

CONSTRUCTIONAL—HUMOROUS—DRAMATIC—EXPLANATORY

The Wireless Magazine

Edited by
Bernard E. Jones

VOL.1, NO.1.

February 1925
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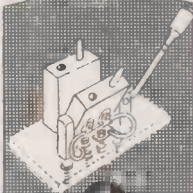
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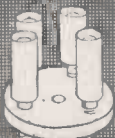
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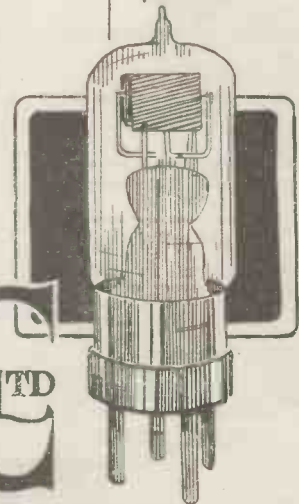
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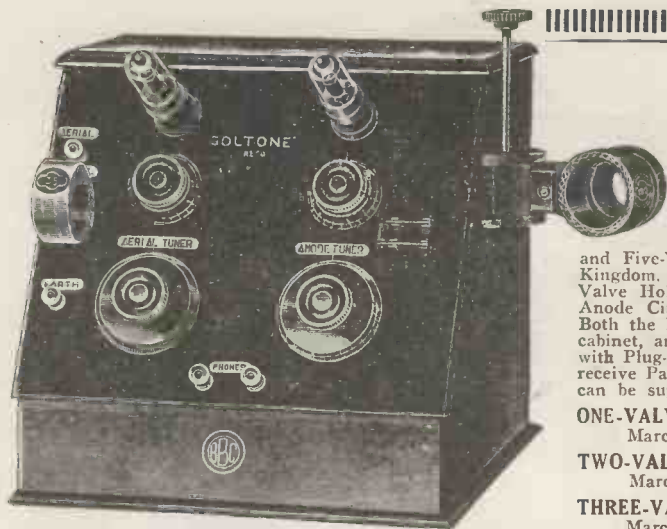


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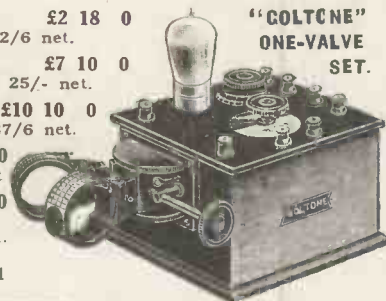
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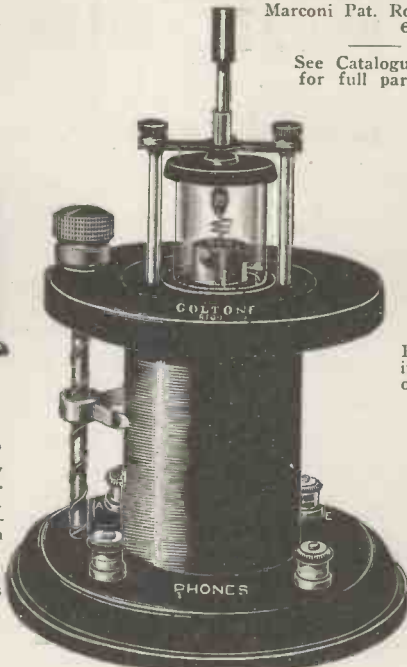
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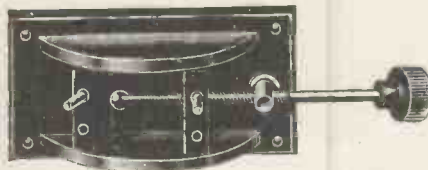
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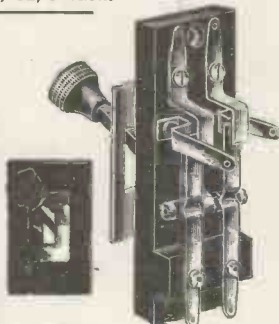
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Wireless Mag., Feb., 1925.

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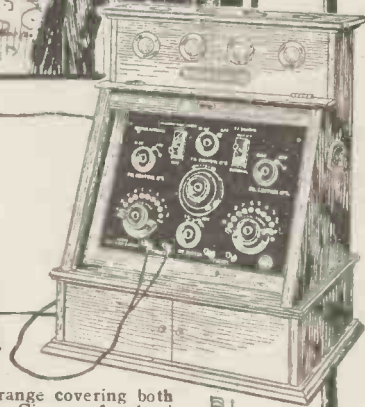


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The Wireless Magazine, February, 1925

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ANNOUNCEMENTS. "The Wireless Magazine," edited by Bernard E. Jones, is published about the 25th day of the month, and bears the date of the month following. Price One Shilling. Contributions, whether MSS., drawings or photographs, are invited; they must have a wireless interest, and if accompanied by stamped addressed envelopes will be promptly considered. Every contribution to "The Wireless Magazine" will be paid for. All communications should be addressed to: The Editor, "The Wireless Magazine," La Belle Sauvage, London, E.C.4.



The B.B.C. Its Policy and Ideals

An Exclusive Article
by Mr. J. C. W. REITH,
Managing Director, B.B.C.

WIRELESS technique, a literature, and a habit have all been introduced in the last two years. It follows that there have been radical adjustments of outlook in various phases of life. The influence of changed conditions is already felt in various quarters. Men are speculating on the extent to which wireless is to affect many of the old ordered circumstances and procedures of daily life. Wireless is recognised as of almost revolutionary power. It is good to be "in on the ground floor," to witness the early struggles, to foresee, and to watch the results unfold.

A Public Utility Service

The promotion of this new journal is another evidence of the hold which

wireless has taken on popular imagination, and since the Broadcasting Company have an onerous and responsible part to play in the general application of wireless, the Editor considered that a statement of the Company's policy and ideals, although outlined on many occasions elsewhere, would be appropriate here in the first number of a new publication of this kind. To THE WIRELESS MAGAZINE and its promoters the Broadcasting Company wish abundant and deserved success.

I do not think it is necessary to indicate how the B.B.C. was formed, or to refer to any of the difficulties of constitution which came upon it in its earliest days. There were reasons for everything, and however much one might have been inclined

to criticise, it was well to remember that anyone could be wise after the event, and that criticising the constitution of an assured successful venture is quite a different matter from laying the plans for a concern the future of which was altogether problematical.

Association of Manufacturers

The B.B.C. is to-day without any question a public utility service conducted in the public interest for public benefit. And yet it is at the same time, nominally some would say, an association of British wireless manufacturers. There are certainly grounds for speculation as to whether the two statements are compatible. It is not usual that they are. But in this case there is a much better

Our photograph shows the most prominent B.B.C. officials and the general staff at 2 L.O. In the centre (8) is Lord Gainford (Chairman of the B.B.C.), and on his right (7) is Mr. J. C. W. Reith (Managing Director). From left to right the other officials are: (1) Mr. H. Bishop (Asst. Chief Engineer); (2) Mr. L. Stanton Jeffries (Deputy Musical Director); (3) Mr. R. E. Jeffrey (Dramatic Producer); (4) Major A. Corbett-Smith;

(5) Mr. Percy Pitt (Musical Director); (6) Mr. G. V. Rice (Secretary); (9) Admiral Carpendale (Controller); (10) Mr. A. R. Burrows (Director of Programmes); (11) Capt. P. P. Eckersley (Chief Engineer); (12) Mr. J. C. Stobart (Director of Education); (13) Mr. D. Miller-Craig (Scottish Controller); (14) Mr. C. A. Lewis (Organiser of Programmes); (15) Mr. W. C. Smith (Press Representative); and (16) Mr. H. Parker.

criterion than that of appearances, or fears, or even precedents. Facts and results determine the issue.

In the early days it was open to argument that manufacturing, and not public interests were paramount—open to argument, note, for it was always "question and answer," as they say in the Courts. Gradually, however; regulations became simpler and simpler; one by one the objections and the difficulties of licensing were removed, till early this year there remained the one single stipulation that British parts alone should be used.

Establishing the Industry

Whether one is a free trader or not, one should recognise the importance of giving this new industry the chance to survive and become established, and, equally, one should appreciate the manifest unfairness of allowing other countries to reap the benefit of British enterprise and capital.

So to-day, although the B.B.C. is allowed to pay a maximum return of 7½ per cent. on the capital which manufacturers laid down to launch the broadcasting service, there is very little element of commercialism in it. Money must be secured somewhere to open any new business, and when the uncertainty even two years ago of the prospects of broadcasting is taken into account, there is little doubt that we were not only financed on favourable terms but we managed also to keep "commercialism" well in the background.

Some eager minds have sought to find evidence of B.B.C. policy being dictated by the trade. I think the search was given up long since. On the other hand, from the opposite direction there have been criticisms that the interests of the trade were not sufficiently regarded, and that too much has been done for the public without regard to the effect on the trade. This objection can at least be understood, whether it be valid or not. It arises from the expressed intention of the Company to make its programmes and the best in its programmes available to the greatest number of people, on the simplest and cheapest apparatus.

Relay and High-power Stations

Hence the establishment of relay stations and the high-power station, the development of simultaneous broadcasting, and so on. There was some disquietude about it, but soon the trade appreciated

that what was actually in the public interest could not fail eventually to be in their interest also; courage and imagination brought about a change in outlook, till to-day it is found that things move normally in this order, first, public interest, and then B.B.C. policy adapted to it, so long as it be true public interest and not a mistaken or fictitious representation of it. Trade policy is adjusted in harmony, for the basic truth is that the Company best serves the trade by best serving the country.

I believe, too, that by now most people understand why the conduct of broadcasting must be under unified control in a country so small geographically as this, where developments are so rapid, and where the influence of the new medium is so widespread. Early apprehensions of the evils of monopoly have been replaced by appreciation of the fact that what has been accomplished—and probably equally what has been avoided—could only have come about in this way. For it should be remembered that this monopoly is not of the kind imposed

for gain or power by a group or section. It is conceived solely in the public interest, and the only rigid standard in an otherwise flexible and accommodating policy is that nothing shall be done to outrage the canons of citizenship correctly interpreted.

Throughout the entire staff of the Broadcasting Company there is manifested an enthusiasm for the service and the determination that, oppositions or not, it shall be what it ought to be, and that no effort shall be spared, no road left unexplored, to bring increased efficiency, enhanced value and greater utility and satisfaction. The task is not an easy one. It is quite frankly one of exceptional difficulty.

A System of "Give and Take"

The operations and the conditions being what they are, it is inevitable that every variety of comment, critical and complimentary, is evoked as the individual taste is gratified or displeased. There must be "give and take" in this matter.

The common interest dictates that extremes cannot be catered for beyond a point. Moreover, in endeavouring to satisfy the majority, most of the time one has to be careful that one is not lowering this average taste instead of elevating it. But it is as foolish to go too fast as it is wrong to go too slow.

Broad Interpretation

In carrying out the responsibility there must be no narrowness in the interpretation of the word entertainment, resulting in a mockery of a service destined for such manifold and beneficial ends. In good music, in the dissemination of information on all branches of human activity, mental and physical, at the service of literature, the arts and sciences, and true religion; in bringing the country into touch with the town, the town with the country, and both with the world at large; in the general consolidating effect which is inherent to its operations—in all such ways as these we may see the influence unfold.

The full extent can only be realised if the Broadcasting Company are given credit for the possession of an adequate conception of their trust, of ideals and standards which they keep before them, and a relentless energy to keep ahead of expectation—all this on the one hand: and on the other the intelligent and sympathetic co-operation of the public.

A MESSAGE OF GOOD WILL

"To THE WIRELESS MAGAZINE and its promoters the Broadcasting Company wish abundant and deserved success," is Mr. J. C. W. Reith's message.

Coming as it does from the Managing Director of the British Broadcasting Company—the most efficient broadcasting service in the whole world—it means a great deal.

Point is given to it by an arrangement by which THE WIRELESS MAGAZINE will reserve a page each month so that the B.B.C. can tell readers what it has done, what it is doing, and what it hopes to accomplish in the future. For this page the Editor of THE WIRELESS MAGAZINE will not be responsible.

Next month the ever-popular Capt. P. P. Echersley, Chief Engineer of the B.B.C., will have some interesting things to tell readers of THE WIRELESS MAGAZINE.



The Growth of Broadcasting

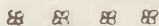
THE number of Broadcast licences issued by the Postmaster-General has now passed well beyond the million mark. Of these roughly 750,000 are in respect of crystal sets, the latter out-numbering valve receivers by about three to one. Taking the low average of two persons to each crystal set, we get at least one and a half million listeners in the crystal category. For valve reception (including loud-speaker sets) the average can be safely put at four per licence, or another million in all, so that, at the present time, the B.B.C. is catering for a regular audience of nearly three million people.

These figures speak for themselves as to the progress made in two short years by what certain pessimists were wont to refer to as "this wireless craze." There is certainly ample scope for further improvements in the present system, some already pressing for attention, whilst others are as yet only dimly visible in the



"This Wireless Craze."

future. But it may safely be taken for granted that a wireless broadcast service will in future be an institution in every civilized community.



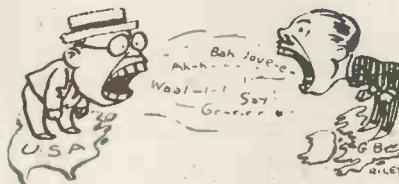
Atlantic Howls

Some of the difficulties of telephoning across the Atlantic are met by a bold scheme put forward by Professor Eccles and Mr. C. F. A. Wagstaffe. The scheme is to produce a series of vowel sounds and to make up a sort of language out of that.

It reminds one of the Glasgow woman buying woollen garments in

a shop. "Aw oo?" (all wool) she asked the shopman. The latter replied, "Aye, aw oo," and the woman next asked "Aw ae oo?" (all one wool) and received the reply, "Aye, aw ae oo." Not a single consonant was used.

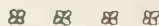
The manner of producing these vowel sounds is very simple. It is



"We can just howl across!"

well known that vowel sounds are made up of certain chords containing pure notes, mixed in a certain proportion. The pure notes can be produced by "howling" in a circuit of suitable capacity and inductance. Several circuits can be arranged to produce the necessary notes, and the notes can be combined by means of a keyboard.

This is perfectly feasible. If we cannot speak English across the Atlantic, we can just howl across!



5 X X in Northants

The Chelmsford high-power station is shortly to be transferred to a more central locality at Borough



"Popular or High-brow."

Hill near Daventry in Northamptonshire. With the removal will come a change in status. It will no longer rank as an experimental station and as an annexe of 2 L.O., but will

transmit a programme peculiarly its own, catering for a wider circle of listeners than any other broadcast centre in the country.

Many listeners hope that the new station will strike out on distinctive lines by adopting a more serious or "high-brow" level than the present standard. They look forward to the transmission of important Parliamentary debates as well as interesting contributions to current thought by recognized authorities. Others, however, favour a continuation of the present more or less "popular" programme. What line will the B.B.C. take on this point?



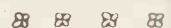
Catering for the Crystal "Merchant"

Incidentally the change of venue will bring in a much wider audience of crystal receivers than before. Any crystal set within a radius of 100 miles from Daventry should be able



"The Crystal Merchant."

to get a clear reception of the 1,600-metre transmissions provided it has a reasonably efficient aerial system. Many of the new audience will also be able to tune in a second programme from one or other of the existing B.B.C. stations, of which there are already eighteen scattered up and down the country. In fact it will soon be a difficult matter to find any locality that is out of crystal range.



"Square-law" Condensers

At the beginning of this winter's rush season for component parts the shortage of "square-law" variable

condensers was most appalling. Perhaps I was no more unfortunate than many others, but this shortage hit me pretty badly. I happened to be near the end of an interesting piece of experimental work, and I wanted to make up a new type of valve set. For this set I had everything by me except variable condensers.

As I had to buy new variable condensers, I thought I might just as well obtain the latest type—"square-law" with fine adjustments. Accordingly I paid a visit to the local dealer who has served me well for years—two to be exact. I paid a second visit to my local dealer to impress upon him my desire for variable condensers of the latest type. Try as he would, my dealer could not get a single condenser of the type I demanded. I wrote to two well known manufacturers of variable condensers. Both asked for my cheque per return, for which they guaranteed delivery in two or four weeks. They did not get my cheques.

I happened to be passing through Manchester, and in that city I called at three different wireless stores—at least, I think they were different stores. It was foggy that day in Manchester, and I might have gone in the same store by three different entrances. Anyhow, I could get nothing in Manchester but the old-fashioned variable condenser with semicircular plates.

