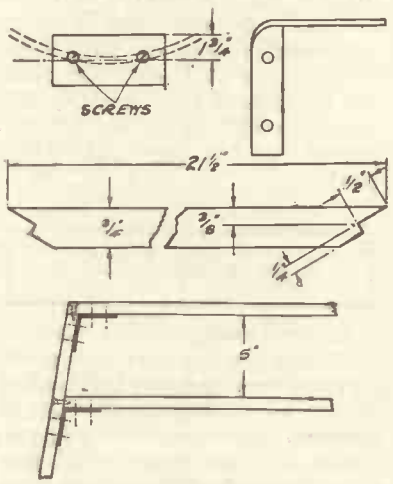
3 pieces ⅜ in. by ¾ in. by 21½ in. long.

1 dozen small brass brackets.

6 1 in. No. 6 wood screws.

4 dozen ⅜ in. No. 4 wood screws.

The two discs may be cut from ⅜ in. wood, with a fretsaw, etc., and in the centre of each a 1-in. hole is drilled. The long pieces of wood have their ends cut at a slight angle, and are secured to the 9 in. disc with the 1 in. screws spaced equidistantly round the edge of the disc. The second disc is fixed between the legs 5 in. below the top disc, also with the



Figs. 5, 6, 7, 8 showing how the loop is secured to the cradle, the dimensions of struts, the inverted L-shaped brackets, how the discs and legs are secured.

1 in. screws. The bottom struts are cut, as shown in Fig. 6. These pieces are secured 9 in. from the bottom of the legs by small pins or nails. They are further held in position by six brass brackets, bent, as shown in Fig. 7. These brackets are fastened to the wood by the ⅜-in. screws. The six remaining brackets are secured to the discs and the legs, as shown in Fig. 8.

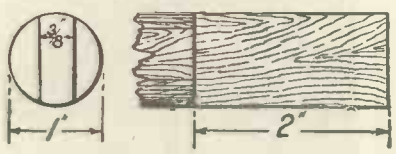


Fig. 9.—Constructional details of the turning handle.

The stand may then be given a coat of varnish stain. While this is drying, the turning gear may be built.

The Turning Gear

This consists of a piece of broom-handle, or other round wood 1 in. in diameter, one end being cut, as shown in Fig. 9. To the other end is fixed a wooden handle by which the frame can be rotated.

In the writer's model this handle took the form of a wheel, which was turned on a lathe, but this is not essential. A disc of wood ½ in. thick and 7 in. diameter will do just as well. In the centre of this wheel is drilled a 3/16th hole, through which passes a 2 in. No. 10 wood screw, into the end of the shaft.

A small wooden ring is then cut out of ⅜ in. wood, 1¾ in. outside diameter and 1 in. inside.

Assembling the Frame

When everything is ready place the loop on the top of the stand so that the hole in the bottom disc coincides with the hole in the next disc, the small wooden ring being placed between them. Insert the shaft from the underside of the bottom disc and pass upwards through all the holes until the top of the cradle is reached. A 2-in. No. 10 wood screw then secures the shaft to the cradle. The frame is now complete.

If the loop is inclined to run a trifle stiff in its bearings a little blacklead may be smeared round the moving parts, especially on the wooden bearing ring.

A Useful Switch Stop

WHEN using switches of the multi-point variety it is essential to have some form of stop to prevent the arm from slipping off the last stud. Stops of the same type as the studs, but with longer heads, are available, but necessitate the drilling of an extra hole at each end of the arc of studs.

A very useful, and at the same time inexpensive, stop may be effected by means of soldering lugs. One is slipped under the last stud at each end of the row, and the stud is then tightened down in the usual manner. The tip of the soldering lug is then bent up against the side of the stud, thus forming an effective stop. As the last stud may be slightly raised in consequence of the lug, the head of the stud should be slightly filed down if necessary, in order that the switch arm may slide smoothly over the studs.

J. W. B.

Emergency Multiple Phone Connections

It sometimes happens that some friends will arrive during a very interesting programme from the local broadcasting station, and the experimenter is faced with the difficulty of quickly connecting up extra phones in order that the visitors may also enjoy the programme. Many experimenters will keep on hand some multiple board method of connecting up extra pairs of telephones, but it may so happen that no such gadget is at hand when the emergency arises. There is no need, however, to despair, for many pairs of phones may easily be connected in circuit in a very short time.

Series Connections

Let us deal, first of all, with series connection, as this is probably the easier. Take the first pair of phones and connect one tag to one of the telephone terminals of the receiver. The other tag is then joined to one end of the second pair of phones by means of thin wire or cotton, the two tags being bound tightly together. This is done for further pairs of phones, the last remaining tag being connected to the second phone terminal of the receiving set. Even if cotton is used to bind the two tags together, a sufficiently good joint will be obtained to permit of the evening's programme being enjoyed by all present.

Parallel Connections

It is, perhaps, a little more difficult to apply this idea to parallel connections, but the following alternative will be found quite satisfactory. All that is required is a length of fairly stout bare wire and a few spare terminals. Bend one end of a piece of the thick wire round one phone terminal of the receiver. The wire is then twisted round the shanks of as many terminals as we have phones to use, and the back nuts of the terminals are tightened down so that the wire is held in good contact with the terminals. This is done for the other terminal of the set, and the tags of the phones are then connected in the usual manner to the terminals. If the telephones are all of the same high resistance the parallel method will, in all probability, be found the best to use, but in cases where telephones of, say, 2,000 ohms, 4,000 and, say, 120 ohms are to be used together, the only way in which they can be connected up is by the series method.

J. W. B.

Sweating Joints

An extremely useful way of soldering two pieces of metal together very firmly is the method known as "sweating." Let us suppose that we wish to join two pieces of sheet brass. We first of all clean carefully the portions that are to overlap, and then tin the surfaces with an even coating of solder which should not be too thick. It is quite a mistake to suppose that the more solder you use the stronger will the joint be. As a matter of fact, the securest joints are made by the use of the least amount of solder that will give an even covering of tin. Place a little flux on the tinned surfaces, and hold them together in the jaws of a pair of pliers (Fig. 1). Then place the metal in a bunsen flame, or over a gas ring, and heat until the solder is seen to run. As

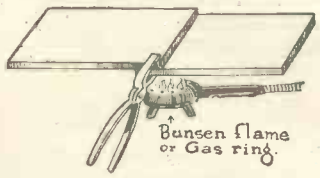


Fig. 1.—Sweating two pieces of metal together.

soon as the metal has cooled a very firm joint will result. This method is particularly useful for doing small jobs where it is difficult to employ the soldering iron. Sometimes we cannot place the work in a gas flame, and then it is best to use the blowpipe, as shown in Fig. 2. The job shown in progress there is that of soldering a fine spring to a piece of brass. Place a small spot of

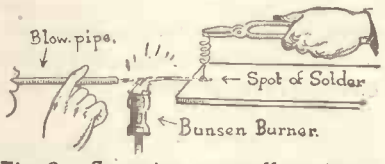


Fig. 2.—Sweating a small spring to a strip of brass.

solder on the brass, touch the end of the wire with flux, and hold it with the pliers so that it rests on the blob. Then with the blowpipe direct a tongue of flame on to the solder, which will melt almost instantly, allowing the wire to sink into it.

R. W. H.

Our photograph shows a model of the wireless cabin on board the Z.R.3 at a recent wireless exhibition in Germany.

A Transformer Tip

MANY pleas for a standardisation of components have appeared in *Wireless Weekly*, and though a good deal has been done in this direction, the condition of affairs still leaves much to be desired. Take, for example, the case of low-frequency inter-valve transformers. In no two transformers of different makes are the holes spaced in anything like the same way. Further, it seldom happens that the lines joining the centres of the holes form a rectangle, and you will probably find that if you have two transformers of the same make, each must be fitted separately, since the holes for the fixing screws are rather differently spaced in the two.

Variety of Dimensions

The great drawback to things of this kind is that if you fit a transformer of one kind to a set when you first make it up and then decide to change to another, different holes must be drilled for the fixing screws, and those made originally make an unsightly blemish on the panel. You can, of course, fill them with black sealing wax or with Chatterton's compound, but "botching" of this kind does not appeal to the constructor who prides himself on the neatness of his work.

For some time now I have made use of a useful little tip which solves all these difficulties. Each transformer is mounted upon a separate block of oak, mahogany or other hard wood $\frac{3}{8}$ in. thick. In this are drilled four 4.B.A. clearance holes at the corners of a rectangle $1\frac{1}{2}$ in. by 1 in. By adopting this method all transformers become immediately interchangeable, and should you decide to substitute another type for the one originally mounted on the set, there is no difficulty in doing so, for the fixing screws in the panel fit exactly into the holes in the wooden base of the newcomer.

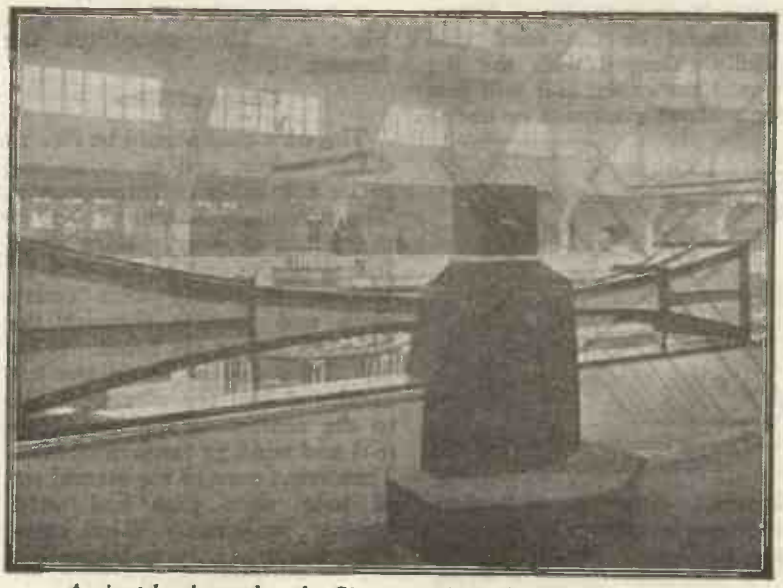
This idea may be extended to other components such as rheostats and fixed condensers, and will always be found in the end to be a great saver of time and trouble. Take, for example, the case of rheostats. All of them require about a $\frac{3}{8}$-in. hole for the spindle, but their fixings vary enormously. In some cases you have the "one-hole fixing," in others two screws are required, in others again three screws. By fitting all rheostats to a base of hard wood—in the case of those with one-hole fixing, the securing nut must be countersunk—you can interchange them with no trouble at all and without marring the good looks of your panels. For this and for fixed condensers it is as well to use wood screws instead of 4.B.A. metal screws.

Discoloured Panels

When a set has been in use for some time, in a position where the sun's rays fall upon the panel, the original black appearance of the panel will turn to a greenish colour. This discolouration is really the result of a chemical change which has been brought about by the action of the strong sunlight, and as well as being detrimental to the appearance of the set, has also a bad effect upon the insulating properties of the panel.

The only remedy is, unfortunately, a drastic one, inasmuch as it is necessary to remove the discoloured surface entirely. This is best done by rubbing with emery cloth, in the same manner as one treats an unguaranteed shiny surface on a new panel. Rub with a circular motion, until all the surface has been covered, when the dust is removed and the panel shows up free from the greenish surface. The original black appearance may now be restored by rubbing the panel with a rag which has on it a small quantity of oil. Make a little go a very long way, and afterwards give the panel a thorough rubbing with a clean dry rag to remove any excess of oil, which, if left on the panel, will collect the dust and soon spoil the look of the set.

J. W. B.



A giant loud-speaker by Siemens which they recently showed at a German Wireless Exhibition.

How to Make a Highly Efficient H.F. Transformer

By DONALD STRAKER.

The ingenious method devised by Mr. Straker has the additional virtue of high efficiency.

(Concluded from page 297.)

TIME will be saved by adopting the following sequence of operations.

From the scrap-box select a piece of 3/16 in. ebonite and cut it to measure 4 in. by 1½ in. Square the corners and mark it out with the scriber as shown in

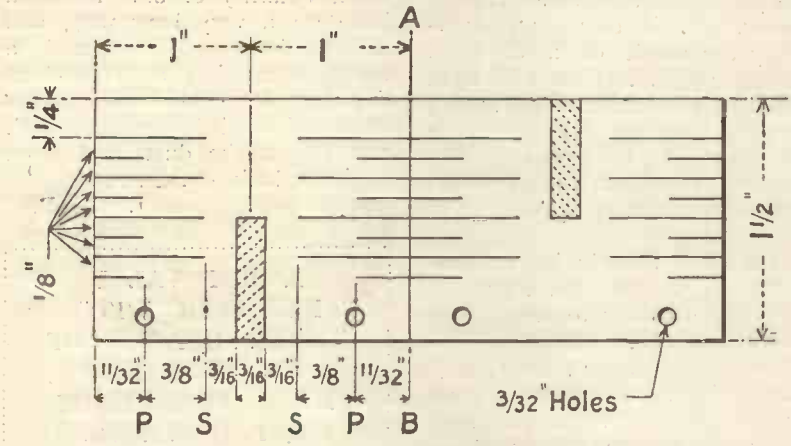


Fig. 1.—The lay-out and drilling dimensions of the ebonite sheet.

Fig. 1. Then cut it in half on the line AB. The shaded slots should be removed by drilling a hole at the bottom of each and sawing down to it along the lines. These slots should be cut small and carefully enlarged with the flat file until the other half will just enter without slackness or undue

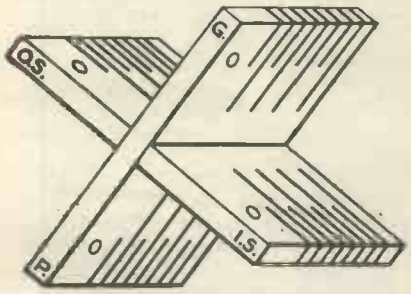


Fig. 2.—The former assembled and the arms marked.

tightness. Now put each piece in the vice in turn with the part above the line P projecting and with a fine saw cut the primary slots down until the saw just reaches the vice. Then put each in the vice in turn with the part above the line S projecting and saw the secondary slots. Each set of slots will then be of equal depth and the resulting windings will make good squares. When the four 3/32 in. holes have been drilled the two halves of the former can be pushed together. Either with the scriber or, better still, with a pen and white, waterproof ink, mark the arms OS, G, Fig. 2. This completes the former.

Gauge of Wire

The wire used should be No. 32 d.s.c. copper, and an ounce will make a number of transformers. The secondary is wound first in the following way. Bare three inches of the end of the wire by rubbing it gently with emery cloth and pass it through the hole OS five or six times. (Fig. 3.) Take the former in the left hand and lead the wire from OS to the nearest of the long slots (S1) and wind 35 turns clockwise. Then cross over to the second set of long slots (S2) and wind another 35 turns. Wind carefully, for it is easy to injure this fine wire. Then cross over to S3 and then S4, putting on 35 turns in each. When the fourth slot has received its 35 turns cut the wire with a few inches to spare and pass it through a tiny hole in the

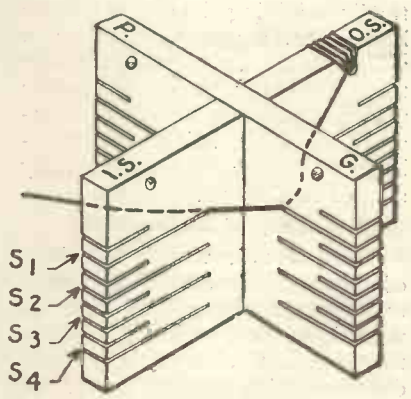


Fig. 3.—Commencing the secondary winding.

arm G, lead it along the inner angle of the former, under and quite clear of the wound sections, and finish it off by baring and passing it through the hole IS five

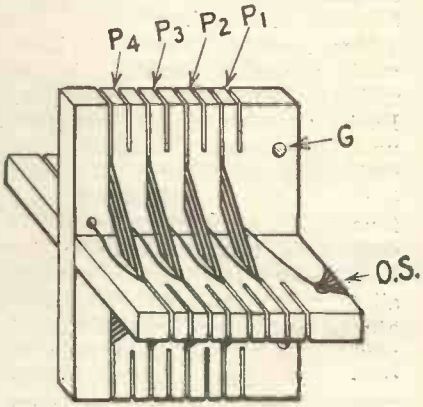


Fig. 4.—The secondary winding completed.

or six times. This completes the secondary winding and the former will appear as Fig. 4.