On returning to London I went into a well-known wireless shop not so very far away from La Belle Sauvage, and, to my great joy, saw the very type of variable condenser I wanted exhibited in a glass case. Although I could not get the capacity I wanted, I was well satisfied to take the nearest. The condenser shown



"It was foggy in Manchester."

to me appeared, on examination, to be an excellent article. I was well pleased with it, and I asked for a second one exactly like the one shown to me.

I took the two condensers home, hurried over my mid-day meal, and got to work on my new panel. The first condenser I mounted on the panel was the one I had inspected. I was delighted with it. There was no difficulty whatever in mounting

We Announce Ourselves

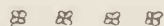
LABOURED apologies on the occasion of the first issue of a new magazine are out of date. And in our case we have no apologies to make. We have seen an opening for a new and different wireless publication—and have tried to fill it. That is all. It is for you—our friend the reader—to say whether you like the array of talent we present. Always the verdict is with you.

A glance through our pages will show that our appeal is to all people interested in wireless, whether they make sets or merely use them; whether they experiment or merely listen-in; whether they own a set or are merely generally interested in wireless. We have a strong and important constructional side, but THE WIRELESS MAGAZINE will be something more than a mere set of working instructions; it will be a real magazine of everything that is interesting to wireless people.

While we have made scores of arrangements with authors and illustrators—and there are great names among them—we are always open to consider promptly any ideas, MSS., drawings and photographs that may be submitted to us, and, indeed, we shall be very happy to have them. We shall always be glad to hear from all readers who have helpful comments to pass or propositions to make.

THE EDITOR.

it. The dial fitted the outer spindle a treat, and I found it an easy matter to screw the knob provided on to the inner spindle which turned the fine-adjustment plate.



The Second Condenser

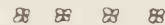
When I took out the second condenser from its wrapping I received a nasty shock. There was no hole through the dial supplied, no hole for the thin inner spindle which worked the fine adjustment. Not only that, but there was no tapped hole in this wretched dial for the screw which was to hold it firmly on the outer spindle. The screw was provided. Oh, yes, that was there all right.

I am afraid that I said unkind things to myself—I was working alone—about the young wireless salesman who had sold the two condensers to me. I should have gone back to town to talk to the young man had it not been Saturday, early closing day for that particular wireless store. I knew it was no good going to my local dealer for help,

so I set to work on that faulty dial. It took me a long time to drill a hole through the dial, I had to go so carefully. It took me even longer to make a tapped hole in it to take the screw which would secure the dial firmly to the outer spindle. But eventually I finished the job.

After tea I soldered up the new set. With great confidence I connected up the set and listened in. Not a sound. I looked the set over carefully and found that the second condenser was at fault. The thin spindle which worked the fine adjustment was making bad contact with the socket in which it rotated. I had to undo part of the soldering to get at the condenser in order to put it right.

What shall I say to that young wireless salesman when I next see him? I shall not be angry with him. Oh, dear me, no. I shall merely suggest to him that he would do a great service to a long-suffering wireless public if he moved to a position in which his responsibilities would resolve themselves into nothing more serious than checking the number of holes in a high-resistance tin whistle.



Background

Here is a little story which will illustrate the effect of a quiet "background" for the reception of a long-distance signal.

A schoolboy when asked to write a description of what he thought was the funniest thing he had heard at school that term wrote as follows:

"One day we were just going to start our dinner in the school dining-room. The master had rung the silence bell for grace. When the room was very quiet and the master



"We did laugh."

was just going to say grace the school cat me-owed outside in the corridor. It was very funny. I did laugh; so did all the others, and even the master smiled behind his hand."

In this case the silent background provided for the long-distance signal from the cat made all the difference in the world. Had those boys been talking volubly over their food, or if the "background" had been

otherwise noisy, the cat's effort would have been wasted.

The whole secret of success in the reception of American or other long-distance telephony lies in the "background" obtainable. Even in the reception of a comparatively near-by broadcasting station a noisy background may be a great nuisance. I know a locality where the reception of Birmingham, the nearest broadcasting station, is frequently spoilt by a background of hoarse spark telegraphy. The last time I was in that locality I listened-in to "Elijah," broadcast from 5 I T. At times the wonderful singing of the soloists was almost obliterated by background noises. Personally I would rather tune-in and listen to any broadcasting station other than Birmingham when in the locality referred to, and that because of the quieter background obtainable for the more distant stations.

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Ignorance

It is amazing how extraordinarily ignorant some people are of the elementary facts of wireless.

Last summer I advised a friend of mine who is a most capable business man with a salary running well into four figures to buy a certain type of valve broadcast receiver. This particular type of receiver has fixed coils inside it, and is only intended to cover the broadcast wavelengths 350-500 metres. My friend has just called to ask how it is that he is unable to get Chelmsford direct on his set. He tells me that London is very good *when relaying Chelmsford*.

"The other night," he went on to say, "I was particularly anxious to



"Ignorance."

hear Birmingham relayed from 5 X X. But try as I would, I was only able to hear the London orchestra from 5 X X. I rang up Savoy Hill and told them what had gone wrong with their transmissions. They did not seem in the least surprised."

No, I expect that Savoy Hill is pretty well used to that sort of thing, and I should imagine that they keep an operator at the telephone who holds first-class qualifications in the giving of the soft answer which turns away wrath.

Wireless at Cambridge

A Cambridge friend tells me that there is some very interesting wireless research work going on at Cambridge University, the home of many distinguished men of science. Perhaps the most interesting work being carried out at Cambridge just now is that dealing with the variation of signal strength as received from our broadcasting stations.

The strength of the telephony from a broadcasting station does not vary very much during the day, but immediately after sunset there are frequently great changes in this received strength of wireless telephony. These sunset fluctuations



"Research Work at Cambridge."

are the greatest for the most distant stations, as one would expect. So far, the Cambridge experimenters have merely confirmed for wireless telephony what has previously been observed for wireless telegraphy. The work, however, is only at its commencement, and we may confidently expect those in charge of wireless research work at Cambridge to uphold in this science the great reputation this old university possesses in every other branch.

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Attractive Advertisements

Have you noticed the extreme beauty of some of the advertisements which have appeared in our wireless periodicals this winter? I have been particularly struck with the way in which our wireless manufacturers and salesmen have called the artist to their aid in the preparation of their advertisements. If I had to select what I thought to be the most artistic wireless advertisements I think I should make my final choice from amongst the advertisements issued on behalf of our valve manufacturers.

Not only do our wireless advertisers provide us with drawings and designs of great beauty, but they give us extremely useful, practical, technical and historical information in their advertisements.

Being always on the look-out for something new in the way of component parts, I read through the advertisement pages of our wireless

papers most carefully, and I can assure you that I find those pages wonderfully interesting.

I also read most carefully the advertisement pages in some of the American wireless magazines, although I have never bought American wireless apparatus. The advertisement pages of the American wireless periodicals are sometimes more thrillingly interesting and tempting than the corresponding pages in our own wireless periodicals.

The British wireless advertiser has the pull over the American wireless advertiser as regards the artistry of wireless advertisements, but I am afraid we must give the palm to the American advertiser when it comes to a consideration of the "story" in the advertisement.

Isn't this extract from an American advertisement just lovely?

"Christmas—and the whole world is young again. The air is a-quiver, the ether crowded with Yule-tide music. The carols, the simple songs that carry us back to a rose-tinted childhood are beating—beating—beating, their soundless tattoos at our hearth stones. Radio is the magic key which translates it all into glorious sounds. Only a Scrooge, untouched by the Christmas spirit, will leave the key unturned. Of course for the utmost in radio enchantment, you will equip your set with tubes—"

But we must not spoil the beauty of the above passage by repeating the necessary reference to a certain type of valve.

Do you not agree in part, if not



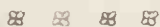
"Buying a Ribbon Aerial."

entirely, with the following extract from another American advertisement?

"You can't get distance with leaky insulators. Using leaky antenna insulators to collect radio energy is like using a sieve to collect rain-water. The ideal material for antenna insulators is —"

How could you possibly resist buying a ribbon aerial for indoor

use when sold under the attractive title of talking tape as is done in the American wireless magazines? I am sure if I lived on the other side of the Big Pond I should not only buy one of these dollar aeri-als but I should buy one for every room in the house, except the one where we keep the gramophone, the jackdaw, and the singing housemaid.



The Elimination of Atmospheric

The elimination of atmospheric is a problem of considerable practical importance.

Professor J. Zenneck is tackling it with the aid of the choke coil. He



"Atmospherics."

utilises the fact that atmospheric are highly damped oscillations, while the ordinary wireless receiver responds to undamped oscillations or continuous waves. To eliminate atmospheric we must devise a system which does not respond to damped oscillations at all. A coil with an iron core has a natural frequency which depends upon the strength or amplitude of the oscillations, and it should therefore be possible to introduce it in such a manner that atmospheric become inappreciable.

The iron core has the disadvantage of wasting a great deal of energy, but this can to a great extent be overcome by using reaction. A more serious objection is that the iron must be magnetically saturated before it will act in the desired manner.

But metallurgy now provides us with nickel alloys which are saturated in very feeble magnetic fields. Professor Zenneck, therefore, feels justified in continuing his investigations in this direction.



Wireless and the Schoolboy

The head master of a large grammar school in Yorkshire has issued a circular to the parents of his boys in which he points out that wireless is interfering with the work of an alarming number of the boys in his school. He states that wireless has been found to be responsible in many cases for scamped homework. He quotes a case in which a boy has had to do his homework in a room

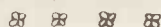
where a loud-speaker was in operation, and he quotes another case in which a boy made a pretence of doing his homework while wearing a pair of headphones.

I have had a most interesting chat with the head master of a similar school in a neighbouring county on the subject of wireless and the schoolboy, and I must say that there is most decidedly another side to the question. The views expressed by the Yorkshire head master are somewhat extreme.

The head master who was so kind as to give me his experience and views pointed out to me that wireless is not the only thing which causes a boy to neglect his homework. There has always been something which the lazy boy has been able to spend his time over in preference to homework. Such things as the scout movement, choir practices, music lessons and the cinema have all, in their day of popularity, made sad havoc of the schoolboys' homework and progress. The majority of schoolmasters view the question of wireless and the schoolboy with equanimity and the most progressive of them are determined to use wireless as an educative force.

It always seems a great pity to me when schoolmasters refuse to take advantage of some new progressive force such as wireless undoubtedly is in these days. Is it not all to the benefit of the schoolboy of to-day that he can hear, in his own classroom, the best of the world's music and the greatest of the world's living scientists? Is it not far better for a boy to read ravenously the pages of a wireless paper in preference to the pages of a juvenile magazine which attracts its readers by impossible stories of adventure and school life?

Wireless is a great force. Possibly it is the world's greatest force. Wireless is rapidly becoming an important profession. How many thousands of our schoolboys will be earning a living from wireless in a few years' time? Our schoolmasters will be wise to recognise wireless as it really is and to take every advantage it offers both to them and to their pupils.



Ebonzola

Sometimes I am compelled by force of circumstances to purchase wireless odds and ends from a dealer who keeps a general store in a country

district. Not long ago I found it necessary to visit this dealer in order to obtain a small piece of ebonite with which to make a low-loss tuning-coil former. Rather to my surprise, the dealer took out a sheet of ebonite two feet square from which to cut the small amount I required.

While the dealer was laboriously cutting my small piece of ebonite with a dull hack-saw from the large sheet I asked him why he stocked such large sheets in preference to the smaller ready-cut standard panel sizes. I pointed out to him how much labour he would save by having the ready-cut panels. He did not seem at all impressed with my idea, but maintained that he got better ebonite by buying it in large sheets.



"A High-power Smell."

"How can you tell good ebonite?" I asked.

"By the smell when I am cutting it," he replied. "The worse it smells when you cut it," he went on, "the better the ebonite."

A few days after this information had been imparted to me I called again on my country dealer. There was a somewhat high-power smell in the shop.

"You seem to be cutting a good piece of ebonite this morning," I remarked to my dealer as he appeared from behind a large pile of groceries built up on the counter in the manner in which small children love to build bricks.

"It's not ebonite this morning, sir," was the cheery reply. "I've just been cutting a ripe gorgonzola. It's exactly like the ebonite though, you know, sir. The worse it smells, the better it is, and the easier it is to sell it."

Really it does not seem quite nice to me to mix groceries with wireless in this manner. HALYARD.



AN old railway-man was invited to a wireless party one evening when a special programme was to be transmitted.

"What time does it begin?" he asked.

"The transmission starts at 7.30," the host replied.

"Yes, yes," he insisted, "but what time will it get here?"



The Author with his Apparatus.

VISIBLE WIRELESS

A Special Article by the well-known inventor
Dr. E. E. FOURNIER D'ALBE.

WIRELESS telephony appeals mainly to the ear. Speech and music are put into the microphone at the transmitting station, and, after some transmutations, enter the ear in the form of sound waves.

But there is no real reason why the joys of wireless reception should not be experienced through more than one of our senses. "Wireless" can be made to appeal to the eye as well as to the ear.

A Simple Experiment

A ready means of "making wireless visible" is the following: Remove the horn from a loud-speaker and place the receiver in such a position that the sound goes vertically upwards. For the horn substitute a funnel about 2 in. across at its widest (Fig. 1). Stretch a rubber film over the opening, turning the edges down, and making a tight joint with rubber solution or some other adhesive substance.

When the rubber is stuck on



Fig. 2.—Compound Resonator.

firmly, and the funnel is mounted with the rubber film in a horizontal position, pour some mercury on to the film until the drop of mercury has a diameter of about half an inch.

Now turn on the "wireless" in the usual manner. The sound will not be as loud as usual, being damped by the rubber and the mercury. But the sound thus lost

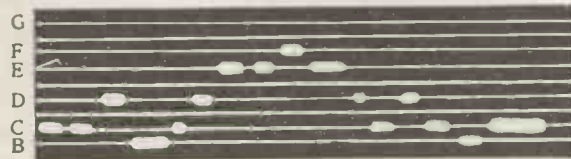


Fig. 3.—Tonogram of the National Anthem.

is used to produce a visible effect. On observing the surface of the mercury in a good light, it will be noticed that its surface is crimping itself into a succession of ever-changing patterns, many of them of great beauty. These patterns vary with every note of the music and every spoken word. The variation is instantaneous.

The effect can be shown on a screen. An electric flashlight enclosed in a cardboard tube throws its beam on the surface of the mercury, and the reflected light is received on a ground-glass screen. On looking at this screen from the other side the patterns are seen on a larger scale.

With an intense light from a small source, such as a Pointolite, the patterns can be shown on a screen before a large audience.

The pitch of the note producing the pattern can be gauged by the wavelength of the pattern on the mercury.

Another Method

But this is, after all, only a rough-and-ready method of recording

itches of notes. A better way is the following:—A hollow vessel, such as a small box of wood or metal, a cartridge, or a medicine bottle, is provided with an opening of such size that on blowing across the opening a certain note sounds. The pitch of the note varies with the volume of the hollow vessel and the diameter of the opening.

To put it more exactly, the pitch, or the number of vibrations per second, varies as the fourth root of the diameter of the opening, and inversely as the square root of the cubical capacity of the vessel.

By varying the size of the vessel and by varying the size of the opening we can tune the vessel to any note we please. Such tuned vessels were used by Helmholtz in his investigations of musical sounds, and are often called Helmholtz resonators.

When a sound wave of the proper wavelength reaches such a resonator, a strong eddy current of air is set up in the mouth of the vessel. This eddy is due to the fact that the

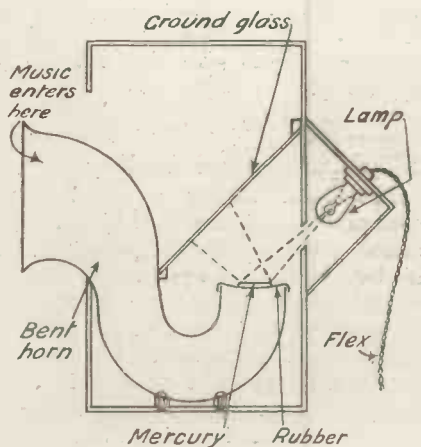


Fig. 1.—Mercury Tonoscope.

sound wave just has time to travel from the entrance to the walls of the vessel and back to the entrance by the time the "trough" of the wave reaches the entrance.

A steep gradient of pressure is thus produced, which leads to a strong surging of air in and out of the entrance.

This surging can be made evident in various ways. Dr. W. S. Tucker, of the Signals Experimental Station, Woolwich, mounts a grid of fine wires across the entrance. The wires are heated by a current, and their resistance is affected by the surging of the air, so that the current passing through them has different values when the note sounds and when it does not.

The author's method is the following: A "reed" of thin glass or mica is clamped at one end, while the other end is provided with a tiny flat mirror (Fig. 2). The reed is fixed so that it projects about half-way across the opening of the resonator, nearly closing it up.

By altering the length of the reed it can be tuned to the same note as the vessel, and when this is carefully done the result is surprising, and very beautiful. When the note is sounded in any part of the room there is an instantaneous response of the resonator. The response ceases as soon as the note stops, as would be expected.

A Selective Resonator

The response consists of a vibration of the reed, which may amount to as much as five degrees. This vibration is best shown by using a small source of light, such as a gas-filled motor lamp. If no such lamp is available, an ordinary gas-filled lamp with a plain (not frosted) bulb may be used. Light from the lamp is made to fall on the reed, and is reflected by the tiny mirror on to a screen of ground glass. Observing this screen from the other side, a small line or patch of light is seen on the screen, which will roughly indicate the shape of the source of light (being, in fact, a "pinhole" image of that source). When the

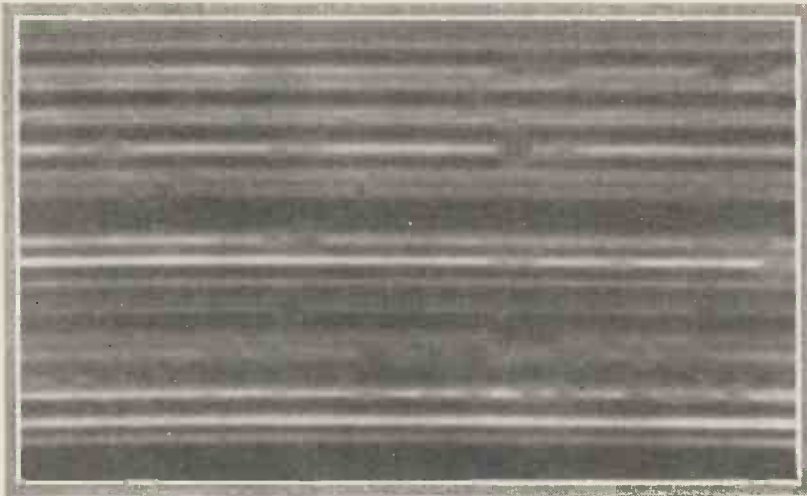


Tonogram of Note F.

each octave, and then let each note be represented by a spot of light on the screen.

On playing a piece of music, each note of which it consists will sound its own "spot," and the music will be "made visible."

Such an effect was first shown by the author at the last Annual Conversazione of the Royal Society, the music being produced by a fine gramophone (supplied for the purpose by the Gramophone Company). Since then the method has been applied



Tonogram of Music by the Savoy Bands.

for the recording of wireless music and speech. In order to do this the spots of light are located one above the other in a vertical line, so that the pitch of the notes rises from bottom to top of the line of spots.

A photograph of the recording of wireless music and speech. In order to do this the spots of light are located one above the other in a vertical line, so that the pitch of the notes rises from bottom to top of the line of spots. A photographic film is moved by clockwork in a direction at right angles to the line of spots, and their responses are thus instantaneously recorded. The result is a photograph embodying a faithful record of the music in a sort of natural staff notation, from which, with some practice, the music can be played (see Fig. 3).

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The response of the resonators is quick enough to record even demisemiquavers, so that even a complicated piece of music can be recorded in a permanent form.

The audible reproduction of such (Continued in third column of next page)



Tonogram of Note B flat.

An immediate result is that a number of resonators may be used, all resounding to different notes, in steps of a semitone. In other words, we can have a "chromatic scale" of resonators, twelve of these resonators to

"WHAT is wrong with the wireless societies?" is a question that has already been asked in more than one interested quarter, and the question will, in the near future, become more acute.

Apparently a species of dry rot has infected wireless societies throughout the country, if one may judge from the scanty reports now furnished to the wireless press, and the scarcely veiled threats of resignation from disgruntled members.

There must be a reason for the apathy displayed by the average member and his reluctance to attend meetings, even when an interesting lecture is to be given or a paper of more than usual interest is due for discussion. Can it be that the vast army of wireless enthusiasts are losing their enthusiasm, and are now quite content simply to listen to a broadcasting station? If this be so, the wireless experimenter, save a few exceptions, will soon become as extinct as the dodo, which is a summation to be deplored from practically every view-point. The amateur in wireless, more so perhaps than in other sciences or scientific recreations, in the past has been largely responsible for the undoubted and phenomenal progress which has taken place not only in the reception, but also in the transmission, of wireless signals, and it would indeed be a retrograde step if he were now to stop in his endeavour.

Who is to Blame?

After calm and dispassionate reflection, one is forced to the conclusion that the society rather than the amateur is at fault, because the amateur very rarely loses interest in a hobby of which he has once become enamoured. This deduction is based on an experience of many years in fields widely apart, and though it is, of course, too early to include, specifically, the wireless amateur, from the overwhelming interest which the study of wireless evokes in the true experimenter, it is fair and almost safe to assume that he, too, will not be different in this respect from his brother amateur in other fields. In fact, one may predict almost with assured confidence that the wireless amateur

What is Wrong with the Wireless Societies?

will become keener and more enthusiastic the further he progresses. If we assume this proposition to be correct, and it would require much evidence—which from the nature of the case must at the moment be non-existent—to disprove it, it naturally follows that the inability of the wireless society to attract the wireless amateurs to membership and, what is of more importance, to its meetings is the fault of the society, and is due either to the selection of its executive officers, to the policy pursued by them, to the venue of the meetings, to the amount of the subscription, or to the choice of unsuitable speakers and topics for discussion.

All who have been connected in any way with a wireless society

must have felt the difficulty which undoubtedly exists of having to make the meetings attractive, not only to the veriest tyros, but also to those of some knowledge and experience. We know a similar

difficulty exists in the arrangement of broadcast programmes; that is to say, a certain section of listeners requires only classical or "high-brow" music, whereas another section desires only popular or "low-brow" music, and this difficulty is overcome more or less successfully by alternating the "high-brow" items with "low-brow" items either in the same or separate transmissions.

General Interest

It should be possible, following these lines, for wireless societies so to arrange their programmes as to interest all their members, but unfortunately this does not appear to be the general practice—hence the gradual falling off in attendance of members and the consequent diminished interest in the societies.

Unless speedy steps are taken not only to awaken renewed interest and enthusiasm but to retain it—and what better way to do this than by ventilating the matter in the columns of THE WIRELESS MAGAZINE?—it can be only a matter of a short time before the majority of wireless societies will cease to exist.

All truly interested in the advancement of wireless knowledge must deplore such a contingency.

OIDAR.

[Would you care to send us your views on wireless societies? If so, see page 112.—ED.]

YOUR QUESTIONS ANSWERED

At some time or other you are certain to come up against some difficulty in wireless that you cannot solve unaided.

Instead of worrying yourself with knotty problems, let the Technical Staff of THE WIRELESS MAGAZINE answer your questions for you.

Replies of general interest will be published each month, but a post reply will be sent without delay to every question if the following conditions are observed.

Ask one question at a time; write it on one side of the paper only; attach to it the coupon on page 115; and send it with a stamped addressed reply envelope to: The Editor, THE WIRELESS MAGAZINE, La Belle Sauvage, London, E.C.4.

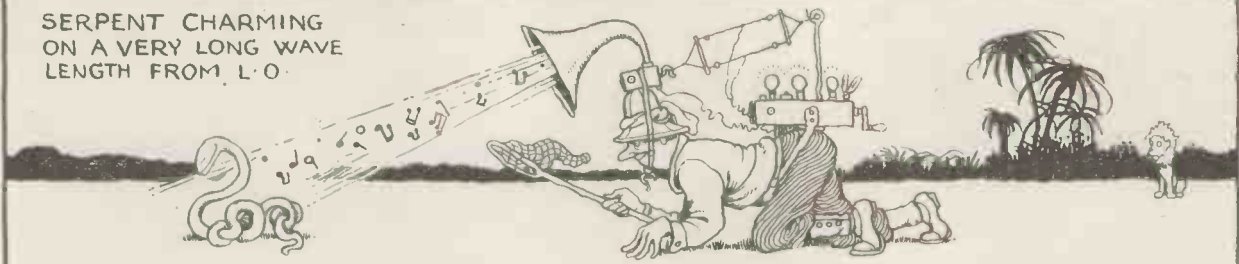
"VISIBLE WIRELESS"

(Continued from preceding page)

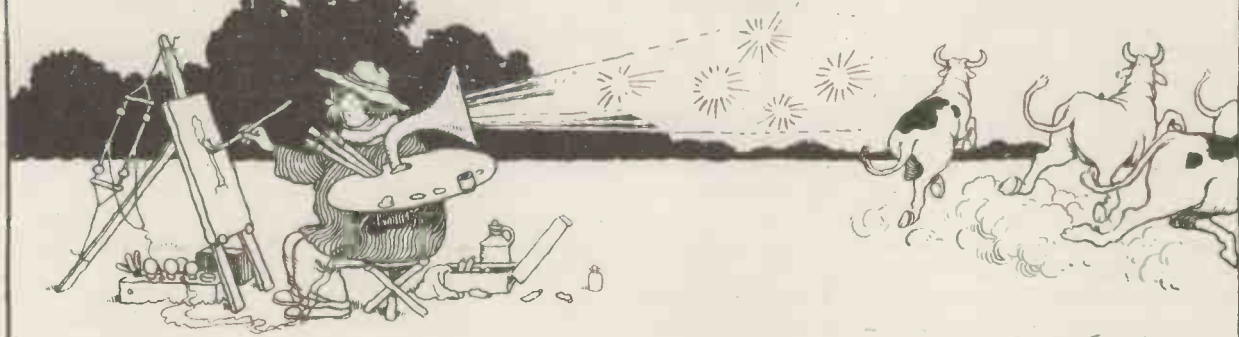
a photograph as music can be accomplished on the well-known principle of the optophone, which converts intermittent light into sounds of various pitches. For this purpose the record is modified so that only the central portion of each spot is recorded. We then get a "negative" effect, which is, however, just what is wanted for the purpose, as the original negative can be used for reproduction.

MR. HEATH ROBINSON'S "USES" FOR WIRELESS!

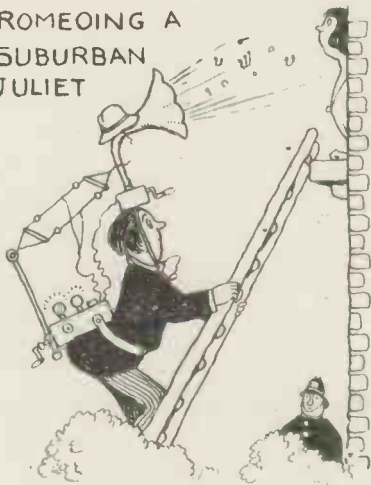
SERPENT CHARMING
ON A VERY LONG WAVE
LENGTH FROM L.O.



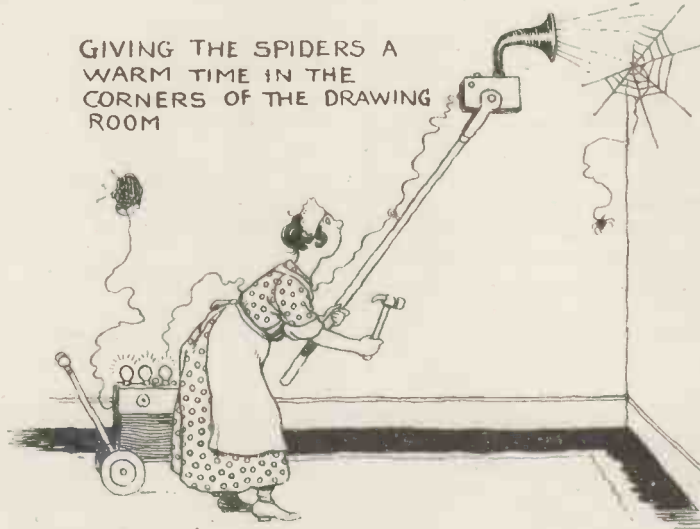
AN INTELLIGENT USE OF ATMOSPHERICS



ROMEOING A
SUBURBAN
JULIET



GIVING THE SPIDERS A
WARM TIME IN THE
CORNERS OF THE DRAWING
ROOM



W
HEATH
ROBINSON



DASTARDLY
MISUSE OF A
GREAT
DISCOVERY

As Good a Set as Money Can Buy

Building a Straight-Circuit Four-Valve Set

Designed by the
Technical Staff of
"The Wireless Magazine"



IN the set about to be described a simple straight four-valve circuit is employed (H.F., det, and 2 L.F.), a switch being incorporated to cut out the last stage of low-frequency amplification. It is our opinion that the great majority of amateurs can get more out of a circuit of this type than any "super" or "reflex" at present existing.

Two Tuning Controls

Tuning is quite simple, being accomplished by rotating the two condenser dials on the front of the panel. In order that all wavelengths may be received plug-in coils are used, one of which (the anode coil L_3) is enclosed in the cabinet. The aerial and reaction coils, L_1 and L_2 , are mounted in a two-coil holder fixed on the side of the cabinet.

The top and bottom terminals on the left of the panel are for aerial and earth connections respectively,

In designing this straight-circuit four-valve set it has been the object of the Technical Staff of THE WIRELESS MAGAZINE to obtain the most efficient set possible with standard high-class components; a set that is, in fact, "As Good as Money Can Buy."

With the help of the full-size coloured plate of the wiring and the blueprint drilling template for the panel (both presented free with this magazine) even the beginner can construct this receiver without difficulty.

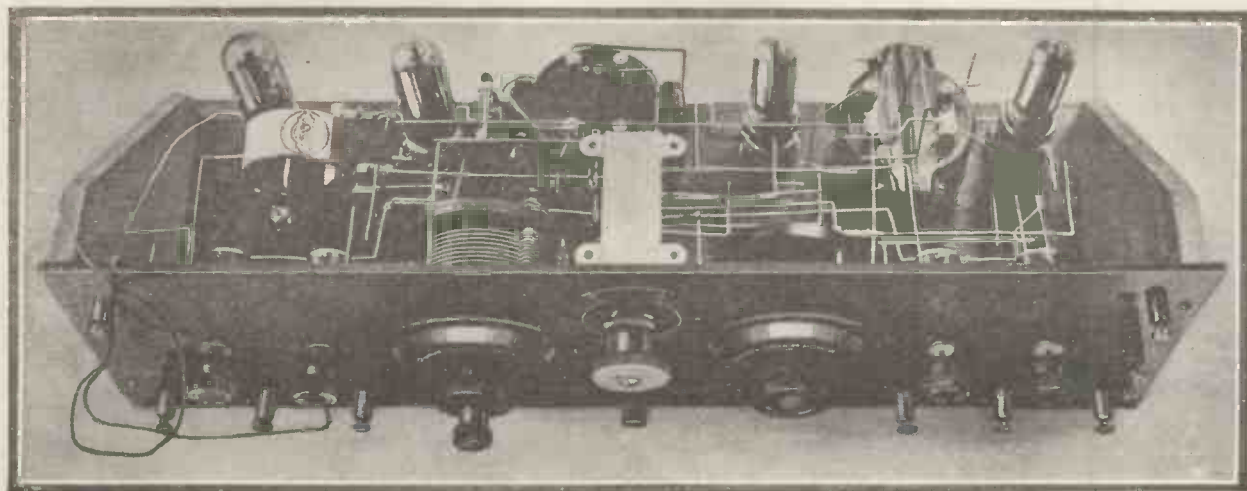
and the four terminals on the extreme right of the panel are for the high-tension and low-tension bat-

teries. On the foot of the panel are four terminals, two on the left, and two on the right, for phone connections. The phone terminals are connected in parallel.

Separate Filament Resistances

Each valve is provided with separate filament control by means of the rheostats R_1 , R_2 , R_3 and R_4 (Fig. 1). The filament current to all four valves is switched on or off by the lever-switch in the centre of the panel. When this switch is in the "down" position the first three valves are in operation. In the "up" position an additional stage of low-frequency amplification is brought into action. In the central position the filament current-supply to all the valves is cut off.

The aerial circuit includes the inductance L_1 with the variable con-



Top View of the Panel Mounted on Baseboard.

"As Good a Set as Money Can Buy"

With this issue of "The Wireless Magazine" is presented FREE a Coloured Plate (Price 2/- net), giving the full-size Wiring Diagram for this set and also a Blueprint Drilling Template (Price 1/6 net) for the Ebonite Panel.

denser C_1 in parallel. The variable condenser C_1 has a fine-adjustment attachment, and will be found very useful in cases of critical tuning.

The anode circuit of the first valve includes the inductance L_3 and the variable condenser C_2 in parallel. Both the inductances L_1 and L_3 are plug-in Igranic honeycomb coils. For British broadcast wavelengths, L_1 and L_3 are Nos. 50 and 75 respectively. For higher wavelengths larger coils must be used.