For the primary the wire is bared and anchored at the hole G with the usual five or six turns and then led to the nearest of the short slots (P1) in which 35 turns are wound, clockwise. In the

same way cross over to P2, P3, and P4, winding 35 turns in each. The end is then cut as before and passed to the hole P, where it is secured with the usual five or six turns. Several tiny holes will be necessary to lead the end quite clear of both windings. The turns at OS, G, IS, and P should then

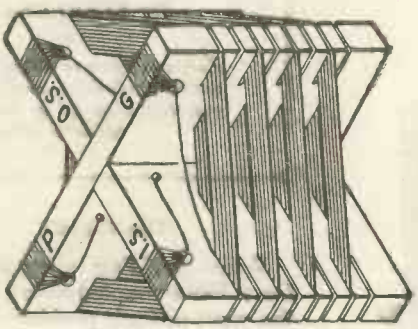


Fig. 5.—The finished transformer.

be lightly tinned with a fairly hot soldering iron to keep the wires together, and make a good clean contact for the clips on the adaptor. The arm P should be clearly marked on the end away from the contact so that it may be inserted in the adaptor the right way round. This completes the transformer.

Fig. 6 shows the separate parts of the adaptor and also the complete unit and needs no description. It is as well to use ¼ in. ebonite for the two squares. The clips should be of very thin and springy brass or phosphor bronze, and can be bent to shape in a jig made by cutting a slit with the saw in a small piece of hardwood. They will look neater if they are all of the same size. If possible, the small pieces of wire to make the connection with the valve legs should be soldered to the clips. The lower square of ebonite retains the clips in position when the nuts are tightened on the valve legs. For ease in use it is as well to file off the corner of the ebonite at the odd leg. The transformer is then inserted so that the marked arm P mates with the clip connected to the odd leg.

Number of Turns

It should be stated that it is not necessary to keep absolutely to the 35 turns specified for each slot, and a turn or two more or less will not make a world of difference. The primary turns can be varied within comparatively wide limits. With fewer turns selectivity will be increased at a slight cost in volume and, conversely, forty or fifty more turns will give an increase in volume and a decrease in selectivity. Thus if it is only desired to receive local broadcast the primary can be increased to anything short of the point of instability. The number of turns specified gives a happy compromise between these warring elements. It should be further noted that very fair results follow the use of enamelled wire in place of silk-covered, but the unit will not be quite so selective.

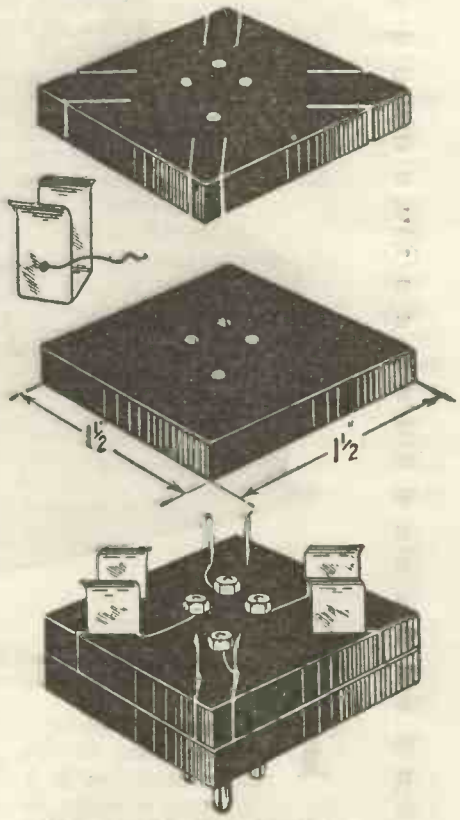


Fig. 6.—The separate parts and assembled adaptor.

□

The Transatlantic V in India

SIR,—I have pleasure in giving you a few of my experiences with the Transatlantic V set which I have built absolutely to the specifications in the June number of *Modern Wireless*. It may with confidence be described as the "Rolls-Royce" of listening-in sets.

I have only a pair of transformers, 300-600 metres. The others I ordered have not been sent out as yet. I am therefore confined to the lower wavelengths.

On Sunday morning, 0.45 a.m. (October 26, 1924) I received the programme which was being broadcast from Aberdeen, using a 50 coil, the condenser in parallel, a 35 coil in the reaction. At about 0.40 Bombay Standard time, *i.e.*, 7.10 G.M.T., I got a carrier wave. I tuned it in and got a voice. This gradually strengthened with tuning, and I found that it was the news bulletin being broadcast by some station. The news amongst other items of interest referred to the arrest of De Valera. It finished with the Exchange quotations. Now followed music, "Tales of Hoffmann," in which the Barcarolle came through quite strength 8 and perfectly clear. Atmospherics were a bit troublesome. From now onwards "Carmen" was broadcast, the music and singing being a real treat. The "Toreador Song" was exceptionally fine. At the conclusion of the singing the orchestra was once again heard. Then the announcer said, "The Aberdeen station calling. I want to . . ." X's drowned the rest. This was followed by a soprano singing. Having got so far, I tried for 2LO. I very soon got a carrier wave somewhere about his tuning on the condenser. I used a 75 coil in series, no reaction coil. The A.T. condenser read 17, the H.F.T. condenser 39. An orchestra was playing, the modulation being perfect. A little tuning brought the music in strength 9. I put the loudspeaker on, and I got the music about a foot away. In trying to improve the tuning I lost 2LO (?), and when I got him again I could not improve on about strength 6.

Once more I got on to Aberdeen. A lady was singing. Then the announcer, after a short period, in which the programme continued, came through with "2BD, the Aberdeen Station calling. Local news." X's were very bad and interfered with speech. When I heard the football results being given I sat up, but the X's just would not let me get them all. Being content with my effort, as it was late, I switched off and turned in. On Monday morning I got parts of the Sunday programme, using the same tuning as the night before. The X's were extremely bad, and as it was impossible to receive well, I "packed up" and got to bed. To-night I am going to sit up again. I hope to get 2BD as the X's are moderate. Will continue this to-morrow and let you hear my results.

On Tuesday morning, about 8.30 p.m. G.M.T., I got Aberdeen again, but he was not near as good as on Sunday morning. I think the "T.A.5" a great set.—Yours faithfully,

FRANK H. HEBBERD.

Prince of Wales Seamen's Institute, Bombay.

An Interesting Tv
Employing Lo

By STANLEY G. RATTEE

The question of interference elimi and possibility, and the follow construction of a loose-coupled readers who suffer fro

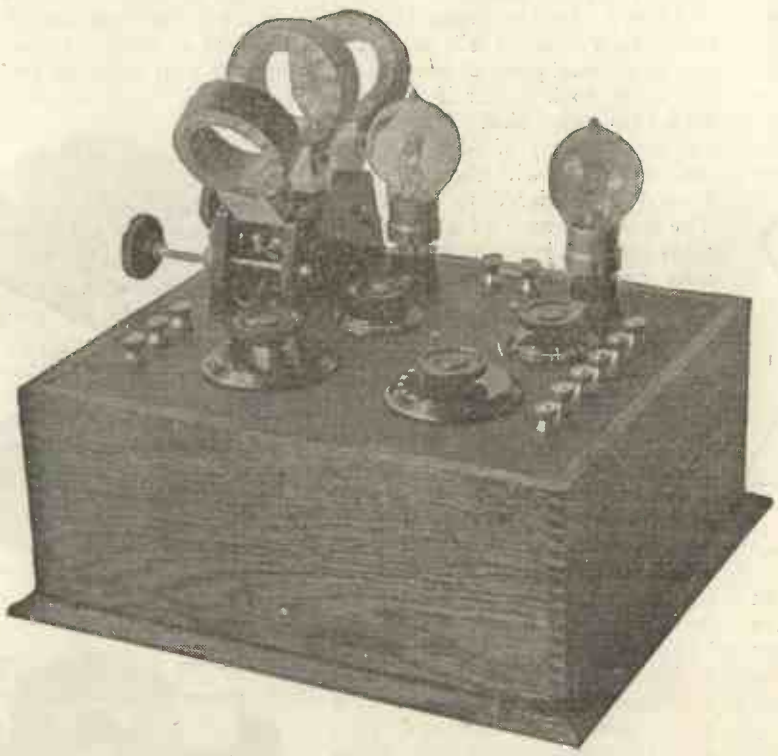


Fig. 1.—The compact and handsome appearance of the receiver may be gathered from this photograph.

THE number of broadcasting stations in this and other countries is becoming so large as to make the subject of interference elimination not only one of interest, but one of general importance, for without selective tuning the reception of many of the stations is, in many cases, an operation of considerable difficulty unless we introduce special devices, such as wavetraps.

Of the various forms of eliminating interference one of the most popular is that in which the aerial circuit is inductively coupled to a secondary or closed circuit.

The method by which such indirect couplings between two separate receiving circuits may be made are, first, that in which the aerial circuit consists of relatively few turns of wire wound directly upon the secondary circuit and untuned, and, secondly, that in which the coupling between the aerial and secondary circuit coils may be varied, both aerial and secondary circuits being tuned. This latter arrangement is what is known as loose-coupling, and is the form of coupling incorporated in the receiver illustrated.

General Considerations

So that the wavelength range of the receiver may be as broad as possible the well-known method of using plug-in coils is employed, together with a three terminal arrangement, which allows either loose-coupling or single circuit tuning to be used.

The general appearance of the receiver may be gathered from the photographs. The three terminals seen on the left of panel permit the use of loose-coupled or single-circuit tuning. The six terminals on the right-hand side of the panel are for the batteries and telephones, whilst the two terminals seen at the back of the panel are for grid cells when desired. The positions of the components as well as the general make up of the receiver may be seen from the photographs showing both top and underside of panel views.

The Circuit

When deciding upon a design for a loose-coupled valve receiver the most difficult problem to solve is how best to apply reaction to the tuned circuits. First, reaction may be applied to the aerial coil, secondly, it may be coupled to the secondary coil, or one may use the method known as the "split secondary"; this latter arrangement constitutes the dividing of the secondary winding into two halves, one half being coupled to the aerial coil and the other half being coupled to the reaction coil, in the manner described by Mr. Kendall in the September 10 issue of *Wireless Weekly*. In the receiver illustrated the circuit finally chosen is that illustrated in the theoretical circuit diagram wherein it will be seen that the reaction coil is coupled to the secondary circuit. The reason why this arrangement was chosen was in order to permit the receiver to be used with single circuit tuning, still employing reaction, without the necessity of including

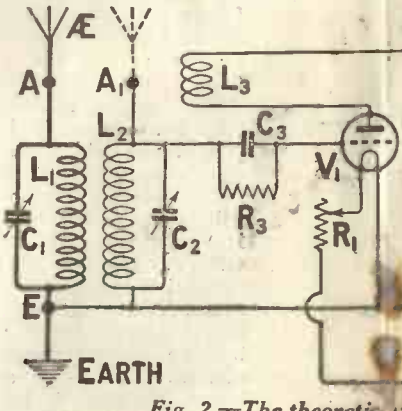


Fig. 2.—The theoretic

vo-Valve Receiver
oose Coupling

Member I.R.E., Staff Editor.

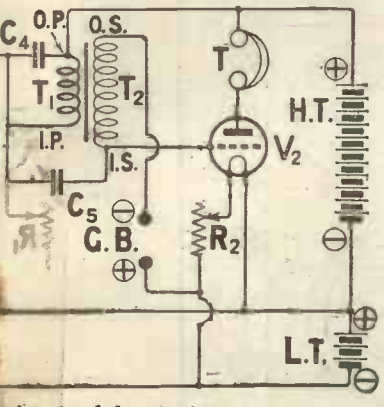
ation is one of increasing interest article giving full details for the receiver should appeal to those commercial interference.

a change-over switch. Had the reaction coil been coupled to the aerial circuit this switch would have become necessary to connect the aerial coil across the grid and filament of the valve.

It will be seen that if we connect aerial to A, Fig. 2, and earth to E, leaving the terminal A1 free, the circuit becomes a loose-coupled arrangement; if, on the other hand, we connect the aerial to A1, still making our earth connection at E, we have a single circuit arrangement.

Components and Materials

The receiver as illustrated is made up with the following components and materials, the names of manufacturers being given for the assistance of readers. This information is not intended, however, to bind readers to any particular makes, but is merely for their guidance should they desire it; so far as values are concerned it is essential that these be respected, as any departure from these figures, which have been arrived at by experiment, may result in either the receiver not working efficiently or else not covering the wavelengths it should be capable of tuning in.



circuit of the receiver.

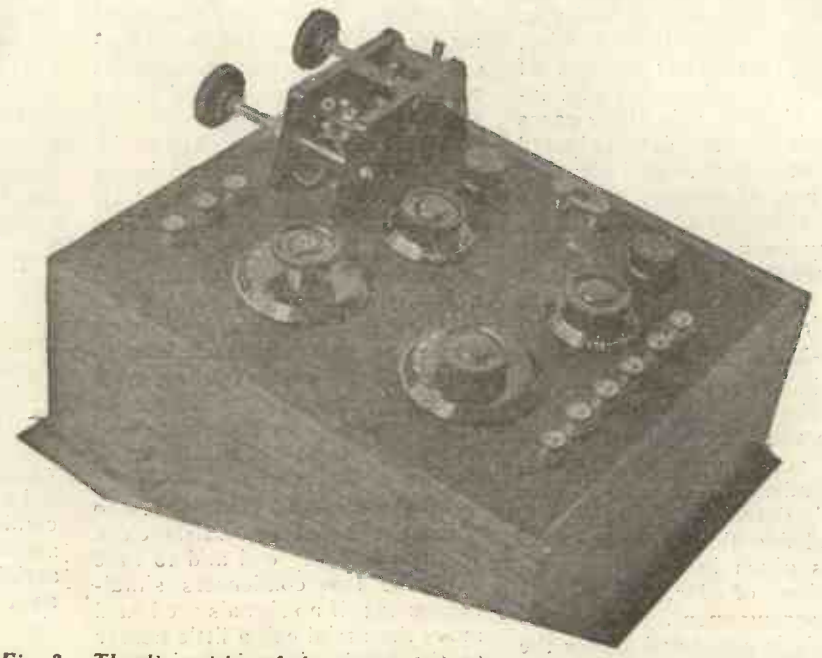


Fig. 3.—The disposition of the components upon the panel may be observed from this photograph of the set without its coils and valves.

One ebonite panel measuring 10 in. by 12 in. by ¼ in. (Paragon).
One three-coil holder (Peto-Scott).
One variable (square law) condenser of 0.0005 μF (Peto-Scott).
One similar condenser of 0.0005 μF (Jackson Bros.).
One fixed condenser of 0.0003 μF (Dubilier).
One fixed condenser of 0.001 μF (Dubilier).
One fixed condenser of 0.002 μF (Dubilier).
One grid leak of 2 megohms resistance (Dubilier).
Two filament rheostats (those illustrated are McMichael duals).
Two valve sockets or alternatively eight valve socket pins.
Eleven brass terminals.
Quantity of connecting wire.
One pair 2,000 or 4,000 ohm telephones.
One L.F. transformer (H.T.C.)
Set of plug-in coils for the wave-lengths desired.

The Panel

This is made from the ebonite sheet heading the list of components and is drilled in accordance with the instructions given in the illustration of the panel lay-out. When purchasing the ebonite for this or any other panel readers should ascertain whether or not the material offered is guaranteed to be free from surface leakage. This precaution is necessary in that there are now on the market ebonites of both types, that is, guaranteed and unguaranteed; whenever possible the former should be purchased, but in cases where only the latter is obtainable, after the drill holes have been made, the surface skin should be removed by means of rubbing both sides with emery paper, the final finishing being made with a soft rag and a drop of oil to retrieve the deep black it originally possessed.

Wiring the Receiver

An examination of the photograph showing the underside of the panel will make it clear to readers that the wiring of this receiver does not call for any more than ordinary skill; it will be further observed that the method of wiring is that of stiff wire without the use of systoflex, all connections being soldered.

For some reason constructors sometimes anticipate difficulty in wiring receivers with stiff wire, preferring the easier method of using soft tinned copper and insulating sleeving; in those cases where this difficulty is anticipated the use of soft wire and sleeving should not, of course, affect the general efficiency of the receiver, and may be used so long as the leads are well separated, kept short, and connections are soldered.

Note-Magnifier Connections

It will be noticed from the circuit diagram that the connections to the low-frequency transformer are somewhat unusual, and if readers will refer to "Valve Notes" dated April 23, 1924, they will find there that the connections given in Fig. 2 are an application of Mr. Scott-Taggart's arrangement. The condenser C_5 is connected across the two windings of the low-frequency transformer, and its value will vary with different makes of transformers chosen. In the receiver illustrated the value of this condenser is .002 μF though readers are recommended to experiment with this value, suitable capacities being .0005 μF and .001 μF. Again, with certain makes of transformers the condenser C_4 may be omitted without disadvantage, though with the make chosen C_4 was necessary before the best results could be obtained, its omission giving a very poor control of reaction.

Valves

As this receiver is fitted with filament resistances suitable for either bright or dull emitter valves either type may be used. When operating this receiver particular attention should be paid to the H.T. voltage applied to the plates of the valves, as any excess of H.T. voltage may, when using the loose-coupled arrangement, probably cause the receiver to oscillate badly; for information concerning the H.T. values for the particular valves chosen the reader is advised to read the instructions given by the manufacturers upon or within the wrapper containing the valve.

Operating the Loose-Coupled Arrangement

With the receiver finally completed connect the accumulator, H.T. battery and telephones in accordance with the terminal markings given in the panel layout. Turn the filament resistances to the "off" position and insert the valves.

At this point connect the aerial to A, the earth to E, and insert in the aerial coil socket, that is, the moving socket on the left, a No. 35 or 50 coil. In the centre socket (secondary circuit) insert a No. 50 or 75 coil, and in the reaction coil socket (moving socket on right) insert a No. 35 or 50 coil; with these three coils mounted, set the two moving coils at right angles to the centre coil and light the valves to a suitable degree of brilliancy.

The operation of tuning is to place the aerial coil fairly close to the secondary coil and to tune with the two condensers simultaneously; if no signals are heard move the aerial coil a little nearer to the fixed coil and again tune with the condensers. When signals have been tuned to their loudest, adjust the aerial tuning condenser alone, bringing the aerial coil nearer to the fixed, or moving it farther away, according to results; when the loudest signals are obtained in this manner make further adjustments with the secondary condenser, again varying the coupling between the two coils.

Reaction

At this stage slowly move the reaction coil nearer to the fixed coil, at the same time making further adjustments on the secondary condenser, taking care that the set does not oscillate. With the best results obtained in this way vary the coupling slightly between all three coils, making final adjustments upon the two condensers.

Eliminating Interference

The careful handling of this circuit will, in most cases, either permit the complete elimination of interference with a certain loss in signal strength of the station desired or else reduce the strength of the interference to such a degree that the desired signals will predominate.

In the majority of cases this condition of things is brought about by the separation of the aerial and secondary coils as far as the reception of the desired signals will permit.

When making these tests it may be found that the receiver will not oscillate, in which case the connections to the three-coil holder should be carefully checked with those given in the wiring diagram. The condition of oscillation will make itself known by a pronounced "cluck" whenever either the aerial coupling is loosened too much or the reaction coil is moved too near the secondary; continuing the movement of either of these coils after the "cluck" is heard will cause the receiver to howl. Readers should in all cases be extremely

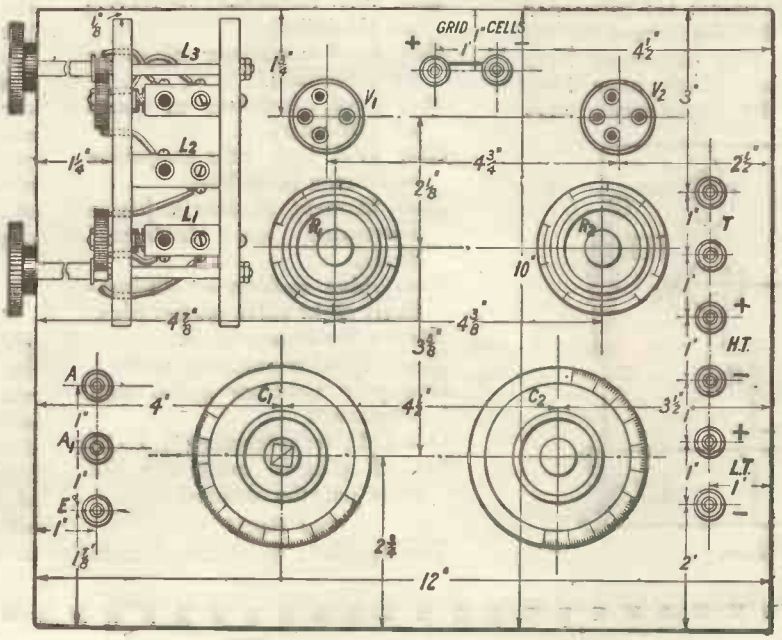


Fig. 4.—The panel layout. Blueprint No. 83a.

careful to keep well clear of this oscillating condition, otherwise considerable discomfort will be caused to other listeners.

Coils

When using the loose-coupled circuit the following coil sizes should be used :—Coil No. 35 or 50 in the aerial, No. 50 or 75 in the secondary, and No. 50 for reaction; for the higher waveband up to 500 metres coil No. 50 should be used in the aerial with a No. 75 as secondary and a No. 50 for reaction.

Other coil sizes are :—

5XX and Radio Paris, aerial No. 150, secondary No. 250, reaction No. 150.

Single Circuit Tuning

Using the receiver with single circuit tuning the fixed coil socket now becomes the aerial coil socket, reaction being as before. The operation of this circuit is carried out by connecting the aerial to A1 and the earth to E.

For the reception of B.B.C. stations with wavelengths up to 400 metres a No. 35 or 50 coil should be inserted in the fixed coil socket with a No. 50 for reaction; the two coils should be turned at right angles to each other, and the valves lighted as before. Tuning is done upon the right hand 0.0005 μF condenser (the left hand condenser being out of circuit) until the best results are obtained, when the reaction coil is brought slowly nearer to the fixed coil, at the same time making further adjustments upon the condenser.

For the reception of B.B.C. wavelengths above 400 metres the same instructions hold good, with the exception that a No. 50 coil is used in the aerial socket.

Those readers who desire to receive higher wavelengths than these may use for the reception of 5XX or Radio Paris, a No. 150 coil for the aerial (with the aerial still connected to A1), and a No. 200 for reaction.

With the aerial connection still made to A1 reception of the Eiffel Tower, Paris, may be obtained by using a No. 250 coil for the aerial with a No. 300 for reaction.

Grid Cells

The receiver will work with either bright or dull emitter valves, and a word on the question of grid bias is called for. Should the constructor choose to use a dull-emitter valve, as the L.F. stage, then it is advised that a battery of some 4½ volts, made up from flash-lamp cells, be connected across the terminals indicated in Fig. 4. This will at once clear the woolly and throaty results which are often produced by using certain valves for low-frequency work without the necessary grid bias. Should the cells not be used, or should they become exhausted, the two ter-

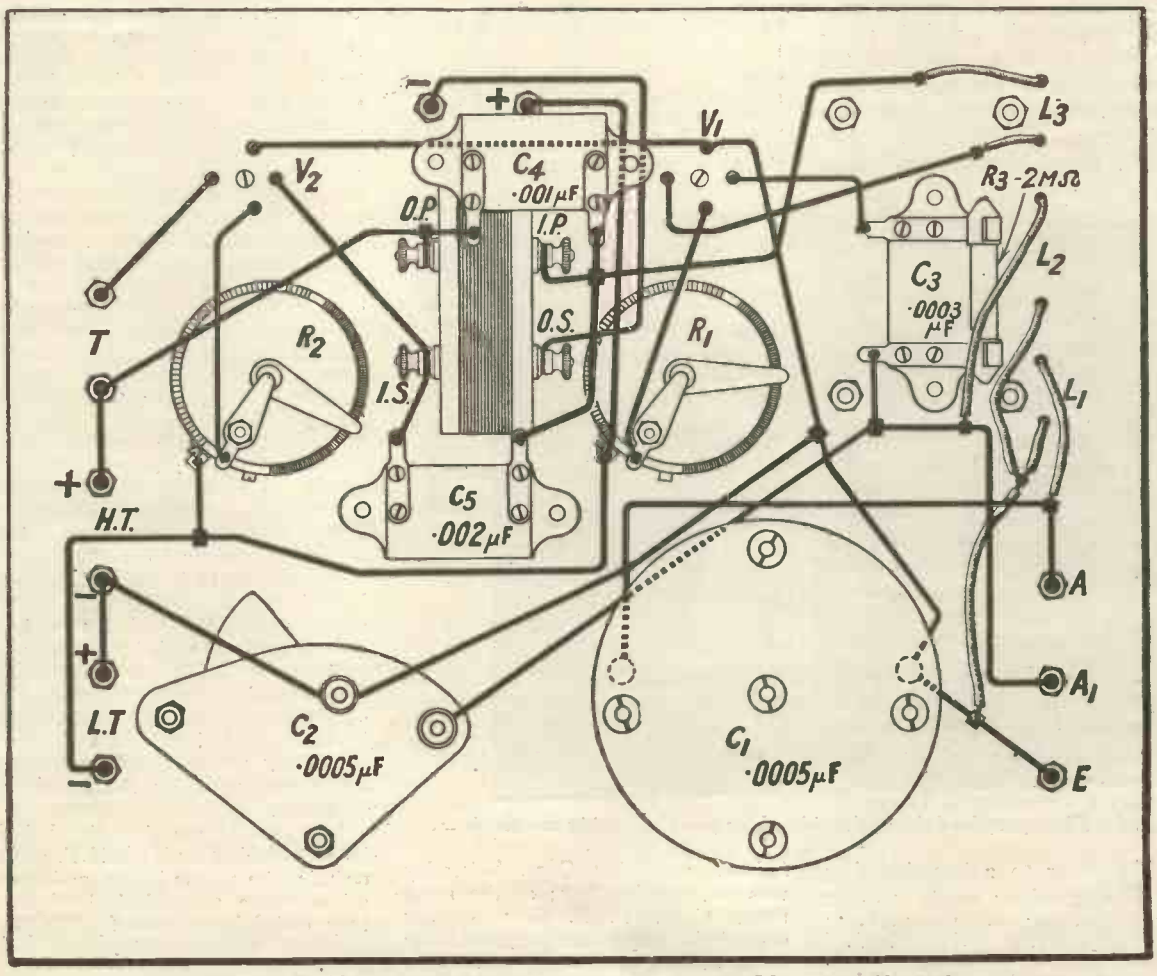


Fig. 5.—Practical back-of-panel wiring diagram. Blue print No. 83b.

minals across which the cells would be connected, should be joined together by a piece of wire, as seen in the photographs.

Test Report

Connected to a small aerial in S.E. London, some half an hour after completion, and using the loose-coupled arrangement during the daylight transmission of 2LO, Birmingham, Bournemouth, Newcastle and Cardiff were successfully received without interference from 2LO. Later, 5XX was also received at good strength upon the same arrangement, the tuning of Radio-Paris also being effected without interference from 5XX. With single circuit tuning Birmingham, Bournemouth, Cardiff and Newcastle were received during intervals of 2LO at good strength; 5XX, Radio-Paris, the Eiffel Tower, and Madrid were also received without difficulty.

Though a receiver of this type, when used as a loose-coupled instrument, will, for the first few adjustments, be somewhat critical in its operation, a little practice will soon convey to the operator the advantages which loose-coupling offers over the single types of circuit. For dwellers near the coast and those who live near to a broadcasting station a receiver made to the specification given herein will prove to be the most suitable, subsequent results outweighing any little difficulties which may be encountered during the operation of the circuit for the first time.

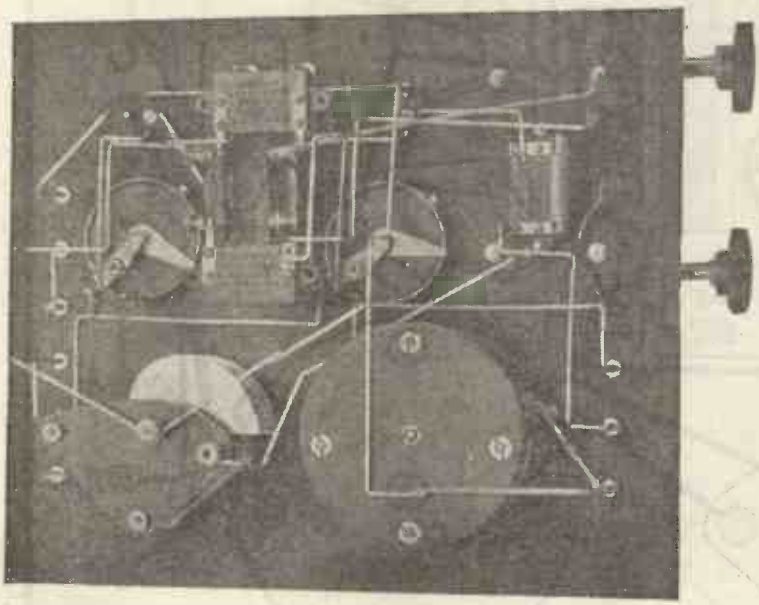


Fig. 6.—Photograph of the underside of the panel showing connections.

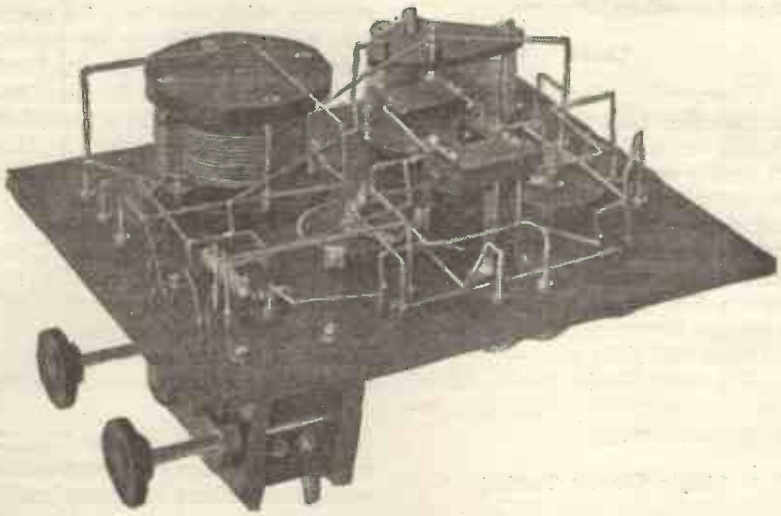


Fig. 7.—The well-spaced wiring of the receiver may be seen from this photograph.