Reaction is obtained by inductively coupling the inductance L_2 (Igranic coil No. 75), to the aerial coil L_1 . The aerial coil is plugged into the fixed arm of the two-coil holder and the reaction coil L_2 is plugged into the movable arm. Any tendency on the part of the receiver to self-oscillation may be checked by loosening the coupling between L_1 and L_2 , and also by the potentiometer mounted on the top centre of the panel.

Low-frequency Circuit

After the high-frequency impulses have been rectified by the detector valve V_2 , they pass through the primary winding of the transformer T_1 , inducing currents at a higher voltage in the secondary winding. These magnified currents are applied to the grid of the first low-frequency amplifying valve V_3 and, if necessary, may be further amplified by the transformer T_2 and the valve V_4 .

In order that readers may be able to construct a facsimile of the original receiver a complete list of the makes

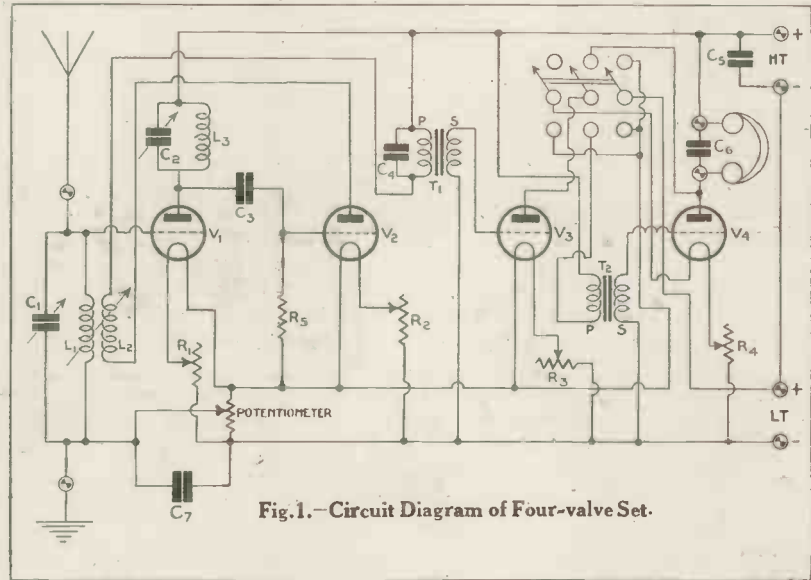


Fig. 1.—Circuit Diagram of Four-valve Set.

of components required, including valves and batteries, is given. Other components, of course, may be used, provided that they are of a reliable make and of similar values to those stated.

1 mahoganite Radion panel, 21 in. by 7 in. by $\frac{3}{16}$ in. thick (American Hard Rubber Co.).

1 two-coil holder (Polar).

4 Lissenstats Major.

2 variable condensers, .0005 with fine adjustment, and .00025 microfarad (Dubilier).

1 three-pole change-over switch for panel mounting (Burndept).

2 low-frequency transformers having ratios of 2.7 to 1 and 4 to 1 (Marconiphone).

5 fixed condensers, .05, .006, .002, .002 and .0003 microfarad (Dubilier).

1 single coil holder for baseboard mounting (Ediswan).

4 Marconi-Osram valves, type DE3

1 potentiometer (Marconiphone).

4 valve holders for baseboard mounting (Athol Engineering Co., Ltd.).

1 fixed grid leak, 1.5 megohms (Dubilier).

10 terminals (Refty).

1 60-volt H.T. battery with wander plugs (Ediswan).

1 4-volt accumulator (Exide).

16 No. 28 gauge square tinned copper wire.

1 oak cabinet.

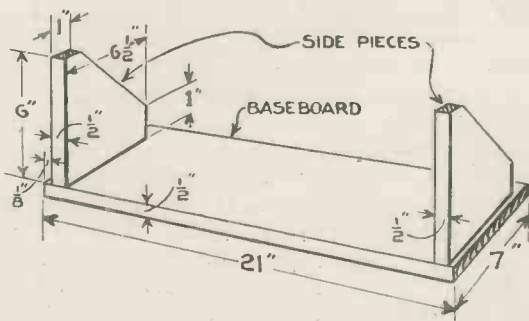


Fig. 3.

Fig. 2.—Details of the Cabinet.

Fig. 3.—Details of the Baseboard which, with the Panel fixed in place, slides into the Cabinet.

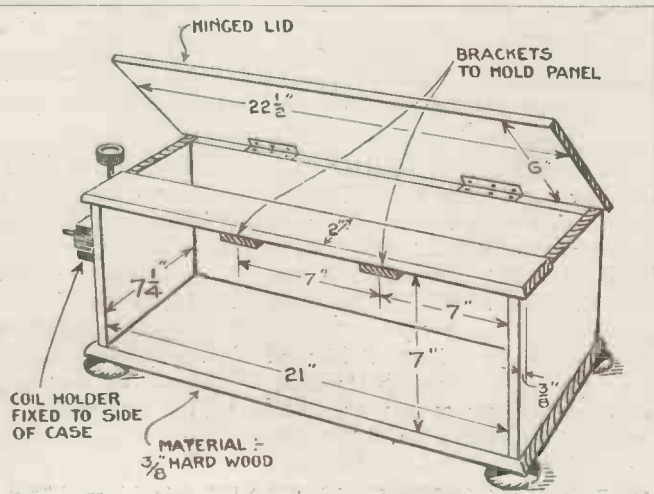


Fig. 2

"AS GOOD A SET AS MONEY CAN BUY" —(continued)

- 1 yd. lighting flex.
- 1 doz. ½-in. round headed No. 4 brass plated wood screws for fixing panel.
- ½ doz. 1-in. No. 4 countersunk steel screws for fixing baseboard to side pieces.
- 2 doz. ⅜-in. No. 4 countersunk brass screws for fixing components to baseboard.

The Cabinet

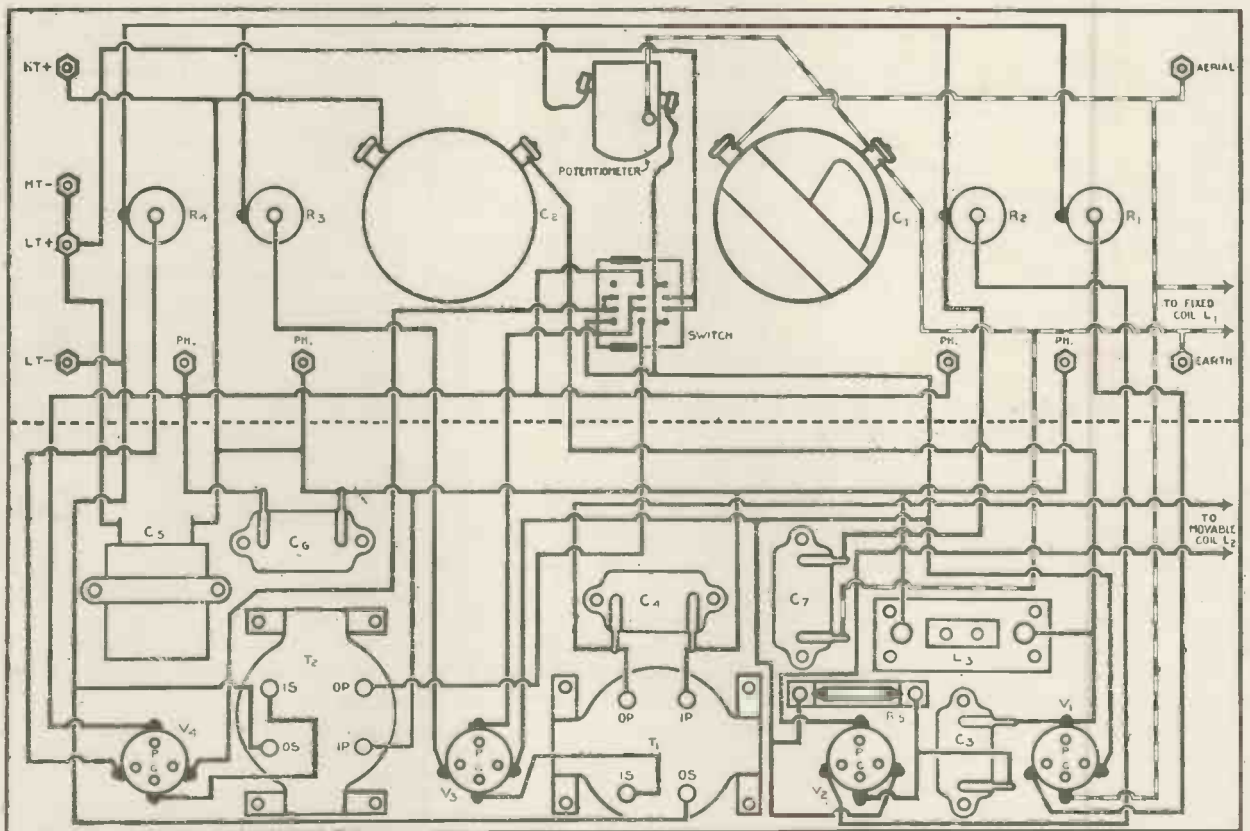
For those who desire to construct their own cabinet and baseboard,

drilling through with the size of drill indicated at the side of each hole. When drilling lay the panel on a piece of flat board to eliminate any tendency of the ebonite to break away when the drill is nearly through. The back of the panel with the instruments mounted is shown on the top half of the coloured plate.

With this particular make of panel it is quite unnecessary to remove the fine polish, and care should be taken to avoid scratching the surface, and so spoiling its appearance.

and panel separate from each other. A suitable grid-leak clip may be made as shown in Fig. 4.

In order to make the wiring diagram of the receiver as simple as possible the valve filament lighting circuit is shown in red. This should be wired up first. The aerial circuit is shown in broken blue lines, while the remainder of the wiring is shown in full blue lines. Before the panel is attached to the baseboard connect up all the rheostats to the negative L.T. terminal and to one side of the



This is a reproduction of the Coloured Wiring Plan given free with this Issue of THE WIRELESS MAGAZINE.

sketches are given in Figs. 2 and 3. In our case the actual cabinet was made by the Caxton Wood Turning Co., Market Harborough. A very good appearance is obtained by employing a fumed oak cabinet in conjunction with a Radion "mahogany-anite" panel.

A full-size blue-print of the layout of the panel is given with this issue of THE WIRELESS MAGAZINE. This blue-print may be used as a template for drilling the panel by laying it flat on the panel, clamping it at each corner so that it cannot move, and

Having mounted the proper components on the panel, our attention is turned to the baseboard. The complete and full-size arrangement of the apparatus on the baseboard is shown on the coloured plate below the black dotted line. The apparatus should be screwed down exactly in the positions indicated. For convenience in mounting and wiring up, the two side pieces and the panel should not be fixed to the baseboard until all the apparatus is screwed down, and as much of the wiring done as possible with the baseboard

potentiometer. The aerial terminal can be connected to one terminal of the .0005 microfarad variable condenser and the other condenser terminal to the earth terminal.

The positive L.T. and the negative H.T. terminals can be connected to one another and also to the left-hand central tags of the switch. Positive H.T. can be joined to the left-hand terminal of each pair of phone terminals. The remaining two phone terminals can be joined together. The other side and the moving arm of the potentiometer should be

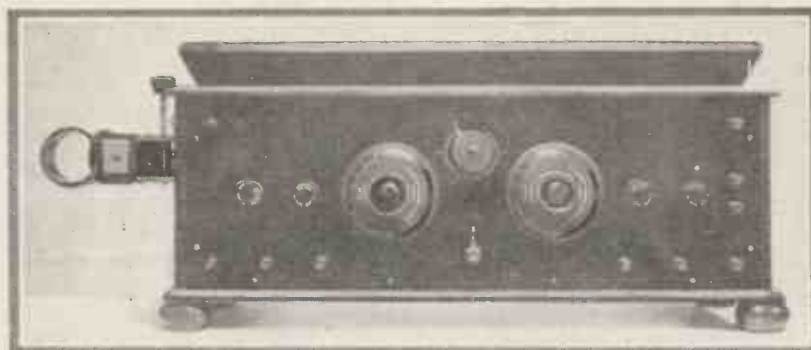
Building a Straight-circuit Four-valve Receiver

joined to earth and positive L.T. respectively. The panel should now be screwed to the baseboard and side pieces, and the remainder of the wiring finished according to the diagram.

For connections to the coil holder on the side of the cabinet short pieces of flex should be used, passing through four small holes drilled in the side of the cabinet.

Checking the Wiring

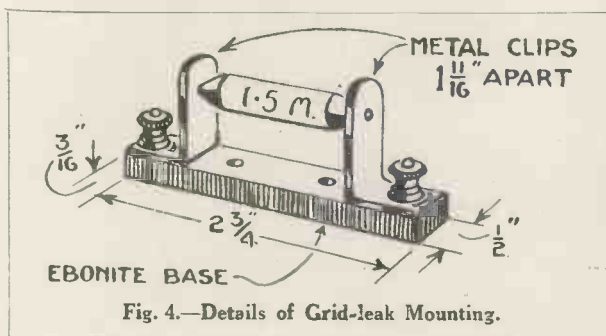
Before joining the batteries to the receiver it is advisable thoroughly to check the whole of the wiring to make sure that all the connections are correct, and that no short-circuits exist. The penalty of a small mistake may result in a ruined battery or a burnt-out valve. Having made certain that everything appears satis-



Front View of the Set.

received move the reaction coil nearer to the aerial coil, thereby considerably strengthening the signals. Care should be taken not to couple the two coils too closely together, otherwise reception will be distorted and considerable interference will be

Make all the connections firm and clean, using great care that no flux or solder spreads to any of the instruments. All the grid and plate wires should be well spaced from one another in order to avoid unpleasant howling effects. A glance at the



Should any reader experience difficulty in constructing this four-valve set we should look upon it as our business to help him as much as we could. Questions should be addressed to the Editor, "The Wireless Magazine," La Belle Sauvage, E.C.4, and should be accompanied by a stamped addressed reply envelope and coupon, for which, see p. 115.

factory, connect the filament lighting battery to the proper terminals, plug in the four valves in their sockets and rotate the rheostats in the "maximum" direction. If the filament circuit is correct each filament will light up when the switch is in the "up" position.

The panel and baseboard may now be slid into the cabinet and the aerial, earth and phones connected up. When joining up the H.T. battery insert a small flash-lamp bulb in series with the positive lead in order to safeguard your valves.

How to Use the Set

Plug a No. 50 coil in the fixed arm of the coil holder, a No. 75 in the moving arm, and a No. 75 in the coil holder inside the cabinet. Switch over to "3 valves" and search for signals by slowly rotating the two variable condensers c_1 and c_2 , keeping the reaction coil well away from the aerial coil. When signals are

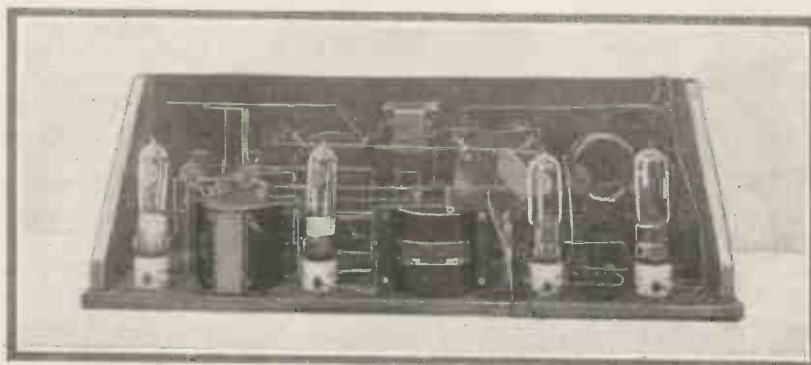
experienced by other receivers in the vicinity. If no reaction is obtained, reverse the connections to the reaction coil.

General Comments

Too much stress cannot be laid on the importance of following the wiring diagram exactly. It is difficult to determine the exact cause of any trouble after wiring up.