KDKA

SIR,—With reference to Mr. E. C. Davies's letter on KDKA in December 3 issue, and the B.B.C.'s failure to re-transmit their chief engineer's speech from this station some six weeks ago, I cannot altogether agree with him.

I agree that KDKA's *music* and their own *announcer* were *very clear indeed*, and that Capt. Eckersley was only fairly clear; at the same time, Capt. P. P. E. was clear enough for one of our party to write down in longhand about half of his speech.

It seemed to us only reasonable that Capt. P. P. E. was not so clear, as about 11.45 p.m. KDKA announced that, "We are now going to pick up outside broadcast"; immediately afterwards Capt. P. P. E.'s well-known voice was coming over. Presumably, Capt. P. P. E. was not at KDKA.

I claim no credit or otherwise for this reception having been invited by a friend to come in and listen to KDKA (this at 9 a.m. on Sunday) that night on a recently connected circuit consisting of 1D and 1LF valve attached to a single wire aerial. Altogether three of us turned up, and each had his own 'phones attached to the set.

KDKA was very good on the whole from 11.35 p.m., when we started up, until 12.15 a.m., when he shut down; trying later, about 12.45 a.m. onwards, for a time we could not make much of him, but thought a clergyman was giving a Sunday address.

Personally, the reception was a revelation to me; there was not a sound of X's or other interference, the background being perfectly silent so long as we kept about 3 ft. away from the set.

By accident I have heard the B.B.C. re-transmitting KDKA twice recently, and think that they have commenced to make progress, the performance being much the best I have heard them give yet. Evidently Capt. P. P. E.'s visit to the U.S.A. has done, and will do, something towards enabling crystal set users to hear American programmes.

It seems to me that the B.B.C. insist on using multiple H.F. valves on this 68m transmission, and themselves cause a good deal of what they call X's.—Yours faithfully,

CHEMRADIO.

Manchester.

Random Technicalities

By PERCY W. HARRIS, Assistant Editor.

Some Notes of general interest to the Home Constructor and Experimenter.

I see that a couple of contemporaries have been at some pains to point out that a "square-law" condenser does not give a straight line wavelength calibration curve in all circumstances. Of course, if you have additional capacity in parallel (as is the case in the aerial circuit), of if you have a circuit in which there is considerable stray capacity, the curve will depart quite appreciably from the straight line. "So far as we know," quotes one of these papers, "in no case is allowance made for the zero or stray capacity." I do not know how far inquiries were conducted in this direction, but a simple question to at least one of the well-known square-law condenser manufacturers would have brought the answer that a suitable allowance *is* made for zero and stray capacity. I grant that stray capacities vary in different circuits, but in the particular case I have in mind the square-law condenser will give a straight-line wavelength curve over a very large portion of the scale when used in well-designed tuned-anode circuits with an Igranic coil, and in a transformer circuit with a good plug-in transformer. In the case of the *Wireless Weekly* short-wave heterodyne, described in this journal for Jan. 23, and using another make of square-law condenser, when I calibrated the instrument on the Radio Society's test waves, I found that, so far as these waves were concerned (they were 191, 153, and 121 metres respectively), the three points fell on a dead straight line.

* * *

Yet, after all, even if the curve is not exactly straight, the great value of a square-law condenser lies in the way it facilitates tuning. As in ninety-nine cases out of a hundred variable condensers are bought for tuning circuits, and as, moreover, we want in most cases to tune with a small amount of capacity in circuit, it is a great advantage to have the wavelength fairly evenly distributed throughout the scale. As I have pointed out on many occasions, the ordinary type of variable condenser has a congested wavelength scale at the bottom and an open scale at the top. When the square-law condenser is used in an aerial circuit, with perhaps

The new Brandes Loud-Speaker.

.0003 μF capacity in shunt with it, the effect in distorting the calibration curve is still further to open up the scale in the lower half. This seems to me a decided advantage, if nothing else.

* * *

I have yet to hear of a man who, once he has changed from the old type of variable condenser to the square-law, has reverted to the old type. On the contrary, a large number of people have said to me that the improvement in the handling of the set is so marked that they cannot understand how they managed so long without them. If in some circumstances the square-law type of condenser does not give a straight-line wavelength calibration curve, the fact remains that the old type of condenser never can! Certainly, the proof of the pudding is in the eating.

* * *

On another page of this issue Mr. A. D. Cowper, M.Sc., gives some interesting tests with counterpoise in place of the usual earth in receiving. You will notice that in a "low-loss" tuner with a crystal receiver the improvement in using the counterpoise was very marked, whereas with a less efficient tuner there was less difference between the earth and the counterpoise. This reminds me that Mr. S. Kruse, the technical editor of the official organ of the American Relay League, has recently published some figures of tests carried out with a number of different coils. The coil to be tested was placed in circuit with a low-loss variable condenser, a small coupling coil, and a hot-wire ammeter. Another coil connected to a transmitting set was brought fairly near to the coupling coil (10 inches to be exact); with a constant current in the transmitter and a constant distance between the two coupling coils, observation was made of the reading of the hot-wire ammeter. A number of different coils were tested. The first was a coil of 24 turns of No. 18 d.c.c wire, wound on a tube 3⅛ in. diameter. The tube was of a bakelite composition, some 1-16 in. thick. The wire was spaced by its own width. The current in the secondary circuit so formed was .26 of an ampere. A glass tube was next tried, the best current in this circumstance being .25 ampere. The tuning was the same in each case, resonance being obtained at 43 deg. on a 100 deg. scale of a .0005 μF condenser.

* * *

The winding was then taken off the bakelite tube and a layer

of currugated paper from a valve package wrapped on, the wire being replaced. Since this made the coil somewhat larger in diameter, the number of turns was slightly reduced to get the same tuning as before. The current was now .3 of an ampere. Finally a self-supporting coil was tried, this giving a current of .33 of an ampere.

* * *

In considering these tests, remember that the quite appreciable resistance of the hot-wire ammeter was in circuit all the time, so that really the difference between the various coils was much more marked than appears at first. There is no question that solid dielectric in the field of a tuning coil, particularly on the shorter waves, makes a pronounced difference. These tests, by the way, were carried out on a wavelength of 180 metres. On wavelengths between 50 and 100 metres the effect would have been far greater. As a matter of fact, several variable condensers on the market in this country are useless on wavelengths much below 100 metres. Only the other day I heard of a case where a set was made up to receive KDKA's 68-metre transmission, and in which oscillation could not be set up by any degree of reaction. On taking out the variable condenser (which had metal end plates with very thin ebonite washers), and substituting for it a condenser with ebonite end plates, the trouble was immediately remedied.

* * *

The new types of power valves burning about .25 to .35 of an ampere are proving a great boon to users of multi-valve sets. These valves, however, like other dull-emitters with special filaments, require careful handling, so that if you take liberties with them and use a H.T. voltage considerably in excess of that indicated by the makers, you will find they become insensitive in a very short time. In seeking after knowledge, I take a lot of liberties with my valves and other apparatus (this is one of the reasons why my expenses are rather high !), and I have just had a very good valve "pack up," so far as signal strength is concerned, through having the plate voltage raised far beyond the point the makers indicate. The fact that the filament remains intact (so far as the eye can see) is no indication that the valve is still good. You will thus see that the makers' instructions are not merely included "for the fun of the thing," but to give real guidance to users. *Verb. sap.*

* * *

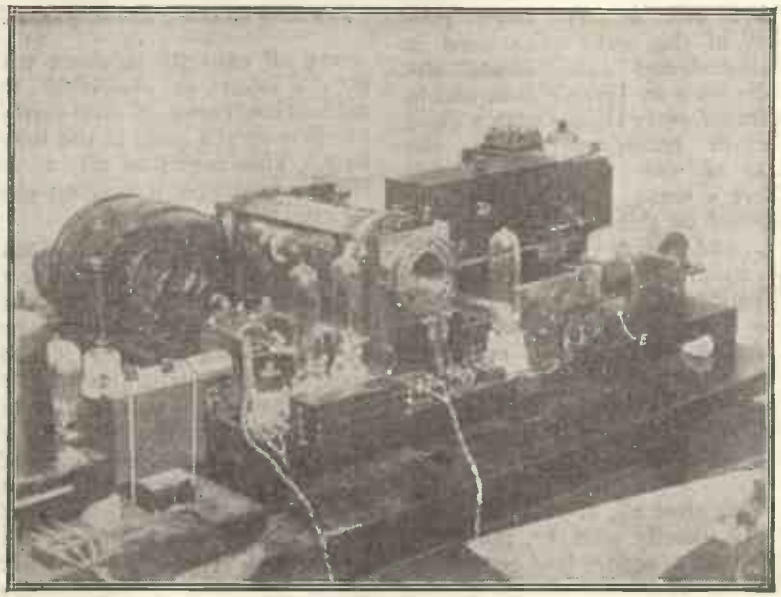
It is surprising how easily a fairly experienced home constructor can miss a point which seems obvious to most of us. I have just had a crystal set (built from one of my designs) brought to me because the maker had failed, after all kinds of experiments and tests, to get the set to work properly. A casual inspection showed that in a four-stud switch, washers had been used under the lock nuts in such a way that two adjacent washers were touching ! This reminds me that not long ago I saw a variable condenser, exactly as despatched from the makers, in which a very small insulating washer separating the spindle of the moving plates from the metal end plate was completely covered up by a metal washer beneath the securing nuts.

* * *

Another trouble which has cropped up very frequently lately relates to the composition of which some valve sockets are made. The insulating properties of the composition are frequently excellent, but the mechanical properties are such that application of the slightest heat may soften it to the consistency of cream cheese.

* * *

Those readers who are experimenting with neutrodyne circuits may be interested to hear of some trials I have made of commercial neutrodyne and other small condensers. There are two circuits of great popularity at the present time—the Cowper neutrodyne tuned anode, using specially wound, or plug-in coils (such as was described by Mr. J. Underdown in *Wireless Weekly*, Vol. 4, No. 14), and the Cowper neutrodyne modification, using plug-in transformers as suggested by the present writer, and first used in the set described in the *Wireless Constructor* for November. The coil method needs quite a small neutrodyne condenser, for which the Gambrell, Bowyer - Lowe, Magnum, Colvern neutrodynes and similar types are all applicable, as they all have a very small minimum valve. In the plug-in transformer method we can have condensers with higher minima, and in addition to the above-mentioned makes the Polar Vernier and the ordinary Colvern work excellently. I do not suggest these are all the makes that work well—I simply name them as condensers I have personally tested and found satisfactory in the circuits named.



A general view of the apparatus used in the transmission of pictures by wireless. A close-up of the cylinder, seen in the centre, is given on another page.

Correspondence

BADGES FOR GOOD BOYS

SIR,—You ask for expressions of opinion as to badges for radio enthusiasts; one has always understood that badge wearing and flag waving were foreign to the Englishman's character, and I think the Woolwich Radio Society has taken your article a little too seriously, as, after all, the caricaturist always exaggerates when depicting anything to which he wishes to call attention. For instance, in old days Mr. Gladstone's famous collars were heavily exaggerated, but I never heard of his writing to the Press to complain that the exact height of his collars was only three inches.

The Woolwich Society's serious letter on the good-humoured exaggeration of your article merely proves that Englishmen object to "flamboyance" in any direction, under which description one may class badge wearing and flag waving. To put it shortly, "It isn't done."—Yours faithfully,

H. C. HARBORD.

Buxted, Sussex.

SIR,—In your issue of *Wireless Weekly* dated December 3 you ask readers to express their opinions on your article entitled "Badges for Good Boys." I, personally, think that every wireless club ought to have a badge. My reasons are: (1) In order that members of any club can distinguish fellow-members although they do not know them by sight. Take, for an example, the "Old Boys" of any Public School know each other by the "Old Boy" colours, say, in their ties. (2) So that members of a club which transmits can be distinguished from those of a club which only receives. (3) Badges would also serve to unite fellow-wireless enthusiasts if they did not know each other's hobbies. —Yours faithfully,

A. H. MCQUEEN.

Sedbergh, Yorks.

FRENCH VALVES

SIR,—No doubt sympathy is deserved by any apologist who sets out to justify the prices of English valves. The explanation so kindly given by Mr. S. R. Mullard in your issue of 3rd inst. is scarcely convincing.

Mr. Mullard says "the R valve quoted costs in France 18 francs." Does he mean this is the cost of making or the cost to the purchaser? Presuming he refers to the retail sale price, why does he evalu-

ate the amount at the pre-war rate of exchange? Surely Mr. Mullard knows the present value of 18 francs is less than 4s. 6d.

Is your correspondent willing to buy and pay in sterling for francs at the pre-war rate of exchange? If he is so willing there should be plenty of business doing.—Yours faithfully,

ARTHUR J. POTTS.

Birmingham.

CONDENSER INDICATORS

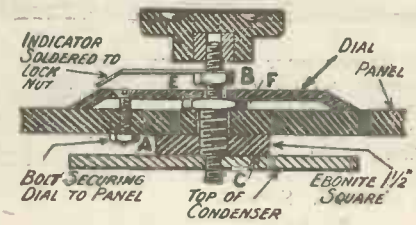
SIR,—In his article, "Random Technicalities," in *Wireless Weekly* for October 15, Mr. Percy Harris has referred to the necessity of having an indicator on tuning condensers to replace the present method of a "scratch" on the panel.

Personally, I have never adopted this method, which is denounced by Mr. Harris, and I do not think that the dial fixed a quarter of an inch or so off the panel enhances the appearance of any set.

Myself, I have always used an indicator of my own, a sketch of which is appended to this letter, which functions splendidly, and can be made for next to nothing, and which may be of interest to many of your constructor readers. With the aid of the diagram and the following instructions no difficulty should be experienced in making it.

Between the underside of the panel and the top of the condenser is fixed a square piece of ebonite C about 1½ in. square, ¼ in. thick.

The dial is fixed over the nut which holds the condenser in position. If the dial does not lie flat on the panel it may easily be made to do so, if the underside is gouged out at E. This is an easy matter if the constructor uses a sharp 1-in. or ½-in. wood chisel. To hold the



The indicator suggested by Mr. Jones.

dial in position a bolt A is fixed through the dial and the panel, the head of the bolt being countersunk in the dial.

On the lock-nut B is soldered a brass pointer. Care should be taken here that no solder flows down into the thread of the nut.

To fix the indicator securely and finally in its position, open the moving vanes out to the point when they are about to enter the fixed vanes. By means of a spanner hold the lock-nut B firmly in position, with the indicator pointing to zero on the dial, then turn the knob until it is "screwed" firmly on to the lock-nut B. Wishing your excellent journal every success, I am.—Yours faithfully,

THEO. S. JONES.

Rhondda.

H.F. CRYSTAL RECEIVER

SIR,—Allow me to congratulate you on publishing the H.F. crystal receiver in *Wireless Weekly*, No. 7, Vol. 4, and Mr. Stanley G. Rattee on producing same. I constructed the set about a month ago in accordance with the design, except that the valve-holder is at the top of the panel in the centre and the crystal detector at the right. I have two loose wires outside the cabinet which are connected to the detector, the idea being that I might try any crystal detector. Results lead me to expect that I could operate a loud-speaker if I added an L.F. valve as described in *Modern Wireless*, No. 4, Vol. 3, also by Mr. Rattee. I have a very bad aerial and earth system, the earth-lead, about 15 ft. long, being attached to the water tap. The aerial consists of two lengths of "Electron" wire attached at one end to a nail driven into a wall 9 ft. high and attached to the gutter

of the house at the other end, which is about 20 ft. high, the length being about 28 ft. including lead-in and about 2 ft. 6 in. apart. Wishing all three periodicals continued success,—Yours faithfully,

J. W. BETTS.

Lincs.