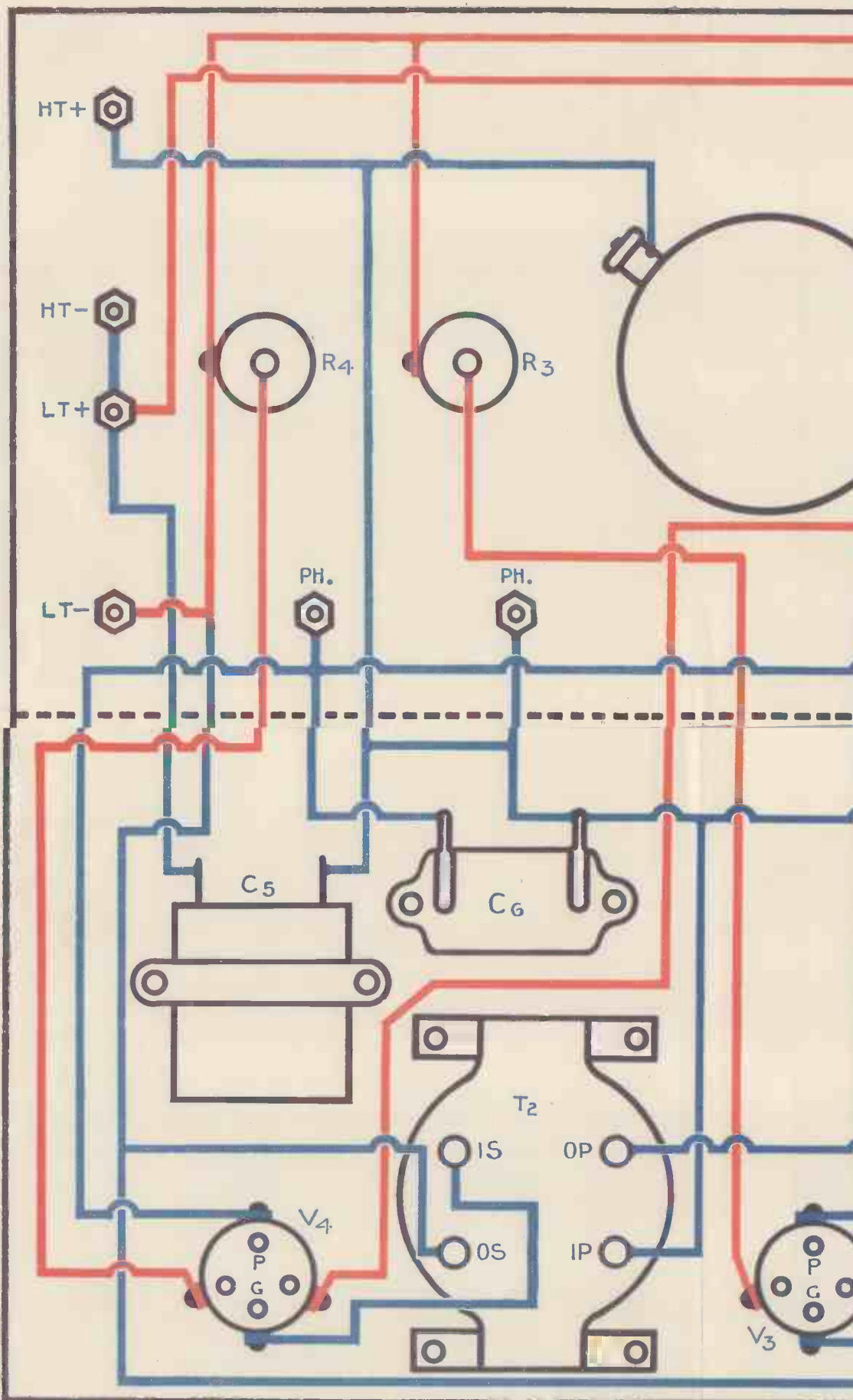
photographs will show how compact and neat is the set and how the wiring is carried out.

Once the filament resistances have been correctly adjusted, there is no need to turn them off when the set is left. All that need be done is to place the switch in the "off," or centre, position. A point that will be appreciated is the mounting of the valves inside the cabinet.



Disposition of the Components.

FULL-SIZE WIRING DIAGRAM OF FOUR

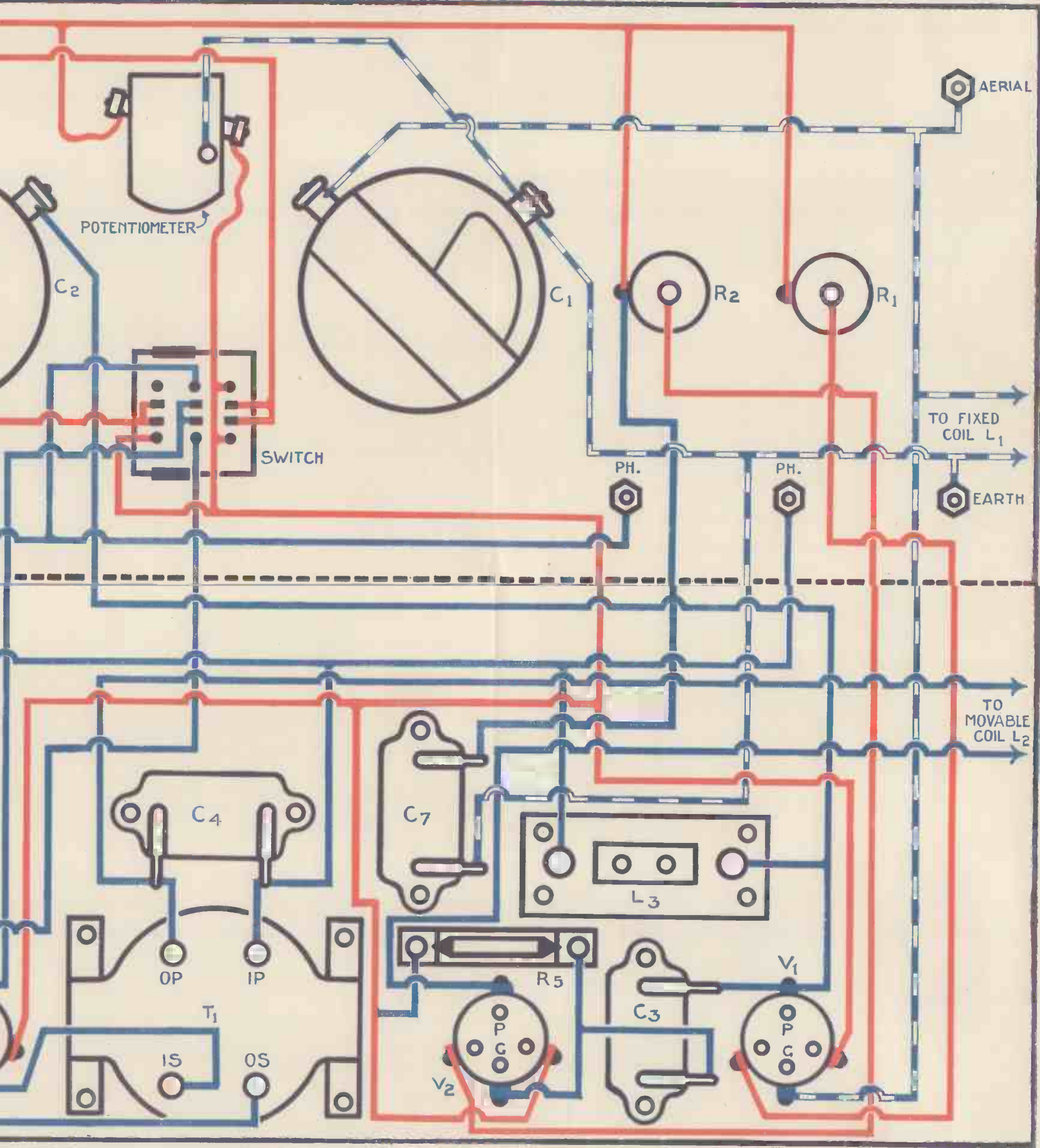


KEY TO WIRING DIAGRAM : Red

LETTER REFERENCES : L1, aerial tuning coil ; L2, reaction coil ; L3, tuned-anode coil ; C1, aerial condenser (.0005 mfd.) ; C6, phone condenser (.002 mfd.) ; C7, potentiometer shunt condenser (.006 mfd.) ; G, grid connection ; H.T., high connection ; PH., phones ; R1, R2, R3, R4, filament rheostats ; R5, grid leak (1.5 megohms) ; T1, low ratio

TR-VALVE SET—"AS GOOD A SET AS MONEY CAN BUY."

2/- net



Red Wiring, filament-lighting circuit ; Blue-and-white Wiring, aerial circuit ; Blue Wiring, other circuits.

C1, variable tuning condenser (0.0002 mfd.) with vernier ; C2, anode tuning condenser (.0002 mfd.) ; C3, grid condenser (.0003 mfd.) ; C4, transformer primary condenser (.002 mfd.) ; C5, high-tension battery condenser (1 mfd.) ; L.T., low-tension ; OP and OS, outside primary and secondary connections of transformer ; P, plate ; T1, transformer (2.7-1) ; T2, 4-1 transformer ; V1, high-frequency valve ; V2, detector valve ; V3, low-frequency valve ; V4, low-frequency valve ; +, positive ; -, negative.

"FLUFF WILLINGTON, of BERYSTED, DORKING"

by Edgar Wallace

Illustrated
by
Charles
Crombie

HURT and silent, Marjorie Clewin offered no explanation, made no excuses. Hurt he knew her to be, but how deeply wounded, he could not guess then. And it all started over the silliest discussion, as to whether or not they should go to Madrid for their summer holidays. It was hot in July, he granted. She might have said as much instead of her "Madrid! How absurd!"

Being young, and having within him the seeds of imperiousness, which success brings in its train, and which so often has the appearance of strength, and is the proof of weakness, he went up in the air. He wished he hadn't.

"Perhaps," he asked sarcastically, "you would like to come back to the ranch."

He knew she hated the ranch, the terrible loneliness which only the Canadian woman experiences, the loneliness which fills the asylums and mental hospitals, and breaks young women and leaves them old. It was a beautiful ranch, with mile upon mile of corn-land and the hoary heads of the Rockies to the West, but the tracks were twenty miles away at the nearest point, and Hambleton which called itself a township, was little more than three grain elevators and a street of shacks; exactly fifty, and there was nothing to do in the world, except to ride and watch the corn and the hawks and an eagle or two that came down from the mountains in the colder weather, and when she said "No" this time her eyes were filled with tears. He thought it was temper. She was something of a fool, too, but young married people are not to be judged by ordinary standards.

And the end of it was that he went to the ranch alone, the last place in the world to which he intended going in the summer of the year. It was a wrench to leave Berysted and the park, and the wide fields, horrible to miss Ascot and Epsom, for he raced a few horses, but strangely enough, the real poi-

nancy of the parting was not leaving his English home and the life he had learned to love, not even leaving Marjorie (their farewells were formal to a point of stiffness), but leaving



"You got a wireless up at your ranch, Mr. Clewin?"

Fluff Willington, his wife's one sister.

Fluff was nine, and had her name from the mop of goldy hair that defied the united efforts of nurse and maid to bring to order. And John Clewin and Fluff were the dearest of friends, exchanged confidences, listened in together at the Children's Hour, and shared her ecstasy when an unknown uncle addressed her by name and congratulated her upon attaining the dignity of eight. They rode together to the meets with Marjorie. Marjorie was sweet and daring and adorable in those days. She had not then developed her curious petulances, the long and painful silences, and her habit of brooding.

John was down at Hambleton one day and called in at the Universal

Canadian Electrical Depot to buy stores, and saw a familiar object standing on a pedestal by itself, the identical instrument he had bought for Fluff. It gave him a little pang to see it, though Fluff was a regular correspondent and sent him long and exciting stories of her adventures, but was so irritatingly silent about Marjorie, that he guessed that some sort of censorship prevailed, and that her fiat had gone forth that no mention of her was to appear. As to Marjorie she had not written at all in the six months he had been in Canada, except to acknowledge with unnecessary curt-ness the expensive present he had bought for her in Winnipeg.

"You got a wireless up at your ranch, Mr. Clewin?" asked the store-keeper.

"No, I haven't," said John briefly. "Orter have a set," said the man, "specially now they are relaying from England."

"Do you get receptions from England?" asked John incredulously.

"Sure we do, said the enthusiastic amateur, "and that," he pointed to the instrument, "brings Winnipeg on to your porch. I've had St. Paul, too, and Philadelphia. Why, I've got receptions from Sacramento on one valve! I guess the waves kinder travel along the Rockies."

John thought for a moment. "Send it up," he said.

He had an aerial fixed the next day and spent three pleasant nights in experimental work. On the fourth night the Winnipeg announcer had an important statement to make.

"At eight o'clock to-morrow morning, which is five o'clock in the afternoon in England, we are hoping to get a daylight relay from London, England——"

He expatiated on the difficulties of daylight reception, dwelt learnedly and enthusiastically upon the improvements which the new beam projector had brought to wireless telegraphy, and excused in advance, as all careful announcers will, the possible failure of the transmission.

John listened, more or less bored, and tuned in to St. Paul, without any great satisfaction to himself. He tried Vancouver and got nothing, and went out into the ether and connected himself with a station where somebody was singing a Spanish song and singing it vily!

The mail came by car from Hambleton just before he went to bed. There was a letter from Fluff. He went eagerly through the remainder.

"Not a line from Marjorie!" he thought savagely. "Out of sight, out of mind."

He, who had begun his voluntary exile with the feeling that he had acted badly, had waited with his trunks packed for the word that would call him back to England full of penitence and self-reproach, was beginning to believe in a grievance which had not (and he was the first to admit this) existed when the C.P.R. steamer passed down the Mersey.

She must hate him, or she would never treat him so, and they had been so happy that first year of their married life. It had been ideal,

would be ideal still, if she had been gracious enough to overcome her repugnance to sweltering Madrid. Why he had wanted to go to Madrid at all at that unseasonable time, when all the court was at Santander, he had long since forgotten, but there was a good and sufficient reason—he remembered now, there was to be a produce race in which he had entered a horse.

Marjorie did not understand him. It was an illusion largely shared by other young men and by other young wives.

He was at his breakfast the next morning and, for him, in an unpleasant mood. The waffles were burnt, the eggs were not done, the ham was salt, nothing was right for him. He got up from the table, pulled his watch from his belt-pocket and stood undecided as to whether he should drive into Hambleton and rustle a bridge party, or whether—eight o'clock, he remembered the announcer and was sufficiently curious to tune in and put on his phones.

There was no sound, except the whir of the carrier wave, and then he saw Fluff's letter unopened on the side-board, and reaching out his hand for it, tore open the envelope.

As he read the first words he uttered an exclamation of dismay.

"Darling Johnnie," it began, "fancy, I shall be nine on the 12th June——"

The 12th—to-day! And he had sent her no present, no word. A cable might remedy that, but he would not be in time. The day was fading in England, and

even the most expeditious of despatches could not get a wire through to Berysted that night. He had half-risen when a voice said in his ear:

"Stand by, please, for London, England."

A curious jangle and confusion of sound, and then out of the mist came a pleasant voice, and he recognised at once that they had broken in upon the Children's Hour.

"Is that Mary Eilen Jones, of Tooting? Glad to hear from you, Mary. It is lovely having such a nice present from your mother. Many happy returns! Harry Franklin of Watford. Hallo, Harry! Congratulations on your birthday, old boy. You must be getting a big boy now. I hope you will enjoy your party. Fluff Willington, of Berysted, Dorking. Hallo, Fluff. Many happy returns! I am glad to hear that you are now a proud aunt, and have a little baby nephew. I hope your sister is well——"

John Clewin leapt up from the table, flung aside the headphones, and yelled for his car. The train that came through Hambleton at 10.30 connected with the C.P.R. mail steamer.

John Clewin leapt up from the table and flung aside the headphones



Which Set Shall I Buy?

(An Article for People who know nothing of Wireless)

THOSE of us who are interested in broadcasting as a means of entertainment rather than as a scientific hobby usually prefer to buy our sets ready made. But the fact that we are "listeners" and not "constructors" means, in most cases, that we do not know very much of the technical side of the subject, and when we want to buy sets of our own, we really do not know which to choose to meet our particular needs

Asking for Advice

We may ask friends with technical knowledge for advice. This, however, is only likely to "make confusion worse confounded," as they talk so glibly of tuned anodes, high- and low-frequency, grid bias, oscillation, reflexing and numerous other matters (there is no stopping them once they have started!), on which we know less than we do of ancient Egyptian hieroglyphics.

We know as well as our more technical friends, of course, that the greater the distance over which we wish to receive broadcasting, the more powerful must be our receiver. And the power of a receiver varies in direct proportion to the number of valves that it contains, so next we had better consider for a moment the ranges of various kinds of valve sets.

Range Factors

Range is by no means an inflexible quantity, inasmuch as so many factors affect it. The lie of the land, the height and length of the aerial wires, and the quality of the earth connection all make a difference, and whether the difference is good or bad depends upon individual circumstances.

As a rough guide, we can decide that a crystal set will not be effective farther than fifteen or twenty miles away from a broadcasting station, when used with a normal aerial, that is, not exceeding 100 ft. in length. Of course with the Chelmsford high-power station this range is greatly extended, and may be as great as 100 miles.