WIRELESS AND INSURANCE

SIR,—I have been a very interested reader of both your publications from their first numbers, and am writing you in the hope that your readers may benefit by my recent unfortunate experience. I have been for some years keenly interested in wireless reception, and have constructed quite a number of circuits culled very largely from your most excellent publications, and was very proud of my collection of wireless apparatus, the majority of which was of first-class make.

To my horror, one Sunday morning I found that my wireless den had been broken into and practically the whole of my apparatus stolen. I naturally made a claim against my insurance company with whom I was insured by an All-Cover policy. In making my claim I simply gave a list of components, valves, headphones and loud-speaker as far as I could remember, together with the purchase price, adding nothing for my labour, foolishly, as I see now.

To my astonishment, they absolutely repudiated all liability and stated that wireless apparatus was not covered under this or any other policy unless specially mentioned. After a good deal of correspondence I was forced to put the matter in the hands of my solicitor, and the company at last offered to settle for just half the amount of my claim. This I very reluctantly accepted to save further bother. Needless to say, when renewing my policy (not with the same company) I made special mention of wireless apparatus. Once again congratulating you on the excellence of your publications.—Yours faithfully,

W. J. GIBBINS.

Hornchurch.

A LOW LOSS TUNER FOR SHORT WAVES

SIR,—Just a line or two to let you know the results I have obtained with the Low-Loss Tuner for short waves described by Mr. Percy W. Harris in *Wireless Weekly* of November 19. I built the set up entirely from scrap. To look at the set it is a perfect ragtime affair, and does not appear as if it would work at all. I have, however, picked up KDKA on his short wavelength every night since completion, and can truthfully say that I can get that station any night at will. On November 22 I picked up KDKA at 11 p.m., and every word was perfect. On November 27 I received the whole of the opera, "The Marriage of Figaro," and have just written for confirmation. Mr. Harris is to be congratulated on this set, and my advice to anyone wishing to receive America is to build this set. Thanking you, I remain—Yours faithfully,

H. E. GOODWIN.

Macclesfield.

ST100

SIR,—It may be of interest to you as something out of the ordinary to hear of the results I have obtained with your ST100 receiver on board this ship during a voyage from Gibraltar to New Orleans and back to Italy.

I was unable to complete the set until I reached Newport News, Virginia, for the want of a battery, but since then, sailing east, I have been in touch with broadcast stations every day, the distances being as follows :—

Boston, WBZ, 1,500 miles, on loud-speaker, Pittsburg, KDKA, 2,150 miles, on 'phones; across the Atlantic I received Bournemouth at 1,050 miles, but could not get 2LO until 800 miles. I have had

Bournemouth, 6BM, nightly right along from the Azores, and I am still receiving Bournemouth much stronger than London, although 2LO is approximately 100 miles nearer me at the time of writing.

I consider this most gratifying. I use, of course, the ship's aerial, approximately 600 ft. long and 150 ft. high; I have a smaller aerial 150 ft. long and not quite so high, but that does not give me such good results. I have experienced no trouble at all except atmospherics occasionally, and no trouble at all from the noises in the ship. Stations I have heard are Porto Rico, Chicago, Detroit, Illinois, New York, Washington, Beaumont, and now the Spanish, French and Italian stations. I now propose when I can obtain the parts making the Four-Valve Receiver (Family). I am, sir.—Yours faithfully,

ALBERT COLES,
Master, s.s. *Shelley*.

"PARADISE OF THE STATION HUNTER"

SIR,—I was very interested to read Mr. F. B. Hodgdon's letter in the December 3 issue of *Wireless Weekly* relative to my criticism of the article written by your American contributor, Mr. Barnard, and published in your issue of August 13 last.

It was most refreshing to see the admission of the use of the long bow in the article in question, for one does not often have the pleasure of reading such a statement written by an American. I quite fail to see, however, where I made use of this particular weapon in my letter, and I should very much like to dispel any such thoughts in the mind of Mr. Hodgdon or any other American reader of this journal.

The sentiments which I expressed were based on a personal experience of the radio ether in the U.S.A., the receiver used being installed on a large Transatlantic liner and was built by one of the foremost wireless companies in the world, so that Mr. Hodgdon's set "built of 5 and 10 cent components" hardly comes into the question. With this receiver, which was very selective in ordinary use, a good deal of trouble was experienced in cutting out the unwanted transmissions, so that it seems only natural, therefore, the ordinary B.C.L. with a fairly unselective "one-control" type set would, as I have previously said, experience the utmost difficulty in eliminating the unwanted stations. I obtained confirmation of this from a B.C.L. residing in New York, who informed me that he was "fed up with radio" as he found it "*quite impossible* to get one thing at once." Of course, I have no doubt that the experienced experimenters get along better than this, but then we are discussing broadcasting from the average listener's point of view, and he only requires wireless as an entertainment and is not always interested in the technical side.

Concerning programme quality, I think Mr. Hodgdon admits the American inferiority, for I notice he says very little on the subject, merely expressing the opinion that "some are good and some are fair," which remark I endorse, especially as regards the "fair" ones. I do not hesitate to say that all British listeners who have heard the American stations will agree with me when I say that our programmes are a long way ahead of those presented to the American listener. I must say, however, that I certainly did not indicate in my previous letter that the American stations were "plain bunk" and their programmes "mere trash." Such a thought would not occur to me, for I do not forget how thrilled I was when first I heard WGY on my receiver in London, but I do maintain that the whole broadcast system of America is vastly inferior to that existing in this country. That this opinion is held by many of your readers I cannot doubt, for

since the publication of my last letter I have been inundated with correspondence on the subject, and not a single letter has been received which expressed an adverse opinion. Such a state of affairs made Mr. Hodgdon's letter all the more welcome, for it does one good to receive healthy criticism. (I sincerely hope mine did Mr. Barnard good.)

Trusting I have not occupied too much of your valuable space.—Yours faithfully,

S. J. MATTHEWS.
(British 2AUV).

Seven Kings.

THE FIRST MILLION

SIR,—Your Editorial in November 19 issue of *Wireless Weekly* gives me furiously to think. You expatiate enthusiastically on the interest taken by the public in the construction of sets, making use of this curious phrase: "Licence-holders take a deeper interest than that of *merely listening* to the programmes." (The italics are mine.) Surely the ultimate aim of every constructor is to build a set that will make listening-in a real pleasure? He builds with that definite object—merely to listen-in. He builds a set to use, not just to look at as an ornament. Admitting this, as I am sure you will, I find it somewhat remarkable that you give no hint to constructors that most likely all their skill and pains will be wasted. Where in any wireless publication is the listener warned that not one evening in seven will he be able to receive broadcast programmes free from interference, or that the more efficient the set he makes the worse his results will be from this cause? This interference may come from atmospherics, from Morse stations, or from misusers of sets. The last-named is easily the worst of the three troubles, and in most town districts is of nightly occurrence. Where I live — at Hampton Wick, not a very crowded place—not a single evening for several weeks past has been free from howling, whistling and groaning from more or less near-by set-users. Most often the interference is so bad *and so persistent* that no other course is open to me than to switch off. It is due, of course, to the misuse, ignorant or intentional, of reaction, and its distressing effects cannot be exaggerated. I cannot understand why the use of reaction in this form was ever permitted, or why its continued use is not at once forbidden. Until it becomes illegal and punishable to employ reaction, at least during broadcasting hours, listening-in for the majority of town-dwellers will simply not be worth while. Unless something is done to mitigate the nuisance I think the wireless boom will inevitably turn into a wireless slump.—Yours faithfully,

P. C. MAYWOOD.

Teddington.

EDITOR'S NOTE.—Our correspondent will find many who disagree with him in his view that the ultimate aim of every constructor is merely to listen in. He has also missed frequent references in our publications to the question of interference and mush on distant transmissions. No journals have done so much as ours to emphasise the care necessary in using reaction or given such explicit instructions on how to avoid interference with other listeners. The misuse of reaction is undoubtedly harmful, but the prohibition of reaction would be an injustice to the careful man.

"What is a Good Tuning Coil?"

SEE Mr. G. P. Kendall's article in next week's "WIRELESS WEEKLY"

Apparatus we have tested

Conducted by A. D. COWPER, M.Sc., Staff Editor.

An Automatic Crystal Detector

Messrs. Grafton Electric Co. have brought to our notice an ingenious type of automatically-set crystal detector handled by them, made by a well-known firm of radio manufacturers. This instrument has, on a highly-polished base adapted for mounting outside the panel by four small screws, a large glass barrel in a horizontal position which houses the crystal and operating mechanism. A small insulated handle projects at one end through the metal cover; the crystal is mounted, by fusible alloy, in a small cup which fits loosely in a hole in the opposite end-plate, being kept in position by a pivoted spring-catch device. On turning the small handle, two operations are performed automatically; the crystal-holder is rotated through a small angle by a pawl action, giving accordingly a new setting; and the cat's whisker is advanced into firm contact with the crystal, and eventually withdrawn by further rotation of the knob when a fresh setting is required, by a simple cam action. The action can be watched through the glass tube, but it can be carried out blind-fold with equal certainty.

Evidently only a narrow circle of "spots" is effectively searched by this device, unless the crystal is shifted slightly in its cup for a second round. For this reason, and for amateur use, we would have preferred to see a more convenient method of fixing the crystal than the usual fusible alloy; whilst the cup can be removed and replaced by a spare in a few moments, it is a more lengthy and more precarious undertaking to replace the old by a new crystal in the same cup, whilst the method of search does not imply great economy of crystals.

On trial, after an unduly stiff and brutal cat's whisker had been adjusted to give the proper delicate contact (a process facilitated by the provision of a small chuck for holding the whisker and the ready dismountability of the whole detector on removing some nuts), it was found easy to obtain an optimum setting of the whisker by simply turning the small knob, and excellent crystal reception was obtained at 35 miles from 2LO, both in aural observation and as shown

by the micro-ammeter. We can strongly recommend this detector for "family use" when there is at least one person competent to make the necessary preliminary adjustments, the setting of the crystal every evening can then be done by the most unskilled.

Neutrodyne Condenser

A modification of the "Colvern" two-plate fine-tuning condenser recently reviewed in these columns has been developed by Messrs. Precision Screw Co., Ltd. In this, certain small sources of avoidable minimum capacity have been effectively dealt with by small changes in design, so as to make the instrument more particularly suitable for use in "Neutrodyne" circuits, such as the tuned-anode modification introduced by the writer some time ago. We understand that this type will be supplied complete, ready for one-hole panel-mounting, with an anti-capacity extension handle, and at a very modest price. The space occupied on the panel is similar to that required by the standard type.

On practical trial, this new pattern was found to be admirably adapted for its purpose; the "zero" capacity was minimal, and the effective range ample for its purpose. Both with the type of neutrodyned tuned-anode H.F. coupling with plug-in coils, and with the convenient modification introduced lately by Mr. P. W. Harris, using a mushroom H.F. plug-in transformer for anode and neutrodyning coil together, satisfactory neutralisation of valve-capacities resulted, and complete stability with light aerial-coupling and sharp, selective critical tuning. With plug-in transformers, it appeared better to use the neutrodyning condenser screwed out so to give the lowest range of capacities.

Insulated Bus-Bar Wire

The vogue for the exclusive use of square bus-bar wire of about No. 16 S.W.G. for internal wiring of radio sets occasionally produces some embarrassment when two wires must perforce be arranged very close together, so that some insulation is demanded. The ordinary insulating sleeving is often quite hard to put on to large square wire. Messrs. Engineering Supplies, Ltd., have drawn our attention to the No. 16 S.W.G. square tinned copper wire which they are supplying already covered with insulating sleeving, which overcomes this difficulty effectively. A sample submitted had the ordinary type of coloured sleeving fitted tightly on the tinned wire; this could be readily stripped off (with the aid of a sharp knife) at the ends or wherever soldered joints had to be made. We understand that this is supplied in 36-in. lengths made up in bundles of 100.

"Pilot" Panel

Messrs. Peto-Scott Co., Ltd., have sent for our inspection a sample of their "Pilot" series of ebonite panels, ready drilled and engraved, for the home assembly of definite types of radio receivers. This particular panel was designed for the well-known "ST100" circuit, of ¼-in. ebonite already matted and finished, 12⅜ in. by 9¾ in., with all holes for terminals, valve-holders, filament-resistance and tuning-condenser mounting, coil-holders, etc., made of the correct size and spacing for these components, and suitable neat engraving, filled in in white for the various terminals and controls.

The ebonite appeared to be of excellent quality; the insulation-resistance, tested on high D.C. voltage between the valve-holder socket positions (the crucial point), was unexceptionable

For those to whom the marking out and drilling of the panel presents difficulties, and those who value the professional appearance obtainable with a neatly engraved panel, these "Pilot" panels of Messrs. Peto-Scott can be strongly recommended.

Information Department

SUPPLIED BY RADIO PRESS SERVICE DEPT., LTD.

A. S. I. (LANGHOLM, N.B.) has trouble with noises in his loud-speaker and asks our advice.

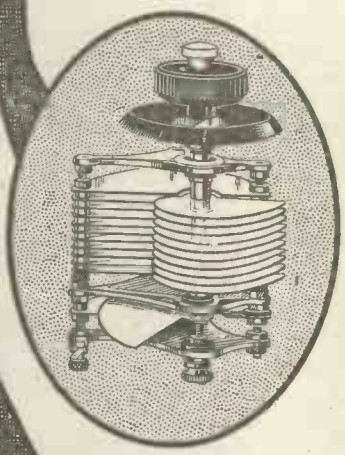
No doubt the crackling you speak of was due to atmospherics. It may perhaps also have been due to neighbouring tram wires if there are any in your immediate vicinity. The question of signal fading is rather complicated. As you probably know, when receiving distant stations at night regular fading very often takes place. This, of course, is due to a factor over which we have at present no control. A nearby re-radiating neighbour is another possible cause. It would be advisable for you to make sure that you have not a nearby neighbour who is affecting you in this way. If you have, this may account for the fading and also for the distortion. If your set was on the verge of oscillation, fading and distortion might also occur. The fault might, therefore, be one of three possibilities—external atmospheric conditions, over which we have no control, a re-radiating neighbour, or the set itself being on the verge of oscillation. To eliminate the last cause, that is, in the set itself, you must make certain that instability is not present.

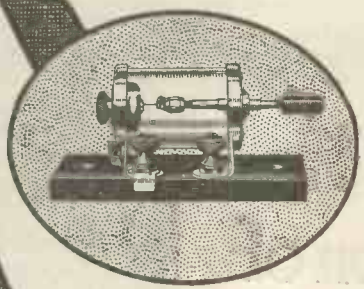
V. A. L. (CHATTERIS) wants to alter his existing Reinartz.

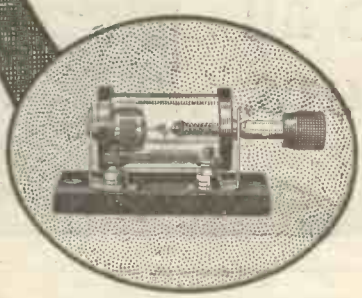
In reply to your query regarding the Reinartz receiver described in the March number of *Modern Wireless*, this design was a finished design intended to be suitable only for a limited band of wavelengths, namely, broadcast wavelengths. To alter this receiver so as to make it suitable for the reception of 5XX would mean modifying the design, and in view of this we would recommend that you reconstruct your receiver on the lines of the Reinartz receiver with plug-in coils described by Mr. Percy W. Harris in the December number of *Modern Wireless*. Mr. Harris designed this latter receiver in response to the many requests for a Reinartz receiver suitable for universal use. The plug-in coil Reinartz receiver seems to be the very thing you want, and it should not be difficult for you to re-wire and generally reconstruct your receiver on these lines. We would therefore refer you to the description given on page 748 in the December number of *Modern Wireless*, and to blue prints Nos. 75a and 75b, showing the lay-out of the panel and the wiring diagram for this receiver.

NEW GECOPHONE WIRELESS COMPONENTS

With Outstanding Characteristics







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SQUARE LAW VARIABLE CONDENSER

A high-class precision instrument.

Low Minimum Capacity. Ball Bearing Movement.
Low Dielectric Losses.
Plates of correct shape giving even tuning over entire scale.

PRICES.

Capacity.	Without Vernier.		With Vernier.	
	Cat. No.	Price each	Cat. No.	Price each
·0002 MFD	B.C. 200	9/6	B.C. 201	14/6
·00025 ,,	B.C. 202	10/3	B.C. 203	15/3
·0003 ,,	B.C. 204	10/3	B.C. 205	15/3
·0005 ,,	B.C. 206	10/6	B.C. 207	15/6
·00075 ,,	B.C. 208	12/-	B.C. 209	17/-
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PATENT "UNIT" CRYSTAL DETECTOR

The very latest development.

Instant accessibility by lifting small lever when detector swings open.
Universal Ball Joint self contained in spring cage. Constant contact.
Crystal breech fed from outside of tube.
Cat. No. B.C. 32. For Panel Mounting, Price 2/- each, } Without Crystal.
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GECOPHONE

MICROMETER CRYSTAL DETECTOR

No better value.

Screw-on Crystal Cup.
Detector Arm has free sliding movement for quick contact.
Micrometer movement for final adjustment.
Operated from one knob.
Cat. No. B.C. 36. For Panel Mounting, Price 4/- each } Complete with
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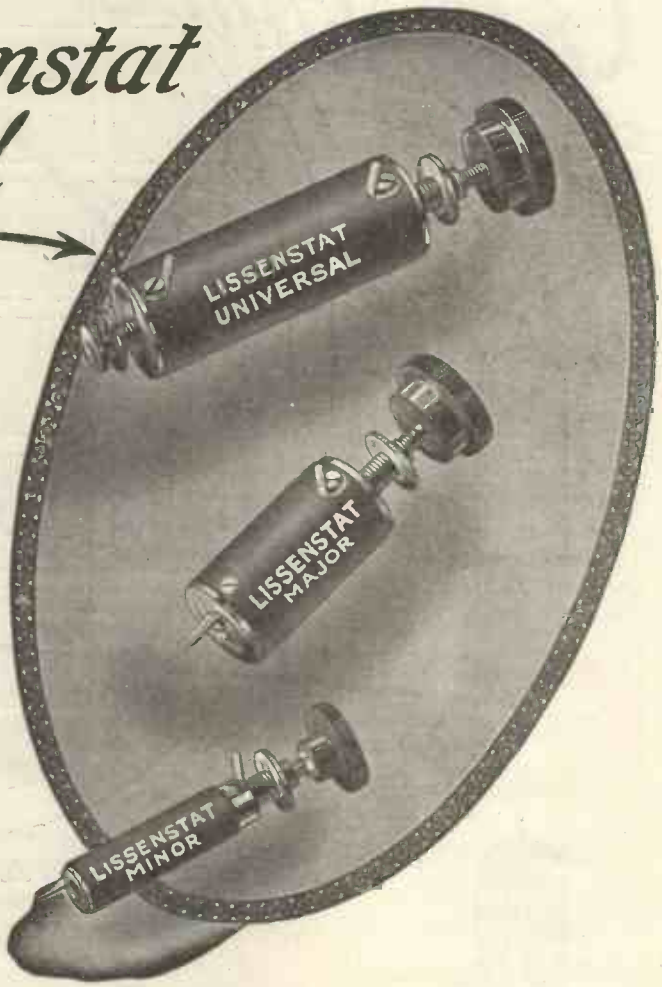
Sold by all GECOPHONE Service Depots, Electrical and Wireless Dealers and Stores.
(Wholesale only)

THE GENERAL ELECTRIC CO. LTD.
Head Office: **Magnet House, Kingsway, London, W.C.2.**
Branches throughout Great Britain and in all the principal markets of the world.

You can feel for the point of critical detection, and unerringly find it — with Lissenstat Control



SIGNALS from farther away, stronger, sharper, more certain than ever before—its unique characteristics, its noiseless, stepless movement, gives the user an absolute control over every shade of electronic flow. With LISSENSTAT control your valve will detect with a power which will be a revelation to you—FOR LISSENSTAT CONTROL GIVES THE VALVE A CAPACITY TO DETECT AS NO OTHER CONTROL CAN.

Sold in three models—

LISSENSTAT MAJOR (patents pending) —gives the most acute tuning possible **7/6**

LISSENSTAT MINOR (patents pending) —provides LISSENSTAT control at a popular price. Is replacing thousands of inefficient rheostats **3/6**

LISSENSTAT UNIVERSAL (patents pending)—with its feature of protection for dull emitters **10/6**

RECEIVERS FITTED WITH LISSENSTAT CONTROL ARE EQUIPPED FOR THE FINEST DETECTION POSSIBLE.

PARTS WHICH PULL TOGETHER—when you know that every vital part in your receiver is pulling strongly with each other, you know you have a receiver which is the best you can ever get.

BUILD—WITH ALL LISSEN PARTS—there is one for every vital place.

LISSENIUM

DON'T MIX YOUR PARTS—
With all LISSEN parts your receiver will give results which would never be possible with mixed parts.

MAKES A WHISPER LOUD—

with perfect tone quality

THIS LISSEN T 1 Transformer will amplify a whisper to a great degree of loudness in a background of absolute silence. It is the transformer which should be particularly used immediately behind the detector valve. This is the first place in L.F. amplification to start eliminating distortion. The LISSEN T 1 Transformer is distortionless for one reason, because the impedance of the transformer is obtained by means of the exceptional coil of the transformer, and not by the use of a heavy iron core, which always tends to distort. The LISSEN T 1 Transformer has a most expensive coil—IT WOULD AMPLIFY BY ITSELF WITHOUT ANY IRON CORE AT ALL.

It is unequalled for first stage work.

Price 30/-

The SIGNIFICANCE of the LEAK—

SENSITIVITY—that is the answer. Every different circuit—every different valve—distant station or nearby station—reaction or no reaction—under the many different conditions of reception, by fitting the LISSEN Variable Grid Leak you are sure you have immediately available the means for getting that shade of difference which sometimes matters so much.

All the wide range of resistance values required of a grid leak is covered with minute variation throughout. LISSEN ONE-HOLE FIXING, of course **2/6**

LISSEN Variable Anode Resistance, same outward appearance as the LISSEN Variable Grid Leak, 20,000 to 250,000 ohms. **2/6**

SMOOTH OUT YOUR LOUD SPEAKER DISTORTION BY PUTTING THE LISSEN VARIABLE GRID LEAK across the secondary of the last transformer OR ACROSS THE LOUD SPEAKER ITSELF—first position is better.

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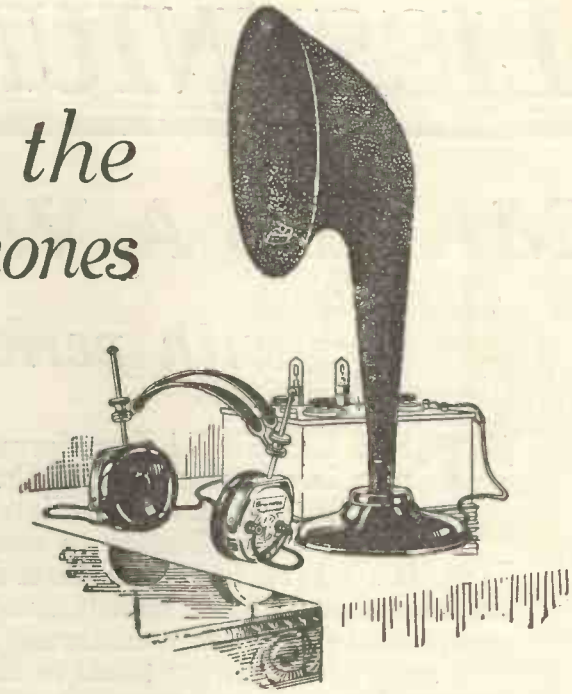
BUILD—WITH YOUR OWN HANDS WITH ALL LISSEN PARTS

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

The Brandes Family Series.

AMARYLLIS holds the floor. "We're going to have a snappy time this Christmas with the *Table-Talker*, and you, Bill," with imperious gesture, "will see to it. If you just dare to have the tummy out of the receiver for one of your confounded experiments about that time," she tailed off in vague threats of dire disaster for young Bill. "You, Father, need not blow through your fungus and look fierce, 'cos the carpet's coming up, anyway. And you've got to shell out for a new valve." Grandpa removed the "*Matched Tone*" 'phones from his ears as the strains of the Savoy band welled up in the *Table-Talker* —Amaryllis pirouetted, favoured him with a covert smile and executed a successful retreat. Father snorted behind his paper, but he knows really that the *Table-Talker* makes for a jolly time. *Ask your Dealer for Brandes.*

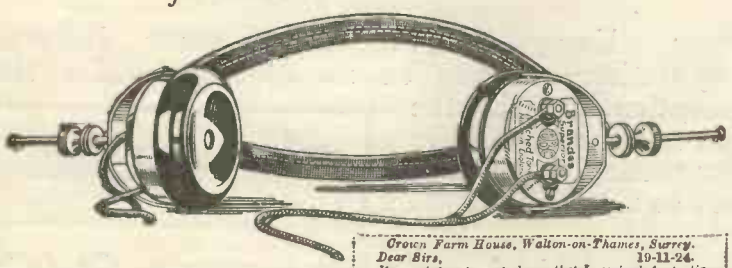


All Brandes products carry our official money-back guarantee, enabling you to return them within ten days if dissatisfied. This practically constitutes a free trial.

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

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

British Manufacture (B.B.C. Stamped).



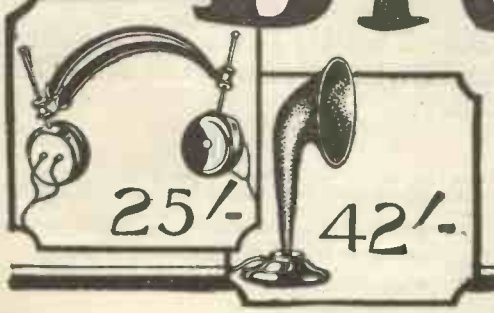
Crown Farm House, Walton-on-Thames, Surrey.
Dear Sirs, 10-11-24.
It may interest you to know that I received Australia on your 'phones. I consider that they are the most sensitive 'phones that I have used, and I am much pleased with their general performance. Yrs. faithfully,
(Sgd.) F. Walker.

For Christmas!

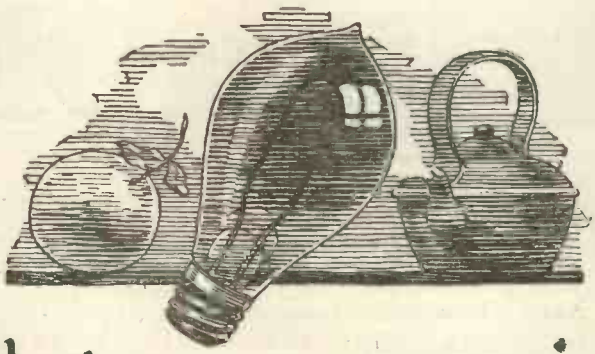
An excellent family gift to the family. Club together and get yourselves Brandes Products for the receiver. They provide good fun during Christmas festivities, and all the year round.

Brandes

Result of 16 Years Experience



The name to know in Radio



What one man saw in a blackened bulb

THE history of progress is tied up with trivialities. Newton made history under an apple tree; Watt saw it in a tea kettle. Modern "wireless" came from a blackened bulb. It was an ordinary carbon filament lamp. Everybody knew that it turned black as it grew older. One man wondered why—and made it his business to find out. What he found was the principle of the thermionic valve. Dr. Fleming was the man and his experimental valve was made in the Ediswan Laboratories.

That was 30 years ago. Since then many developments have taken place in the evolution of the valve. Ediswan Valves retain the lead they won in the early days of wireless. They are wholly reliable — experienced workers and careful testing see to that.

Ediswan Valves will bring the best out of your wireless set—get some on the way home and enjoy a better programme from to-night onwards. All dealers sell them.

THE EDISON SWAN ELECTRIC CO. LTD
QUEEN VICTORIA ST., LONDON, E.C. 4

An interesting study of early wireless history may be made at the Science Museum, South Kensington, London, where the complete series of Dr. Fleming's experimental valves can be seen.

EDISWAN
VALVES

162-12

B.T.H. Headphones

WE couldn't improve the technical qualities of B.T.H. Headphones. They were and are perfect in tone, clarity and volume. We have, however, embodied a great many constructional improvements in the latest pattern, which make it the most comfortable and convenient instrument of its kind. Here are some of the more important features of the new B.T.H. Headphones :—

Weight, with cord, only 9½ ozs.

No hair-catching projections.

No "scissors" movement of headbands.

Adjustable to any head by a single movement, without the manipulation of screws or nuts.

No screws or nuts employed in construction, and therefore nothing to work loose.

Minimum number of separate parts.

Body of ear-piece made of non-resonating material.

Diaphragm rigidly clamped around periphery between surfaces of non-resonating material.

Permanent magnets are really permanent and are not affected by lapse of time or external changes of polarity.

B.T.H. Headphones are unequalled for sensitiveness, volume, comfort and appearance.

Price 25/- per pair

(4000 *ohms.*)

Obtainable from all Electricians & Radio Dealers

Advertisement of The British Thomson-Houston Co. Ltd.
Crown House, Aldwych, London, W.C.2

INDISPENSABLES TO MAXIMUM RADIO EFFICIENCY

PARAGON CURTIS

GOOD COMPONENTS DESERVE A GOOD PANEL

Uniform Fine Grain. Dead Matt Finish. GUARANTEED Non-Metallic Surface, free of leakage.

Tested and Recommended by "MODERN WIRELESS."

PARAGON Radio Quality Post Office Specification. "The Best Made." EBONITE PANELS

Special panels for Receivers described in this or any previous issue of RADIO PRESS PUBLICATIONS—CUT, EDGES SQUARED and GROUND, ¼d. per square inch. Prices for drilling and engraving upon request.

Home Constructors who wish to be certain of perfect reception should apply for our 16 pages Catalogue of "Essential Raw Materials and Accessories," post free on request.

STANDARD SIZES.

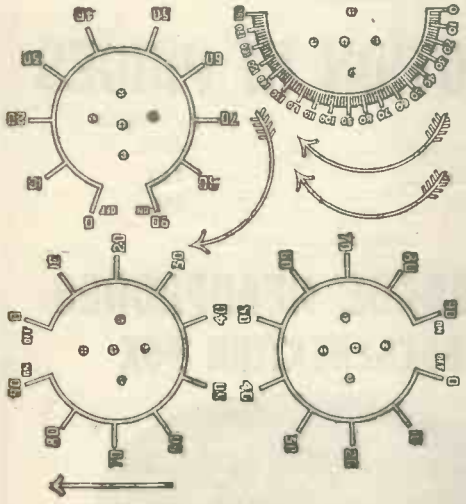
8	×	6	×	¼	2/6	24	× 10	× ¼	14/6	18	× 6	× ¼	6/9
8	×	6	×	¼	3/3	24	× 12	× ¼	17/6	12	× 8	× ¼	6/–
10½	×	8½	×	¼	5/3	8	× 5½	× ¼	2/9	10	× 8	× ¼	6/9
12	×	10	×	¼	7/3	10½	× 7	× ¼	4/7	7	× 5	× ¼	2/3
12	×	12	×	¼	8/6	12	× 6	× ¼	4/6	10	× 9	× ¼	5/8
14	×	12	×	¼	10/–	22	× 11	× ¼	15/3	9	× 5½	× ¼	3/6
16	×	12	×	¼	11/6	16	× 9	× ¼	9/–	10	× 5	× ¼	3/3
18	×	12	×	¼	13/–	12	× 11	× ¼	8/3	12½	× 9½	× ¼	7/6

PARAGON POLISHED MAHOGANY EBONITE

Is NOT a composition, but GUARANTEED POST OFFICE QUALITY EBONITE, and is of similar specification to the now universally used PARAGON EBONITE.