It should be remembered that the first cost of a crystal set is practically

the last, and the upkeep of a fair-sized valve set may approach 1s. 6d. a week.

A single valve without what is called "reaction" is little better than a crystal, and we may put its range down as about twenty to thirty miles.

When we come to valve sets with that mysterious "reaction" (which is just a simple way of amplifying signals), it is still more difficult to define range. We may say that the safe range of a single detector valve with reaction is 100 miles, but many listeners are able to hear broadcasting from stations as far distant as 1,000 miles with one valve.

To get range (as distinct from volume), we add "high-frequency" amplifiers; a detector valve with one stage of high-frequency amplification will have a safe range of 500 miles, but in skilled hands the range of such a set is almost unlimited. Quite a large number of people are able to hear American broadcasting with such two-valve sets.

Although a single detector valve, with or without a high-frequency

amplifier, may have great range, it may not give very loud signals from even the nearest station. In this case we add a "low-frequency" amplifier (remember that "high-frequency" means "range," and that "low-frequency" means "volume" rather than "range"). To work a loud-speaker we shall, in most cases, have to use two low-frequency, or volume, amplifiers, no matter how many high-frequency or range amplifying valves we have in front.

With One Valve

From all this it is clear that almost wherever we may be located in Great Britain, a single detector valve with reaction will enable us to hear some broadcasting station or other. A detector valve with one high-frequency amplifier (that is, a two-valve set), should enable us to hear all the British broadcasting stations, at least, and, if we are lucky, a good many Continental transmissions as well. To receive these stations on a loud-speaker we shall have to add one or two low-frequency amplifiers (making it a three- or four-valver).

For ordinary headphone reception a three-valve set including one high-frequency amplifier, a detector valve (every valve set must have a detector), and a low-frequency amplifier is perhaps the most satisfactory.

We shall not have delved far into the mysteries of broadcast reception, though, before we hear quite a lot about "reflex" sets. In these, one valve is usually made to amplify at high-frequency and also at low-frequency at the same time. The result is therefore the saving of a valve, but as one valve is doing double its ordinary work, quality is likely to suffer. But there are now on the market a number of "reflex" sets made by well-known manufacturers to which this objection does not apply.

Catalogues

Having obtained a rough idea of whether we want a set with high- or low-frequency amplifiers, let us glance through the catalogues of a

(Continued on page 112)

IF YOU WANT TO BUY A SET

and know nothing of wireless, let us help you to choose it. With our special experience we are able to advise as to which are the best types of sets for use in any particular circumstances.

Tell us how much, roughly, you wish to spend, where you are situated, what stations you wish to receive (whether only the local station or others as well), whether you intend to use headphones or a loud-speaker, and we will advise you as to the general lines of sets that will answer your purpose.

Send your enquiry with coupon (p. 115) and stamped addressed envelope to

"Buyers' Advice Bureau,"

THE WIRELESS MAGAZINE,
La Belle Sauvage, E.C.A.

Short-wave Practicalities

A GREAT deal of interest is centred at the moment on short-wave transmission and reception, and there is no possible doubt that the future of wireless as a dependable, commercial proposition is bound up with the question of research into wavelengths as low even as a fraction of a metre.

Only two of the many advantages enjoyed by workers on the short-wave band, namely comparative freedom from severe static interference and a greatly increased range with a given power, are sufficient to prove this.

Work to be Done

But even on the present short waves there is an immense amount of work to be done; much of which will eventually be carried out by amateurs.

There is one idea which seems to have gained almost universal credence, and which I wish to squash at the outset of this article, even though it requires some space to do so.

In practically every treatise dealing with work on the short-wave band I find it stated more or less definitely that it is an impossibility to use high-frequency amplification on ranges below, approximately, a hundred metres.

This is absolutely fallacious. It is amazing, to me, that it should have been so widely believed in both this country and the States—though recent experiments have dispelled it to some extent in the latter country.

Let us consider, for a moment, the chief characteristic of work on short wavelengths. It is this characteristic which is responsible for most of the advantages to be gained by working below one hundred metres—a much higher frequency.

Difficulty of Control

Currents of a very high frequency have one disadvantage in that they are more difficult to control than lower ones; more difficult to keep in a given path and within given limits. One might say that they are so slippery that they wriggle through corners and escape where their more respectable brethren would be unable to do so.

This peculiarity, which is the source of all the articles denying the possibility of using high-frequency amplification on these wavelengths, can be controlled with proper care in the layout of a receiver and the insulation of the lead-in and aerial circuits.

And against this one disadvantage we may place a hundred advantages.

First of all there is the lowering of the internal resistance of the receiver which is due to these extreme high frequencies. This causes two distinct benefits.

Range and Selectivity

First of all it increases the sensitivity of the instrument and therefore the range, secondly it adds immensely to the selectivity by making the curve of audibility rise much more sharply to an apex.

In this series of articles it has been the author's object to give as many practical hints as possible on short-wave reception.

That he is able to write authoritatively on his subject nobody will question, for Mr. E. C. Davies, of Highgate, has been notably successful in long-distance short-wave reception.

There is little need to go deeply into the technical reasons for this; any worker on wavelengths below a hundred metres will have established the accuracy of it for himself.

Advantages

There seems to be little doubt that the chief advantages in short-wave work come from the receiving end, hence the necessity for concentration upon this new line of action.

Another great advantage of short-wave work is the comparative immunity from static. This is not at the moment capable of definite explanation but it probably lies in a fundamental difference in the frequencies of static discharges and the transmitted signal.

Static discharges have, apparently, no frequency proper, but they do appear to have a wavelength and to fall within a fairly wide band.

Generally speaking the higher we go the more musical the note of static. This suggests that static possesses a very high wavelength.

Eliminating Static

Now one of the chief troubles that face the optimist who hopes to eliminate static is the fact that these interfering currents are not brought in along with the transmitted signals but superimpose themselves upon the actual wanted wave in such a manner that they cannot be filtered out of it.

High-frequency currents do appear to possess the ability to travel through the atmosphere without absorbing, to any great degree, exterior electrical discharges. This may be due to the fact that their frequencies may differ enormously from those of the static currents.

If one adopts the old method of throwing a stone into a pond and watching the resultant ripples one may come to some interesting conclusions.

Drop two stones, simultaneously, from either side of the pond and watch the first ripples travelling towards each other. When they meet what happens? They are baffled for a moment, unless one is greatly more powerful than the other, and then they continue their passage, having passed over or through their opponents.

But the ripple that has conquered its momentary indecision has changed. It has lost strength and altered in characteristic. Practical demonstration will show my meaning.

Now endeavour to create ripples on one side of the pool that are very close together—by which I mean ripples which follow each other at a very short distance.

Allow these ripples to radiate outwards and meet other ripples which are much more widely spaced.

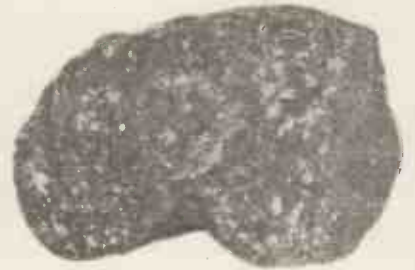
When Wave Meets Wave

In this case you will find that the period of indecision when the two conflicting waves meet is much less than in the former case and that the quicker ripples, representing the higher-frequency currents, pass through their opponents with scarcely

(Continued on page 86)

NOBODY KNOWS HOW THE CRYSTAL WORKS

or Scarcely What it Does!



THE discovery that a crystal could be used to detect wireless signals was made in the year 1906, two years after the invention of the Fleming valve. Carborundum and the Perikon combination came first in order, followed by a long succession of different varieties down to the present popular hertzite or synthetic galena type.

Many Theories

In spite of its widespread use the precise mechanism of crystal rectification is still more or less of a mystery. Many theories have been advanced, some more elaborate than others, but no one theory has so far been generally accepted as satisfactory.

The usual explanation given to the beginner is a bare statement to the effect that such crystals possess the property of unidirectional conductivity. In other words only one half of each incoming wave can pass through the crystal to the phones, the other half-wave being wiped out owing to the infinite resistance of the crystal in that direction.

Pronounced Bends

This statement is supported by means of characteristic curves showing the relation between different static voltages applied in both directions, and the direct currents that pass through the crystal as a result of the applied pressures. It is found that such curves are asymmetric, i.e. they have pronounced bends or kinks at the particular points at which rectification occurs.

This explanation is true enough so far as it goes, but in reality it begs

the whole question. It affords no insight into the actual reason why the crystal behaves in the observed manner. Neither does it give any satisfactory clue to the actual mechanism involved. Finally the conclusions drawn from a series of measurements utilising static voltages and direct currents are not necessarily valid when applied to high-frequency currents such as are used for broadcasting.

One attempt to probe more deeply into what happens at the precise point of rectification may be summarised as follows.

Ohmic Heat

In the case of broadcast reception approximately 100,000 pulses of high-frequency current are applied in both directions across the point of contact in the first tenth of a second. Suppose that both half-waves are passed during this period of time. An appreciable amount of ohmic heat will be generated, and this, so to speak, initiates or "sets" the crystal into the proper condition for rectifying. The crystal being a poor conductor and a bad radiator of heat, as compared with the metal catwhisker, will become hotter than the latter during this first fraction of a second.

We then have two substances in contact with each other at different temperatures. This sets up a thermoelectric effect (thermo couple voltage) in one definite direction, which may be considered as opposing, say, the positive half-wave of incoming energy, whilst at the same time it assists the passage of the negative half-wave. This is only an approximation to the

full theory, but it may help to form a mental picture of the reason why one half-wave is suppressed and not the other.

Molecular Action

Another explanation is based upon the theory that the actual process of rectification takes place across a very thin film on the surface of the crystal, amounting to a total thickness of only a few layers of molecules. Under these circumstances the sulfate molecules are swung bodily around under the electrostatic stress set up by the received voltages. In other words, these molecules are polarised or orientated (similarly to the molecules of a magnet) in such a way that the passage of electrons forming an electric current is facilitated in one direction and obstructed in the reverse direction.

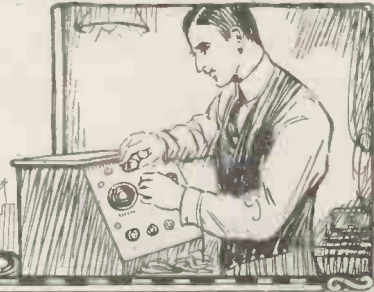
It has also been suggested that a minute arc is formed across the precise point of contact between crystal and metal, accompanied by a one-way electron discharge or stream, somewhat similar to that which takes place between the filament and plate inside a thermionic valve.

Involved Process

Simple though the crystal may be in outward appearance, it is certain that the processes involved in its action as a rectifier of wireless waves are complicated and obscure beyond what is commonly imagined. Possibly the discovery of the new "oscillating" property of certain crystals may help to elucidate the mystery. On the other hand it may deepen it still further. We can only wait and see.

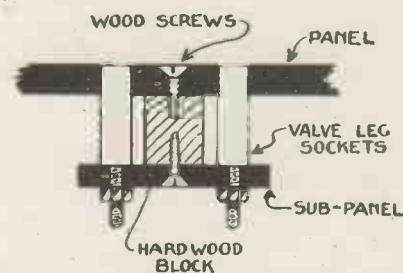
B. A. R.

Gadgets, Hints and Tips



Flush-mounted Sockets

FLUSH-MOUNTED sockets, whether of coils or valves, enhance the appearance of almost any set. A simple method of thus fixing



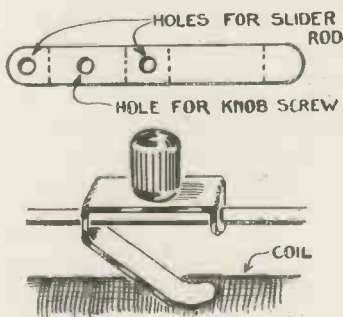
Flush-mounted Socket.

sockets of the usual types is shown by the diagram.

The sockets are rigidly mounted on a sub-panel, which is held close to the main panel by screws in a hardwood block. C. H. L.

Sliding Contact

A SIMPLE, efficient and easily made tuning coil slider can be made in the following manner. A piece of $\frac{1}{2}$ in. brass strip about 4 in. long is shaped and three holes punched in it at one end, as shown. It is then bent into shape along the dotted



Simple Sliding Contact.

lines until the side elevation appears as shown above.

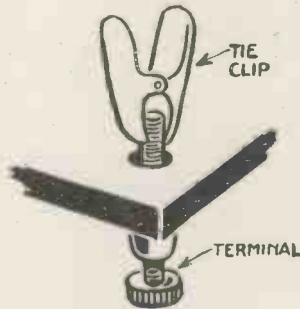
A knob of ebonite or other insulating material (some types of terminals have composition knobs

that are suitable for this purpose) should be attached in the middle hole. The brass rod over the inductance tube is pushed through the other two holes and the finished article will appear as shown.

It will be found that the springiness of the brass strip makes a very efficient contact. F. C. S.

Temporary Terminals

WHILST making rearrangements in an experimental set one is frequently annoyed by terminals dropping out of the panel as soon as the nuts are unscrewed. This difficulty can readily be overcome by obtaining



Temporary Terminal.

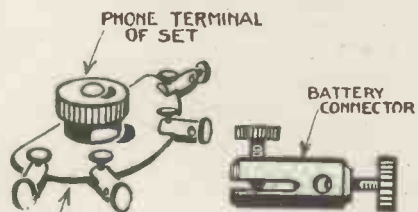
about a dozen tie-clips of the tweezers pattern.

When the panel is inverted any terminal which shows a tendency to drop through when its nut is removed can be secured with a clip until it is wanted again. This is much less tedious than replacing the nut. S. D.

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and Tips. We
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thing we Publish.

Adding Phones

WHEN the set will stand it, many listeners want to use several pairs of phones. The illustration shows a novel form of multi-phone terminal.



METAL PLATE

Method of Adding Phones.

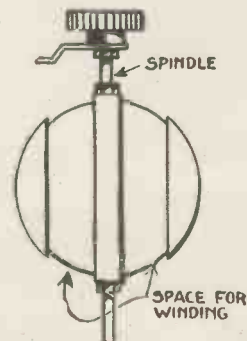
A metal plate of any convenient shape is fixed in each phone terminal of the set and slotted battery connectors of the type shown are clamped to the plate.

The phone tag is then pushed into the hole in the connector and held by means of the set-screw. W.

Variometer Rotor

SERVICEABLE variometer rotors can be made from old tennis balls. The method of preparing them is to cut away sufficient of the outer covering to accommodate the winding.

The wire can be fastened by



Arrangement of Rotor.

means of pins pushed through the rubber. Fixing the spindle presents little difficulty. W. A. W.

(More Gadgets on page 78)

JOKING APART

WIRELESS AS A HOME WRECKER

BY

F. W. THOMAS

Illustrated by Will Owen



NOW I shouldn't like you to run away with the idea that I am one of those stick-in-the-mud, last-ditcher, what-was-good-enough-for-granddad-is-good-enough-for-me sort of fellows. Far from it. Miles and miles from it.

Though I say it, there are few men so progressive, so receptive of new ideas and new inventions, so keen to be smack-up-to-date and in the swim as deep as the earlobes.

Was not my family one of the first to discard antimacassars and plush photo frames? Did I not introduce into our neighbourhood the earliest phonograph that went "Krrrrkkrrrrkkrrrrkkrrrk Edison BELL record krrrkrrrk," causing such a sensation that our cook got the wind-up and left without her box, in which we found two pounds of demerara, one spoon, and three

silk stockings, she having a sister who had lost a leg through refusing to come off the Tower Bridge when it was going up, in consequence of which her left limb got caught between the bascules and fell on to a steamer bound for Antwerp with a cargo of wireless muzzles for wireless wire-haired terriers? . . . Very well, then!

And yet, there are times when I have my doubts about wireless. Of course, I know that it has already proved of immense benefit to many people, including the folk who squirt the juice into our accumulators at so much per squirt. It has helped many a bed-ridden invalid to forget his castor oil and other troubles. It has saved life at sea, and it has saved life on land.

For instance, only last week it saved young Pottifer's life, because I knocked at his door and told him

that if he didn't shove a sock or something down his loud-speaker's throat I'd kill him. And he did, so I didn't.

But apart from these things, can we really and truly say that wireless is going to add to the ultimate happiness of the human race? I doubt it.

Let us take the case of poor old Tuppencequick. . . . Curious name, isn't it? Yes. He was called Pennyquick before the war, you know, but since everything else went up a hundred per cent. he's changed it to Tuppencequick.