PANELS CUT TO SIZE, Squared, edges ground, 1d. per square inch.

Valves and Coil Holders, Condenser Dials and Knobs, in Polished Mahogany Finish to match.



THE "NU-GRAVING" PANEL MARKING PROCESS,

Series 10. Complete as shown, 6d.

This name on every envelope is your only guarantee against spurious imitations. Nu-graving is guaranteed for an indefinite period against chipping or cracking.

PARAGON-CURTIS ONE PIECE MICA CONDENSER

UNIFORM ACCURACY.

The design and manufacture of the PARAGON-CURTIS CONDENSER guarantees uniform accuracy at all temperatures and under all conditions. All Paragon-Curtis Condensers are guaranteed within 5% of the stated capacity.

·0003 to ·006	2/6
Complete with Grid leak Clips	2/9
Grid leak...	1/6

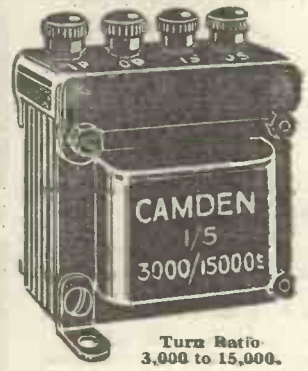
CURTIS CONSTANT-TUNED H.F. AMPLIFIER

No Tuning Condenser Required.

The Curtis "Constant-Tuned" High-Frequency Amplifier is the only automatic high-frequency amplifier which guarantees high efficiency for two stages of radio amplification on any wave-lengths between 300 and 3,000 metres, and requires no additional controls. For the greater convenience of the constructor and to conform to existing panel designs, the CURTIS CONSTANT-TUNED is designed with the orthodox 4-pin plug for panel mounting and must be connected in accordance with the circuit diagram supplied.

Model A, 300 to 800 metres, 15/–, postage 6d.

Model B, 800 to 3,000 metres, 17/6, postage 6d.



Turn Ratio 3,000 to 15,000.

WE HAVE NO HESITATION in confidently recommending the

CAMDEN INTERVALVE TRANSFORMER

for maximum power amazingly free from distortion. This component carries our full guarantee.

PRICE 12/6

PETER CURTIS LTD.

75 · CAMDEN ROAD · N.W.1.

Telegrams: "PARACURTEX" — 'Phone: NORTH 3112.

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The PARAGON RUBBER MFG. CO. LTD.

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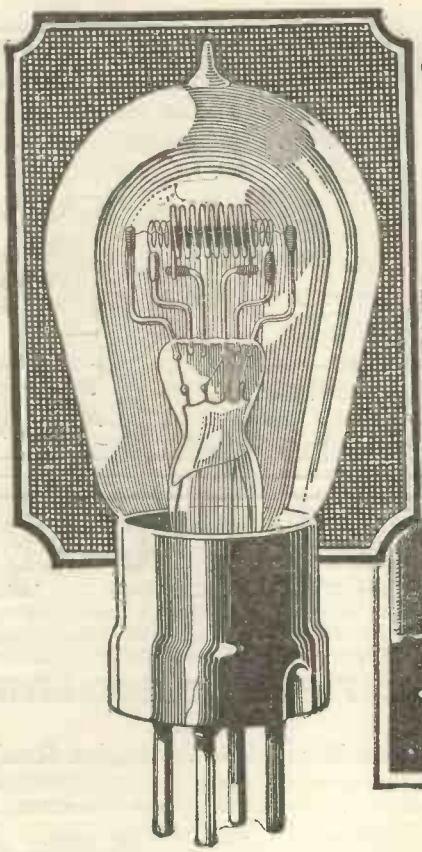
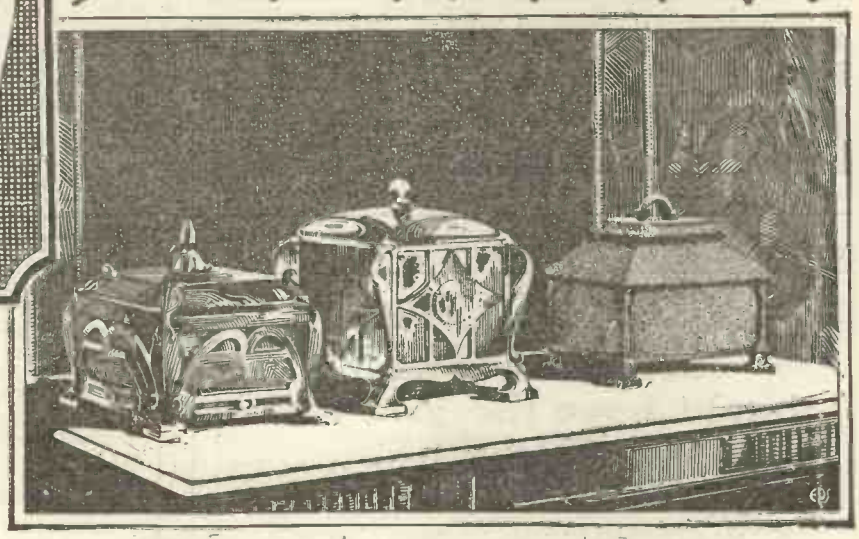
MANCHESTER: 312, Deansgate. *Central 5095.*



Louden



The three caskets

10/-

It was not the Golden Casket that contained Portia's portrait, but the lead; and so it often happens that the most expensive article is not necessarily the one most to be desired.

There are many valves more expensive than the Louden; yet there is not one of them that combines all its many advantages.

It uses considerably less current from the accumulators than is usual amongst valves of the bright filament type—a point which needs no labouring to those anxious to keep down costs.

It gives a reproduction full in volume and silver clear in quality, and it has a stout filament which is not readily broken.

Further it only costs 10/-

Four months ago people had not heard of Louden Valves; to-day they are demanding them at the rate of many thousands per week—which is, perhaps the most striking testimony of all.

See that your next valve is a Louden.

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

FELLOWS WIRELESS

Manufactured throughout in Great Britain.

All Loudens are silver clear and free from mush.

The current consumption is low and the life long.

Louden Valves - Silver Clear

AMPLIFY WITHOUT VALVES

BY THE AID OF THE

"DETECTAVOX"

Can be clamped direct to the earpiece of a **CRYSTAL RECEIVING SET.** A supersensitive instrument that really does what is claimed for it. **Price 17/6.** Accessories needed are Transformer, 17/6; and 3-volt Dry Battery.

Our 44-page New Radio List illustrates this and hundreds of other Radio Components. Send 4d. in stamps and secure a copy at once.

ECONOMIC ELECTRIC LTD. | Head Office: 10, FITZROY SQUARE, LONDON, W.1. | Showrooms: 303, EUSTON RD. N.W.1

Handsome nickel dial.
One hole fixing.
Phosphor Bronze contact arm.

2/6

6 ohms
15 ohms
30 ohms

Winding cannot be damaged by ordinary use.
Size. 1⅞ ins. diameter, ½in. high.

From all Wireless Stores or direct from:

The Bedford Electrical & Radio Co., Ltd.,
Electrical Engineers & Manufacturers.
22, Campbell Road, Bedford.

Say "PEERLESS JUNIOR" when you want a better Rheostat

NEUTRODYNE RECEIVERS

should have the grid leak VARIABLE

Contemporary design is favouring the Neutrodyne principle, which, it will be remembered, involves a method of neutralising internal valve capacity and lessening the tendency for a receiver to self-oscillate. Adjustment of the neutralising condensers is critical within limit and some more delicate control is occasionally required, more particularly on distant signals.

A variable grid leak offers a good solution, since signals to which the receiver can previously be blind may actually be tuned in by the control which a variable grid leak gives. It secures a final adjustment. Incorporate a variable grid leak in Neutrodyne Receivers—but be sure it is a WATMEL.

WatMel

All goods of our manufacture bear this mark. It is your only guarantee

WatMel
VARIABLE GRID
Anode Resistances are fitted with a compressing spring which assures good contact on the plunger.

IMPORTANT NOTICE

to intending purchasers

Patent 206098

5 to 5 Megohms ... 2/6
50,000 to 100,000 Ohms 3/6
Other Resistances to suit any circuit.

Send P.O. for Descriptive Folder.
SEE THE TRADE MARK

WatMel

ON EVERY GRID LEAK. BEWARE OF IMITATIONS.

The Watmel Wireless Co. wish to notify the trade and public that their Variable Grid Leak Patent Application No. 206098 was contested in the Comptroller's Court, and on Appeal; in both instances the Patent Grant was upheld and costs awarded.

It is the aim of this Company to protect traders', customers', and also its own interests by securing Patent protection for the novelties in its specialities, as it is these novelties, invented by experts and exhaustively tested, which are the Hall Mark of all Watmel Products.

THE WATMEL WIRELESS CO.

332a, Goswell Road, London, E.C.1.

Telephone - - - - - - - - CLERKENWELL 7990.

Barclays 469

IMPORTANT NOTICE!—

Messrs. The Fallon Condenser Co., Ltd., wish to notify all London and County Retailers that a considerable time-saving and economy can be effected by obtaining

ALL FALLON SPECIALITIES

at their

New London Depot, 143, Farringdon Road, E.C.2.

where prompt attention and keenest wholesale prices are always yours to command.

Illustpated Catalogue free on request.

FALLON CONDENSER CO., LIMITED.

Price Fixed SOUND BOX.
£3 7 6

Large Adjustable SOUND BOX
£4 15

Try it. Money refunded if not satisfied.

The Very LATEST!

The REMO Reflex LOUD SPEAKER

This Loud Speaker is the result of careful experiment and has the following outstanding features:—
(1) Ample Volume with a low input.
(2) Avoidance of all "Horn & Tunnel" effects, giving in practice the effect of a hornless loud speaker with volume and purity, and is mechanically strong.
(3) Apneara nce. The general outline and colour is artistic.

The sound in the Remo Reflex Loud Speaker is reflected from the base of the horn, creating sufficient resistance to correctly damp the diaphragm for the perfect reproduction.

RICHD. MELHUISH, LTD.
Tool, Machine & Electrical Experts. *Estab.* 1828
50, 51 & 84, Fetter Lane, Holborn Circus. London, E.C.1

Patents, Designs and Trade Marks

H. D. FITZPATRICK & Co.,
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Phone: HOLB. 459.

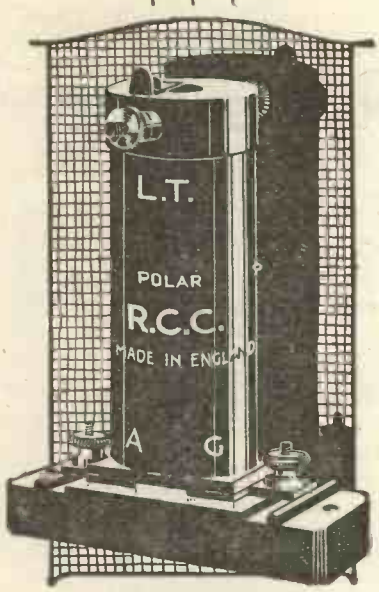
EBONITE

Sheet rod and tubing in all sizes kept in stock and cut to any required size while you wait, or sent by post on receipt of cash.

WE CAN TURN ANYTHING IN EBONITE.

BURGE, WARREN & RIDGLEY, LTD.,
91/92, GREAT SAFFRON HILL, LONDON, E.C.1. Phone: Holborn 50

MUSIC *and* CLEAR SPEECH *in* BROADCASTING.



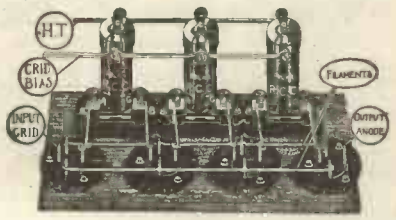
POLAR
RESISTANCE CAPACITY
COUPLING UNIT.
Price 15/-

Immediate Delivery.

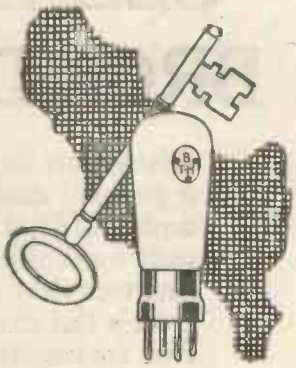
Distortion in wireless reception has been a general cause of complaint in the past and could not be eliminated as long as the only available method of intervalve coupling was that of the iron core transformer. Iron is the chief trouble in this connection. But fortunately we are no longer at the mercy of iron. It is well known that resistance capacity coupling between stages of low frequency amplification completely eliminates distortion. Perfectly pure reception can be obtained by this method.

When you buy an iron core transformer you may be buying distortion, and paying a stiff price for it too. Why do this when resistance capacity coupling can be as easily incorporated in your set? The Polar Resistance Capacity Coupling Unit, which enables you to eliminate distortion, consists of a wire-wound anode resistance, a grid leak and a Dubilier condenser specially built for the purpose.

The unit is perfectly self contained and, having four clearly marked terminals corresponding to the four transformer terminals, it lends itself admirably to straightforward wiring, as may be seen from the illustration below. If you wish to obtain pure music and speech, incorporate R.C.C. units in your set and give your loud speaker a chance. A leaflet giving wiring diagrams accompanies every unit.



RADIO COMMUNICATION CO., LTD., 34-35, NORFOLK STREET, STRAND, W.C.2



The Key to Good Reception

Good reception is dependent, to a great extent, on the *silent* functioning of the valves, which in turn is governed by the degree of "hardness." B.T.H. Radio Valves are perfectly silent in action, because they are completely exhausted. They are made by the most up-to-date machinery, and a special B.T.H. process is employed which produces an exceedingly high vacuum.

B.T.H. VALVES WILL DO ALL THAT VALVES CAN DO TO MAKE YOUR SET PERFECT

From all Electricians and Radio Dealers

B.T.H. RADIO VALVES

GENERAL PURPOSE VALVES:

Type R. ... 12/6 each

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

Type B 3 ... 21/- each

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

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

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

POWER AMPLIFYING VALVES:

Type B4. ... 35/- each

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

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

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

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

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

*For use with Dry Cells

B T-H

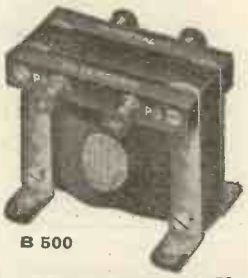
Advertisement of The British Thomson-Houston Co. Ltd.

2261

Silvertown

WIRELESS ACCESSORIES.

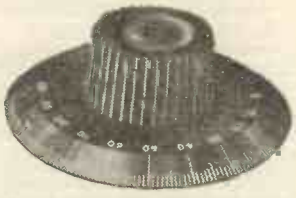
Quality guaranteed by over 50 years' electrical manufacturing experience.



B 500

INTERVALVE TRANSFORMERS.
Adopted by leading manufacturers of Wireless Receiving Sets and discriminating Amateurs in all parts of the world. Guaranteed for 12 months. Price 21/- each.

FILAMENT RHEOSTATS.
With finished and lacquered brass bush for panel mounting. Resistance wire wound on insulating rod, thereby giving perfectly smooth adjustment. Each supplied with diagram giving drilling dimensions.
3/6 each.



EBONITE CONDENSER DIALS AND KNOBS.
In one piece, graduated in white 0.1800, highly finished, complete with fixing screw, dial approximately 3 in. diameter.
Complete 1/3 each. Dials only, 10d. each.

SILVERVOX LOUD SPEAKER

This instrument will reproduce both speech and music without the loss of its original tone and quality. Coils wound to either 120 or 2,000 ohms.

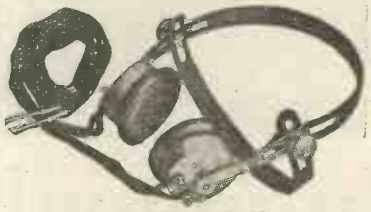
The tone arm is a heavy aluminium casting.

Excellent strengths can be obtained on an efficient 2-valve receiver within 10 miles of broadcasting station.

Total height, 20 inches. Size of trumpet, 12½ inches diameter.

PRICE **£3 10s.** *EACH*

VARIABLE CONDENSERS.
(For panel mounting.)
Strongly constructed. Moving vanes are shaped to give low minimum capacity. Fitted with a stop to allow of a movement of 1800 only. From 5/6 each.



TELEPHONE HEADPIECES.
The "Stalloy" diaphragms are matched so as to secure a balance of tone and quality. Resistance from 120 to 12,000 ohms. Price (4,000 ohms) 25/- each.

POTEN IOMETERS.
(For panel mounting.)
On rectangular ebonite former, complete with knob and pointer. Former mounted on cast brass frame. Resistance approximately 400 ohms. 7/6 each.

Makers:— THE SILVERTOWN COMPANY,

106, Cannon Street, London, E.C.4.

Works: **Silvertown, London, E.16.**

BELFAST: 75, Ann Street.
BIRMINGHAM: 15, Martineau Street.
BRISTOL: 4, Victoria Street.
CARDIFF: Pier Head Chambers, Bute Docks.
DUBLIN: 15, St. Andrew Street.
GLASGOW: 15, Royal Exchange Square.
LEEDS: 1, New York Road.

SILVERTOWN A D I COMPONENTS

LIVERPOOL: 54, Castle Street.
LONDON: 100 and 102, Cannon Street.
MANCHESTER: 16, John Dalton Street.
NEWCASTLE-ON-TYNE: 59, Westgate Road.
PORTSMOUTH: 49, High Street.
SHEFFIELD: 88-90, Queen Street.

For You!

—or your friends who are interested in wireless nothing will give greater pleasure and satisfaction than just the set of components desired. A seasonable and reliable gift is assured provided M.H. products are chosen.

DUAL CONDENSERS

Dual Condensers are essential for the perfect handling of sets in which two stages of High-Frequency Amplification areemployed. M.H. Dual Condensers are of course up to the high-efficiency standard of all M.H. products and embody the refinements quoted below under the heading Square Law Condensers. M.H. Dual Condensers are specially suitable for using with 2 M.H. Plug-in Transformers in tandem.
Capacity 0.0003, Price 19/-

SQUARE LAW CONDENSERS

With or without a single plate vernier attachment. The advantages of the square law type of condenser are, of course, well known, the variation of capacity being even over the whole range of the dial.
Aluminium plates—Well Insulated—Perfectly spaced—Smooth and delicate movement—Simple to fix—Drilling template and zero indicator supplied with each.

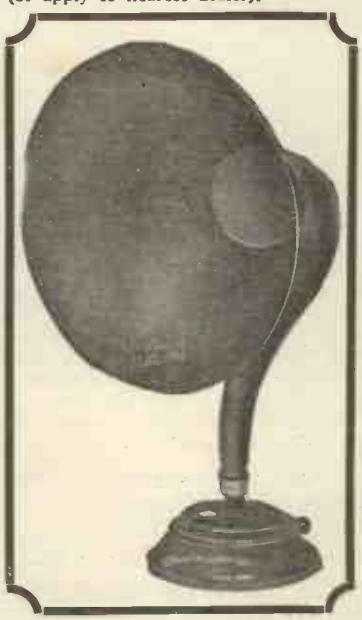
PRICES

	Vernier. s. d.	Plain. s. d.
0.001 μF	17 6	11 6
0.0005 μF	15 0	10 6
0.0003 μF	14 0	8 6
0.0002 μF	12 6	7 6

L. McMICHAEL LTD
IN CONJUNCTION WITH B. HESKETH LTD
RADIO CORNER, 179, STRAND, LONDON, W.C.2.
Barclays 478

"It's more than a Loud Speaker —it's a Reproducer"

THE more one listens to the average loud speaker (accent on the *loud*) the more one realises how folk are choked off wireless. They've never really listened in, they've never heard a good rendering of good music through a really class reproducer like the Ericsson Super-Tone Loud Speaker.
Gone is the usual distortion, "tin" and blasting, and in their place come through full, mellow notes at practically crystal purity. Many months of weary testing, selection and rejection have ensured this.
Thus we have a de luxe loud speaker at a fair price—75/-. In dull finish on a polished wood base and standing 18 in. high. Write to-day (or apply to nearest dealer).



Selling Agents:
MANCHESTER: Palatine Wireless Equipment Co., 3, King St. W. Deansgate.
NOTTINGHAM: W. J. Furse & Co., Traffic St.
COLCHESTER: 121, High Street.
SCOTLAND: Malcolm Breingan, 57, Robertson Street, Glasgow.
BIRMINGHAM: 14-16, Snow Hill.
N.E. ENGLAND: Millburn Ho., Newcastle-on-Tyne.
LEEDS: North British Engineering Equipment Co., Excelsior Buildings, Lands Lane.
IRISH FREE STATE Stocks carried by A. W. Doyle, Kelly & Co., 174, Pearse Street, Dublin.
BELFAST: J. Robertson Ltd., 46, May Street.
WALES: E. Thompson & Son, Western Mail Chambers, Cardiff.

The British L. M. Ericsson Mfg. Co. Ltd.
67/73, Kingsway, London, W.C.2.

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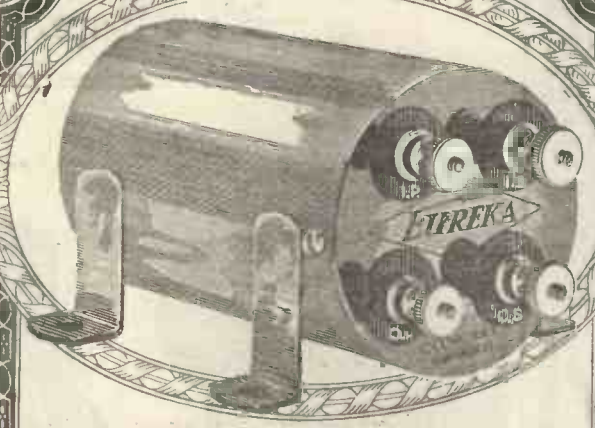
SUPER-TONE LOUD SPEAKER
BBC
Buy British Goods Only

It will pay you always to watch WIRELESS WEEKLY *Advertisements.*



EUREKA
—the Quality Transformer

IT is human nature for all of us—even though we may not be blessed with riches—to want to possess things recognised as the finest of their kind.

The wealthy man owns his Rolls Royce because the whole world knows that it is the finest car. Perhaps it is only a bicycle—a watch—or a fountain pen . . . . but a time comes when we say "when I can afford it I shall buy a—— because everyone knows there is no better." And wireless enthusiasts are looking upon the Eureka in much the same way. We know that to many the outlay of 30s. is an appreciable sum. To them we express our regrets. The superior quality of all the materials used in a Eureka and the more costly methods of manufacture, precludes any idea of producing it at a lower price.

Indeed, we know that no Eureka user would wish to see the price reduced if it meant sacrificing even one of its many exclusive advantages. If Wireless enthusiasts could but see the extravagant care taken during every stage of manufacture—if they could but see the tests that each individual Transformer has to undergo successfully—they would well understand why we are able to guarantee every Eureka to give *years* of service.

Concert Grand 30/-

Eureka No. 2 22/6
(*For second Stage.*)

Sold by all Dealers and Manufactured only by—

PORTABLE UTILITIES CO., LTD.,
7 & 8, FISHER STREET LONDON, W.C.1

Scottish Agents: FULLER, BLACKIE & RUSSELL, LTD., 80, Gordon Street, Glasgow.

Gilbert Ad. 1922

Wireless Weekly Small Advertisements.

EXCEPTIONAL OPPORTUNITY FOR REAL BARGAINS.

	£	s.	d.
New Magnavox Loud Speaker - -	4	5	0
New Cosmos Crystal Set - - -	1	8	0
Brown's A type phones, 120 Ohms -	1	2	0
3-valve Mark IV Amplifier - -	4	9	0
3-valve Aircraft Receiver - -	3	17	6
5-valve Aircraft Receiver with 5 new V24 valves, remote control -	13	9	0
Mark III Tuner complete - -	5	0	0

Carriage paid anywhere in U.K. Approval.

ASHBOURNE, 108 Moorland Rd., STOCKPORT.

FOR DISPOSAL.—Flourishing Wireless Business. 2 miles from Broadcast Station. Main Street. Low Rent.—Box A7, Bertram Day's Advertising Offices, 9/10, Charing Cross, S.W.1.

PATENTS AND TRADE MARKS.—Inventor's Advice, Handbook and Consultations free.—King, Registered Patent Agent, 146a, Queen Victoria Street, London. 'Phone: 682 Cent. 38 years' references.

TELEPHONE RECEIVERS and Loud Speakers Rewound, 2,000 ohms, 3/6.—A. Roberts & Co., 42, Bedford Hill, Balham, S.W.12.

HEADPHONE REPAIRS. — Rewound, remagnetised, readjusted. Lowest prices quoted on receipt of telephones. Delivery three days. Est. 26 years.—Varley Magnet Co., London, S.E.18.

AGENTS Wanted. Wireless valve repair business. Deal with the actual repairers. Lowest trade terms. All types repaired. A hard vacuum guaranteed. Also old valves bought for cash, 9d. each. Cossors 1/- each.—M. & G., 60, Churchfield Road, Acton, W.3. Telephone Chiswick 2681

BATY'S Variable Grid Condenser gives perfect final control for all circuits. 4/9 post free.—Baty, 157, Dunstable Road, Luton

THE MULTI-PLUG TERMINAL ends your connection trouble, and improves your Set. Sure sells. Agents wanted, Particulars, 34, De Montfort St., Leicester.

TO Amateurs.—A ship's Wireless Transmitting and Receiving Set with Radio ammeter. New in 1918. £5 10 0. Worth £50. Machinery & Trading Corp., Ltd., Poole, Dorset.

WIRELESS CABINETS

In 5/8 in. Oak, French polished, very low prices for half-doz. lots.

Lambert Robertson & Sons
Gisburn Street, BARNOLDSWICK.

THIS IMPROVED Athol TRADE MARK MEANS INSULATION

THE ATHOL COMBINED RESISTANCE & VALVE HOLDER

For rear of panel mounting. Single hole fixing,

5/6 each.

"A clever idea,"
says Mr. J. Scott-Taggart.

See "Wireless Weekly," Nov. 19th, page 166.

We will send goods post free if you mention dealer's name

ATHOL ENGINEERING CO.
Cornet St., Hr. Broughton, Manchester.

RADIO PRESS INFORMATION DEPT

2/6 QUERY COUPON

WIRELESS WEEKLY.
Vol. 5. No. 9. Dec. 17, 1924.
(This coupon must be accompanied by a postal order of 2/6 for each question, and a stamped addressed envelope.)

Observation and application

About the year 1749 an engraver named John Sadler, of Liverpool, whilst taking proofs off a plate he had engraved, was suddenly startled by shouts of jubilation from his children in the room. On turning round to see the cause he found that one of them had picked up a still wet spoilt copy that he had thrown on the floor and applied it to a piece of crockery, and was triumphantly holding up the decorated piece of china. This accidental revelation was pursued by Sadler, and it is on record that together with a master printer named Green they, a short time afterwards, printed "1,200 earthenware tiles in about six hours, better and neater than one hundred skilful pot-painters could have painted in the common and usual way of painting with a pencil."

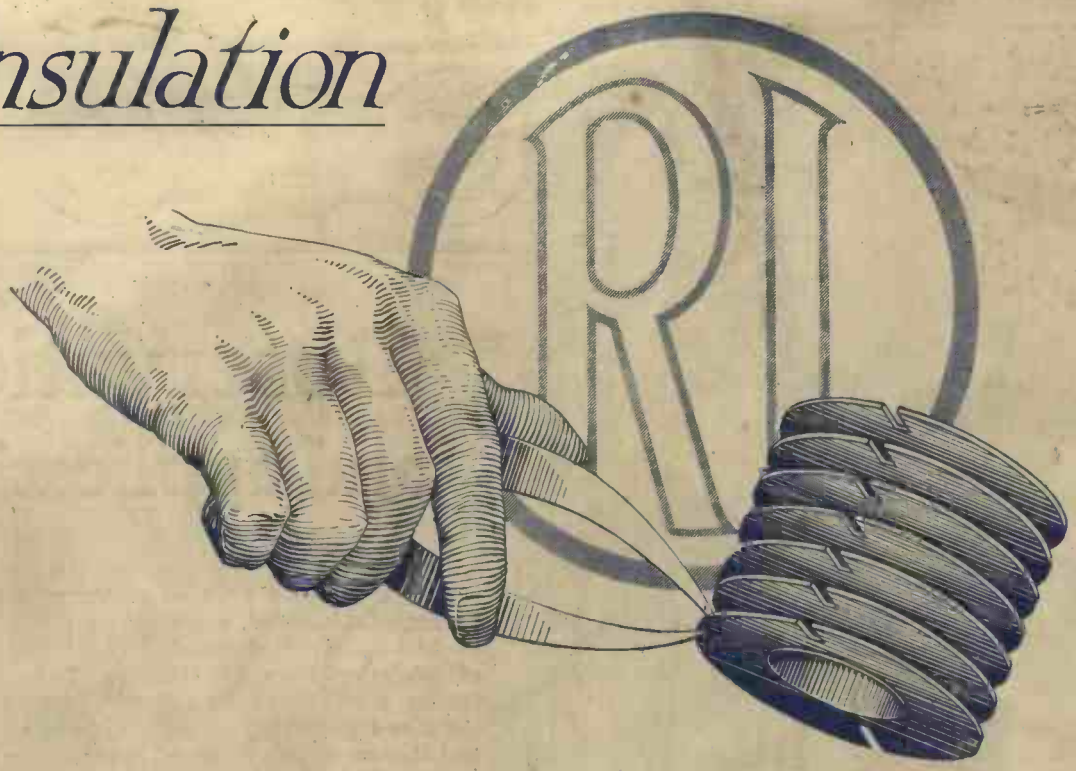
This is probably the earliest known transfer printing; after Liverpool many other factories, such as Battersea, Worcester, Bilston, Staffordshire, Swansea, Coalport and others, made transfer-printed ware.

Transferring is a common process in Lithography where it is used for "making up work," viz., transferring a lot of impressions either all of the same matter or different to a large stone so that they can all be printed at once.

Ladies use transfers for getting their designs on material for silk and other fancy work, in fact, its uses are innumerable.

The "Radio Press" were quick to realise the immense advantage the process offered to amateurs in lettering their panels as against the comparatively costly method of engraving, and thus have placed in the reach of everyone the Radio Press Panel Transfers.

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. Their design and workmanship is so splendidly strong in construction and results that the possibility of failure is reduced to a minimum. Thousands have found the claims of the R.I. to be genuine. You must make sure of

MAXIMUM VOLUME—MINIMUM DISTORTION

by demanding an R.I.

Price 25/-

Ask for the new R.I. Brochure.

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