Now, Tuppencequick is, or was, a poet. Like those two johnnies Sheets and Kelly. He used to write the little things they put in the corners of papers to fill up; those thing-mejigs with a capital letter at the front of every line and ragged edges. Like—

There was a young man of the Rhine

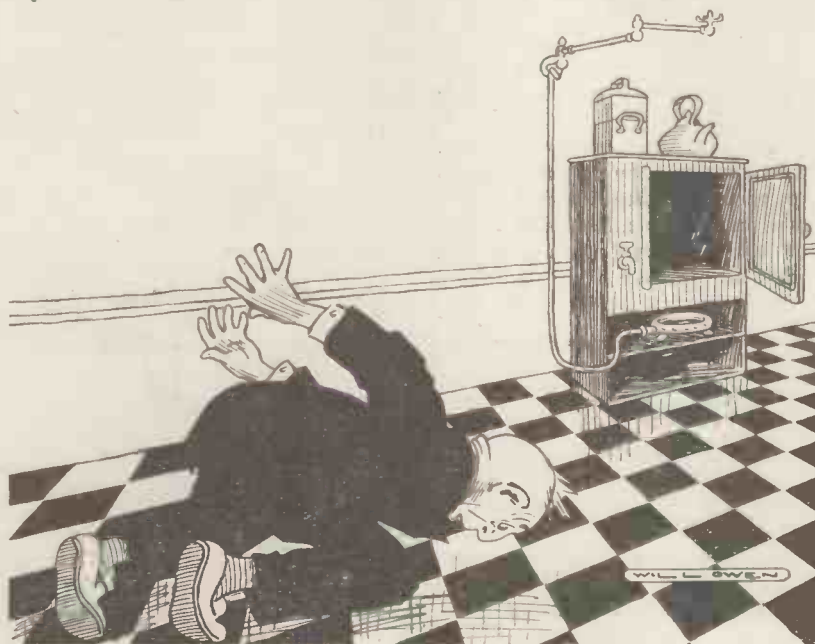
Who swallowed a heterodyne.

Yes, he used to compose that sort of stuff all out of his own head, and people paid him good money for it. Which proves once again that Barnum was right.

Now, in addition to being a poet, Tuppencequick was also a wireless fan. Not one of those poor amateur coots who is content to sit down with the phones and wallow in the wild and wobblesome waves, but an earnest student of the art, a tireless seeker after new worlds to conquer.

You'd go into his place and find him sitting wrapped in a cocoon of flex, like a chrysalis, with one finger held warningly in the air. And "Sssssssh!" he'd say, "I believe I've got London."

Over the dining-room fireplace was an illuminated motto which said:



Beating his brow upon the linoleum, he crawled back into the gas oven.

WATT IS OHM WITHOUT ANOTHER ?

Well, a few weeks ago Tuppencequick started work on a poem about wireless, a sort of Radiode. He was going to astonish the world, to be the Laureate of the Loud-Speaker, the Tennyson of the two-valve set.

But, alas! when I went in to see him three days later I found the floor littered with paper and lumps of hair; while poor Tuppencequick had his head in the gas oven. Fortunately there wasn't any shilling in the slot, so the thermis had all died of starvation.

I lugged him out, broke glass, pulled handle, and waited for engine, and when he had come round, or part of the way round, he sat up and recited to me the following :

Of when at eventide I don the phones
 And listen spellbound to some far-off speech,
 Or something extra choice of Mendelssohn's,
 Mixed with some oscillating blighter's screech,
 Mayhap I grind my teeth and have bad dreams,
 Sometimes a nasty spasm of hysterics,
 To think how Tooting's ether always seems
 To be bung full of blinking atmospheric.
 O volts and amperes, terminals and grids!
 O variometers, rheostats as well!
 O vacuums and potentiolospids,
 O calibrate, O ammeter, O ell.

I immediately performed the proper ceremonies for the resuscitation of the apparently crazy, loosened his collar, turned out his pockets, and so forth; and after an hour or two a faint smile passed over his so-called features and, opening his off-side eye, he murmured, "Why did the oxide? Because the acid." From which I gathered that he was too far gone to be of any further use in the world.

But presently Tuppencequick sat up, and tearing out the remainder of his hair, which was never a very long one, he began to rave and storm and curse wireless from Alpha to Beersheba by all the gods that ever were.

"Tell me," he screamed, "what rhymes to anode? What can a poet do with filament, electron, thorium,

vernier, or parallel? Parallel, carallel, darallel, whatthehell, fal-lal-lal. It can't be done, and I am ruined." And beating his brow upon the linoleum, he crawled back into the gas oven.

There the cook found him two days later, but though a careful watch was kept he managed to elude his keepers, and last Monday as ever was he blew out his brains.

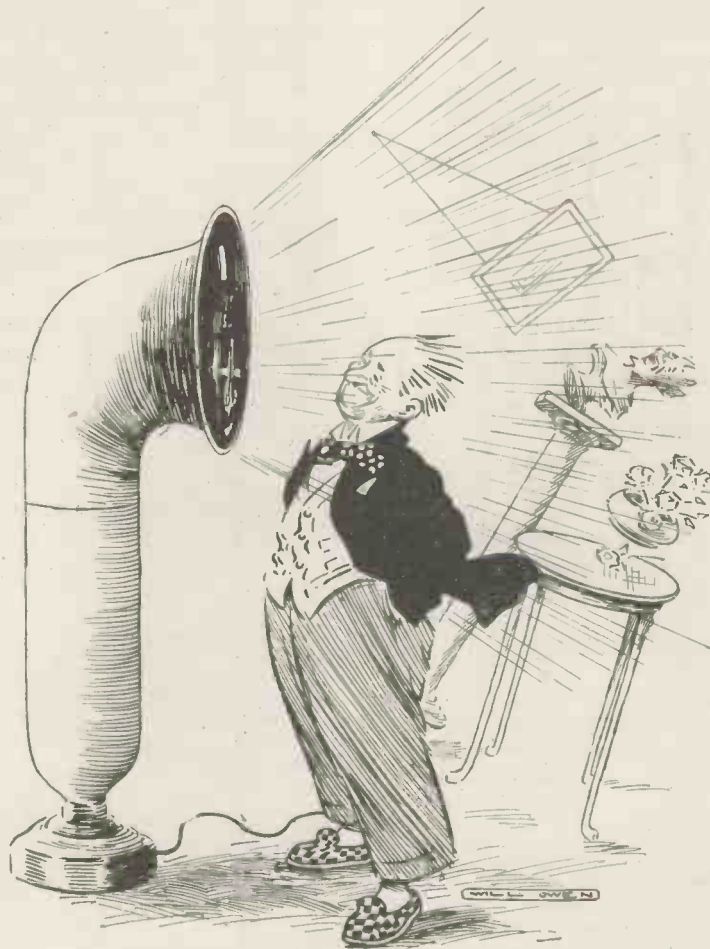
He's been ever so much better since.

That is only one instance of the dreadful toll which wireless is taking of our people.

all about wireless, Pottifer does, and then some more. And all the rest as well. And he lets you know he knows.

He comes along and pokes his silly face over the fence and looks at my aerial, and says "Ha-ha!" Just like that. "Ha-ha!" Most irritating! A sort of superior snigger with the tip of his nose tilted upwards.

You remember, before wireless was invented, how we used to grow potatoes in our spare time, during the allotment boom. And you remember how certain superior cusses



Made it out of one of the ventilators from an old Atlantic liner.

If you want still further evidence of its evil results, I can tell you of a murder which will be committed one fine day (or possibly on a wet one) in the purlieus of Gunnersbury.

When it comes off, the chief mourner will be that same fellow Pottifer mentioned above. He will provide the body, and I shall do the rest.

Pottifer, you must know, lives a few doors from me. Not nearly enough doors by the way. He knows

would come along, look at our radishes, and curl their lips, and say, "Rotten year for weeds, isn't it? Ha-ha!"

Well, that's the sort of person this Pottifer is.

"Ha-ha!" he says. "Washing-day, I presume." And I paid 4s. 7d. for that pole, delivered.

But that isn't all. He meets me in the train sometimes, and in a large loud voice tells me how he got Nijni-Novgorod last night on one

oodlum-gadget and a what'sname. Clear as a bell!

Also he has a loud-speaker. And because it is Pottifer's loud-speaker it is therefore the loudest loud-speaker that ever loud-spoke. Never mind the quality; never mind the finer nuances of tone and timbre, never mind the delicate shading of the "Unfinished" or the sonorous chords of the *Götterdämmerung* (I know those words are all right because I borrowed them from Mr. Scholes), never mind these things; quantity is what Pottifer wants, not quality.

Wherefore he has built him a super-loud-speaker. Made it out of one of the ventilators from an old

the Admiralty hoists the South Cone at Dover and the Channel boats are delayed several hours.

Well, without a word of exaggeration, last summer when they broadcast the nightingale, Pottifer shoved his thing in the garden; and immediately the little brown bird started chirruping, the girls at a laundry four miles away knocked off work. They thought it was the hooter. And in case any superior chump should remember that the nightingale only works at night, let me tell them that the laundry was putting in overtime, owing to the Christmas rush. See, clever!

And now for a moment I must become a little scientific.



At the same time I hear Pottifer's pestilential paraphernalia bellowing the same thing on the air.

Atlantic liner. And when he gets it good and going, with the drawing-room door open, people half a mile away dry their washing in the draught it makes.

It has bowels of brass and roars like to a Bull of Bashan. It turns the "Spring Song" into a thunderstorm, and the "Bees' Wedding" sounds like an air raid.

When Uncle Mungo speaks the folk in King Street, Hammersmith, and the crowds on Wigan Pier stand still to listen.

It is ruining the wireless industry, because nobody for three miles round needs a set. They all use Pottifer's. And sometimes, when he's got more juice than usual, and Auntie Phyllis is telling fairy stories,

Pottifer, as I have stated, loves to let the rest of the world know what a dreadfully loud loud-speaker his is. Wherefore he sticks the thing out of the window, so that it doesn't blow the paper off the walls, and lets her rip.

Now, as you know, wireless waves travel at the rate of something like umpteen million miles per second. It may be more, or it may be less. Scientists have not yet decided. But that is near enough for our purpose.

On the other hand, the common or garden sound waves crawl along at the comparatively sluggish rate of 30,000 feet or miles or something per minute. Very well, then!

I am sitting with my phones on, listening to a delightful lecture on

"Protective Coloration in the Eggs of the Lesser Spotted Bugwort." The ether-borne waves bring me the sound at the tremendous speed indicated above, but at the same time I hear Pottifer's pestilential paraphernalia bellowing the same thing on the air. This reaches me at the slower rate, about one-umpty-umth of a second later.

What is the result?

My friends, the result can be divided into two (2) parts (parts). Thus: "Professor S. Q. Lapius speaking.

"We we next next come come to to the the consideration-ation of of the the common common or or binomial binomial Bugwort Bugwort. The the feathers feathers of of this this wonderful wonderful flower flower are are so so arranged arranged——"

Now I ask you, can one learn anything about Bugworts from that?

The second part of the result is that I go into the garden, boiling over with righteous wrath, and throw flower-pots at Pottifer's windows.

But flower-pots cost money. Wherefore I am going to slay Pottifer, slowly but efficiently, and invest the cash in National Savings Certificates. Nobody will mind; except, maybe, Pottifer. But if there should be any interfering busybody who starts making trouble about it, I am relying upon you, my friends.

All those willing to sign a petition for a reprieve will please forward their names to me as soon as possible. Send no money, mind. A postal order will do.

And now, as Uncle Arthur used to say every Sunday evening:

And the night shall be filled with burglars,
And the cats on the garden wall
Shall hold up their tails like an aerial,
And spit and splutter and squall-

Further Articles by

Mr. F. W. THOMAS

(Some of them, he threatens, illustrated by himself.)

Will appear in coming issues of

THE WIRELESS
MAGAZINE

A Loud-Speaker— and a Fiddle, Too!

An Invention by the Editor of
"The Wireless Magazine" (Patent applied for)

Every reader is given permission to build
the Fiddle Loud-Speaker for his own
experimental purposes - - -



THE idea occurred to me that I might utilise the principle involved in the large-diaphragm hornless loud-speakers in a new way: so I forthwith commandeered my sister's "Stradivarius" and con-

bridge were removed and the instrument examined in order to see where lay the base bar. (Generally on the underside of the front of the instrument—just under the bass strings.) The result was not altogether encouraging, for it lay quite close to the centre of the instrument, and as it was, there was none too much wood on that portion of the surface and I wanted to cut a circular hole somewhere about the position normally occupied by the bridge. However, nothing venture nothing win, so I decided to cut the hole so that it came slightly to the right of the treble side. The next thing was how to cut it. I am no wood worker, so this presented quite a problem.

Eventually I collected from the kitchen, etc., quite a number of sharp-edged tools which I thought might be useful, but, as transpired afterwards, only two of them were required. These consisted of an old safety razor blade and a potato-peeling knife which had a sharp vicious-looking point, whose ordinary duty in life was to gouge the eyes from too wideawake potatoes.

First of all a circle was scribed by the aid of a coin (Fig. 1), and as the front wood of a violin is very tender and likely to fray, I cut around the circle with the safety razor blade and thus defeated any tendency of the surface to split and spoil the appearance of the instrument. Having done this, a very careful but manful attack on the "belly"

with the potato knife resulted in getting a hole of quite good circular formation through the wood. The edges, nevertheless, were slightly rough, so that I resorted to the use of a fine piece of glass paper wrapped around an old half-round file, and after a little perseverance the edges were passably smooth.



Fig. 1.—Position of Hole in Front.

verted it into a loud-speaker (What I actually did was to run around the local pawnshops and music dealers and eventually obtain a foreign-make violin for 12/6.)

The photograph illustrates the result of the things which happened afterwards. Firstly the strings and

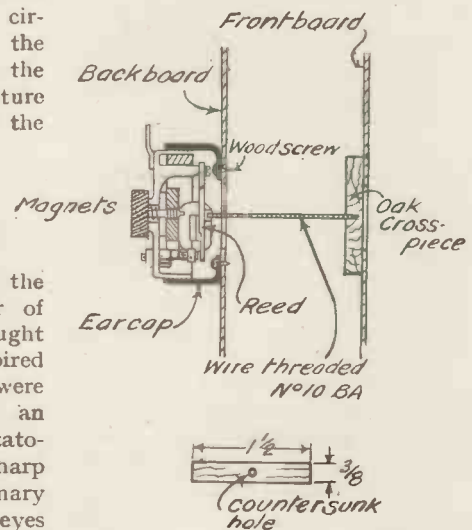


Fig. 2.—Details of Phone Mounting.

The next problem was how I was to tackle the back. I had foreseen slight difficulties in getting a round hole in the back to register exactly with the front one, but when I came to the trouble, it was very quickly overcome.

(Continued on page 98)

Where Wireless is Forbidden!

SNOW on the hills and down our lane, such drifts that Liese-Lotte, who has just come in, has been placed by the kitchen fire to thaw. The child has been to our nearest village for the letters, and she has been upset by the fractiousness of Max, who disapproves of snow beyond his fetlocks and who, turning his long ears towards home, has jerked her from the sledge and struggled back to the farmyard, his back just showing above the drift. Liese-Lotte followed alone, begging the Lieber Gott to note Max's misdemeanour and mete out a fit punishment to a wicked donkey. The mail having come, deep peace again descends upon our homestead, buried in the back-of-beyond of a German countryside.

Five Years . . .

Five years have we been here. For five years the Union Jack has flown from the flagstaff on the British Headquarters in the Cologne Dom Platz, and on each and every day have I left my country home for the bugle calls and routine of the British Occupation, to return and forget it each evening among these pastoral surroundings.

Through these years runs, like a thread, the record of our life in a lost dip of the Bergisch hills, so near to the city that its twin spires seem to rise at our feet, so far that no faint echo of the world's doings disturbs the serenity of our woods and fertile slopes.

But for the crackling of the log fire, all is still.

At long-drawn intervals there comes across the valley the faint sound of children's voices as they tramp from one remote cottage to the other, singing the old German Lieder and begging the coffee, the cake and the kiss which are their due. They will finish their round at the Englaender's, where they are sure of a slice of English plum-pudding—a heavenly and outlandish delight in return for their age-old carol.

Other visitors have been here already. Early in the morning the farmhands Konrad and Hugo, flanked and surrounded by their

children, called to offer the Season's greetings. Blue-nosed nites, in their stiff Sunday clothes "knicksed," bobbed and smirked, received their slabs of pudding and departed to compare sizes and notes in the farm kitchen. The fathers, invited to sit, were given schnapps and remained for ten minutes of genteel conversation with the Herrschaften.

Neither of them had been in that particular room before, and while they perspired at their task of keeping alive a formal interview, their roaming eyes came to rest, time and again, upon the ebonite-mounted collection of gadgets on the corner table. "Was that the telephone of which the Herr had told them?" Yes, that was it, but it was not a telephone; it was—well, it was a little difficult to describe to them, but if they cared to come in this evening after stripping the Xmas tree with the children, they could hear for themselves. "Does it speak?" They would see. "How could it receive anything when the wire went no farther than the pine-mast in the meadow, which Hugo had helped to set up, and which he foretold would prove too high and too weak for hanging the week's washing?" They would see! Let them come. "Yes, they would come if the Herrschaften did not take it amiss and think it an unheard-of liberty."

The Home Call

You, whose cities are now held together by a web of aërials, and in whose homes "the set" has established itself as firmly as the sewing machine, may not know that wireless has been forbidden throughout Rhineland since the beginning of the Allied occupation, and that 12 million people are unaware of its blessings. Apart from half a dozen receiving stations owned by members of the British Forces, there are none within the area.

The long winter afternoon follows its lazy course. Now and then sledge bells faintly tinkle in the snow-bound distance or a laden pine discharges from its branches a layer of its ermine cloak.

With the closing of the shutters

our own little world is finally shut out and a wider, more wonderful, opens to us. The lamps on the ebonite altar are lit and trimmed, and there comes to us, ether-borne, the pulse and throb of the great world beyond the hills. Across the myriad roofs of London, the Kentish weald, the leaden winter sea; across the bleak Dutch flats, and the marshes of the lower Rhine, a voice is heard; and here, far from our own land, after so long an absence, it is difficult to listen to it unmoved, for the Bells of St. Martin-in-the-Fields are pealing their summons to the Christmas Evening Service, and our hearts leap out to keep the tryst.

The Little Lamps . . .

The little lamps tell us that the Frenchmen, the Dutchmen, the Spaniard, and the rest are jazzing and singing merry tunes, but there is a call in the English bells which cannot be withstood.

A shuffling in the snow outside, and the piping of childish voices. Our little minstrels have come at last to serenade us. But now they are rather full of coffee and cake, their fingers are numbed, and their voices somewhat hoarse, but they mean well. "Come, Kinder, and listen. In England they are also praising the Lieber Gott and, hear, the tune is the same as the one you have just been singing. Is it not strange?" Eyes grow round in wonder as the first English hymn floats out into the solemn stillness of the night. "Come in, Hugo, come in, Konrad, and the rest of you. This is what comes through that long wire fastened to the pine-mast in the meadow."

The room is already crowded, but many more are pushing through the door anxious to hear but fearful of appearing shameless. At first the girls are inclined to giggle but their elders elbow them into silence, and one after the other they take up the ancient melody and join in the full-throated chorus. Their voices ring out and blend with those from England until there is but one chant, one prayer rising to Him who listens and who understands all hearts and tongues.

J. G. A.



By Mr. G. Burnett, a London Schoolmaster.

HAVE you ever tried to estimate the amount of useful information that has come your way through wireless? If so, you will realise what might be possible were this side of broadcasting systematized and developed.

A glance at the London programme for any day of the week from Monday to Friday will reveal the announcement: "3.15 p.m. to 3.45 p.m.—Transmission to Schools." It may be of interest to know something of the inside working of these schools' transmissions.

Eminent Authorities

Their justification lies in the fact that the people chosen to broadcast are eminent authorities on their particular subjects, and therefore speak from a fund of knowledge possessed by very few. If they can manage to present this knowledge in a suitable form, their services should be welcomed by all those schools not fortunate enough to number such an expert on the staff.

At present the main difficulty is reception. No school is compelled to listen; any wishing to do so must obtain permission from the local education authority, must install its own apparatus and stand all the expenses of the venture.

Typical Experience

This limits the experiment to the enthusiasts, but recent inquiries have proved that there are many such within range of 2 L.O. The writer's personal knowledge of the efforts of a particular elementary school six miles from the studio may be taken as typical.

The experiment began with Friday afternoon transmissions. Long before these were announced, several youthful constructors had produced crystal sets of varying efficiencies, but the occasion demanded more than phone reception. Funds were raised by voluntary contributions and social functions sufficient to purchase materials; the constructors got to work, and the first lecture saw the school equipped with a two-valve and crystal reflex set working a large Amplion loud-speaker sufficiently well to fill the hall.

Boys' Attention

Everybody listened to those first lectures. There were 300 odd boys seated on the hall floor, and one of the things learned was something of the degree of attention that might be expected from normal boys of various ages.

Amongst the disadvantages of the loud-speaker is its lack of personality; when compared with the living person, it can be as a cast-iron radiator to a blazing fire.

In September last the scheme developed into a daily lecture, and a definite syllabus was drawn up. It

became obvious that considerable discrimination would be necessary in selecting classes by which the boys would benefit. Apart from the difficulty of subject matter, there is a grave danger attached to enforced listening—the danger of creating a feeling of boredom, indifference, and even contempt of the loud-speaker, and eventually of broadcast generally.

Quality of reception is a vital point in connection with these experiments.

Brief Notes

It is regarded as vital that something should be done to prevent the lectures from becoming merely a pleasant passage of time. The art of making good notes on the spot comes only with long practice, so at present nothing more than a few salient words or phrases are asked for—sufficient to act as reminders when reconstructing.

In the use and elaboration of these notes comes the chief value of the lectures. They are used as the basis of an essay which is written up out of school as homework, and presented for correction and comment. This is then re-written and the best sent up to the lecturer, c.o. 2 L.O.

Commendation

The kindly word of commendation such efforts receive on the following week, and, perhaps even more, the informal personal letter of encouragement such as some have received from Professor A. J. Ireland is a coveted and much-prized honour. The desire to do well in these essays has had a most stimulating effect.

In 1923 a Central Educational Advisory Committee was appointed to supervise and control the periodical "talks to schools." Independent of this Central Committee, each station possesses its own Local Committee which arranges "chats" on various subjects. In this article our contributor deals with the possibilities of this side of broadcasting.

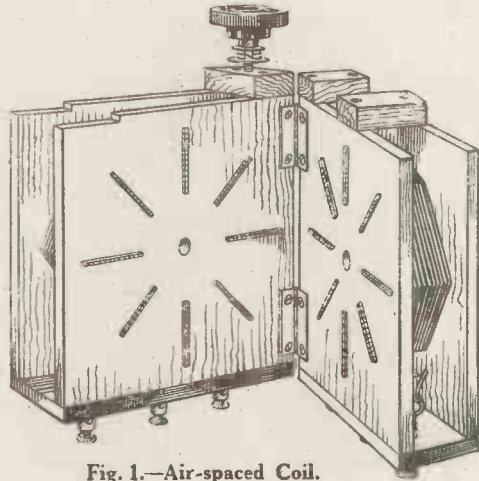


Fig. 1.—Air-spaced Coil.

CRYSTAL SET

with
Air-Spaced Coils

THE writer, having been approached by many friends on the subject of a low-loss loose-coupled crystal set, set to work to design a suitable instrument. Such a receiver is particularly valuable to those persons situated close to a local transmitter, for by its aid interfering stations can be readily tuned out unless the signals are of the same wavelength and strength as the desired station, in which case there is nothing that will help the "heckled" listener.

Bulky Coils

The inherent drawback to bare wire air-spaced cylindrical coils is that considerable space is taken up by such coils, and a closed circuit secondary coil suitable for use on the broadcast band of wavelengths would be of such a size as to render its use almost prohibitive, apart from the considerations of skill required for the threading of the wire through them and the drilling of the ebonite strips.

When the problem was seriously tackled many alternatives suggested themselves. Most of them, however, required the same amount of skill and care as was required for the skeleton coils; in fact, in most instances they were modifications of the cylindrical coils above referred to.

It is now generally known that the dielectric losses increase in a tuner according to the frequency of the incoming signals, i.e. the lower the wavelength the higher the frequency and the greater the losses. Obviously, an air-spaced coil was called for in the design as broadcasting takes place on moderately short waves and losses occur with cotton-spaced coils on such wavelengths. Some sort of former was required on which to wind the wire, leaving

the form of the inductance was decided upon, a little thought had to be devoted to a suitable construction—one which the amateur could carry out without any great amount of skill being required. The solution to this little problem was a fretsaw and some fretwood. A fretsaw

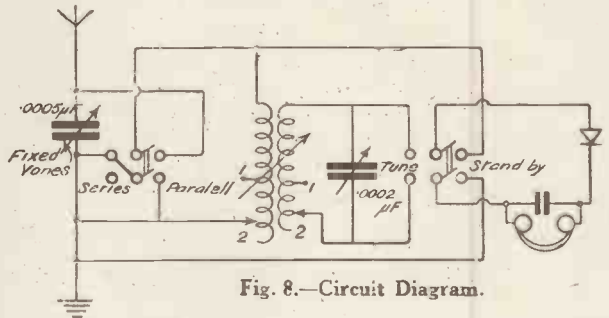
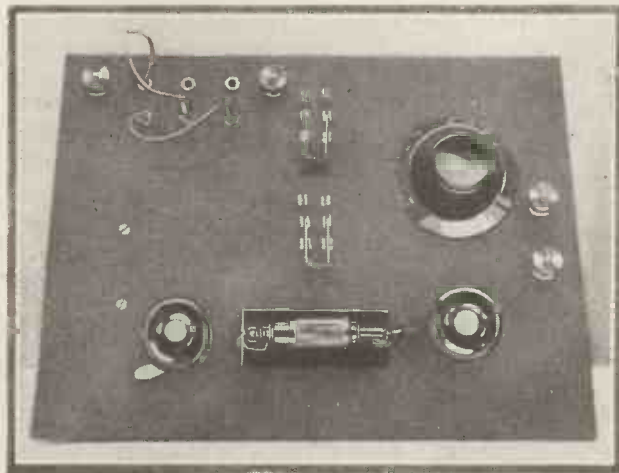


Fig. 8.—Circuit Diagram.

may be purchased for the modest sum of one shilling and sixpence, and is a tool which every wireless home constructor should possess, there being many uses for it apart from those mentioned in this article.

Making the Coils

First the four "end cheeks" are prepared, these being cut from $\frac{1}{4}$ -in. larch wood and the dimensions being 4 in. by 4 in. (Fig. 2). Larch is specified, as this is a particularly tough, close-grained wood, and its advantages will be apparent when we come to screw the fittings to the finished coil. A full-sized drawing of the sketch (Fig. 2) is now made on a piece of paper, after which, by the aid of carbon paper, the drawing is transferred to one side of each of the four squares of wood. Next bore a $\frac{1}{4}$ -in. hole through the centre of the squares, and by means of a fretsaw remove the wood from the



Front View of Panel.

strips shown in heavy black outline, so that there are eight radial slits cut in each "end cheek." The ends of a wire spool are now removed and the wooden tube thus obtained sawn across so as to form two small bobbins with a hole through the centre, the hole being that which was used by the wire manufacturers for winding purposes (Fig. 3). Two lengths of No. 4 B.A. condenser tie rod—that generally used to hold the fixed vanes in position—are now obtained, together with four large nuts and washers. The piece of rod should be about 2½ in. long. The bobbins, after being "trued up" at the ends, are now smeared with liquid glue at each end, and one placed between each pair of "end cheeks" so that the hole registers with those in the end cheeks. Next, the No. 4 B.A. rod is passed through the whole arrangement and secured by being firmly locked by the nuts. One end of the rod should terminate flush with the nut, but the other should

handle in a bench vice to steady it. Eight turns are now wound on the bobbin, each turn being equally air spaced from its neighbour, and on the completion of this number of turns a matchstick is inserted in each slit, so that it cuts across the coil in the process of winding and through the other side, the ends of the sticks projecting for an equal distance on each side. It will

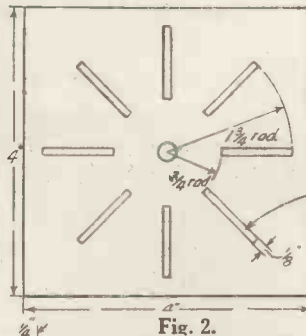


Fig. 2.

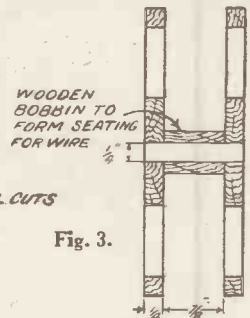


Fig. 3.

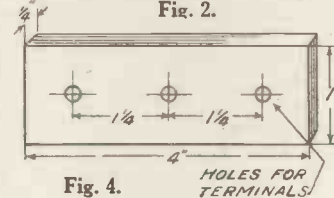


Fig. 4.

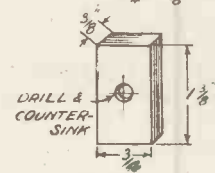


Fig. 5.

Fig. 2.—End Cheek. Fig. 3.—Position of Distance Piece. Fig. 4.—Terminal Block. Fig. 5.—Wood Block.

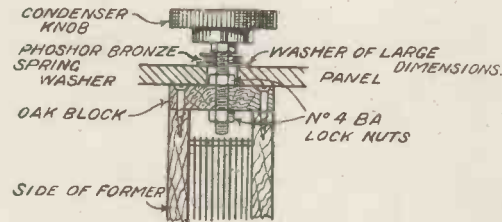


Fig. 6.—Fixing of Secondary Coil.

overhang, as it is used for winding purposes.

A raid on the match-store to obtain three boxes of "Bryant and May's" or Master's "Army and Navy" matches complete the preparations for the winding of the coil. These brands of matches are specified as they are of uniform thickness and shape.

Winding the Formers

A reel of ½ lb. of No. 24 gauge d.c.c. wire is required for winding the primary coil and the winding is carried out in the following manner:

First, a piece of shellacked or waxed brown paper is folded around the bobbin and the end of the No. 24 d.c.c. wire is threaded through two holes of 1/8 in. diameter, which should be made on the "end cheek" near the bobbin. The end of the wire is to be about 5 in. long and to be left free on the outside of the former. The No. 4 B.A. rod is then gripped in the jaws of a drill chuck and the drill gripped by the

completed inclusive (see photograph below).

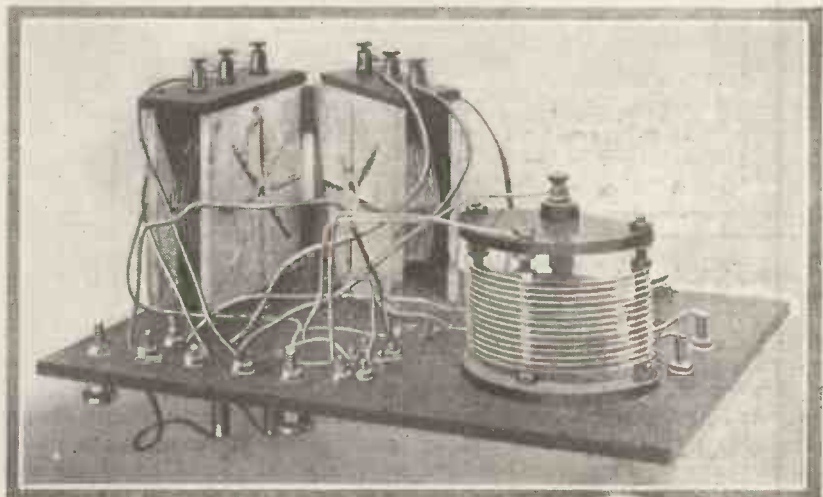
In order to make the tuning as flexible as possible, a tapping is made on the coil, and this is done by bending the wire back double, so that a hank 6 in. long is obtained, and

threading and securing this by means of holes bored in the "end cheeks" of the former. The tapping on this, the primary, is taken at the end of the seventh tier. A further five tiers of eight turns complete the coil, which is finished off in the same manner as the tapping was carried out, except, of course, that there is only one strand of wire.

Finishing Off

The secondary coil is constructed on the same principle as the primary, except that No. 28 d.c.c. wire is used and there are twelve turns to each tier. A tapping is taken from the end of the ninth tier (inclusive of the first layer), a further three tiers being added after this, in the same way as before.

Two pieces of ebonite are prepared as shown in the sketch (Fig. 4) and



Under View of Panel, showing the Air-spaced Coils.

fitted with three terminals. Four small screw-holes are also provided for screwing to the bottom of the formers. The tappings on both coils are taken to small holes bored at the tops of the "end cheeks" and threaded through so that they come between the sides of the former. They are then stripped and prepared for soldering and soldered to the terminals on the underside. Three small wood blocks of oak or other tough wood are next prepared according to the sketch (Fig. 5), two small holes being bored to allow screws to be placed in the sides of the former for fixing purposes. The holes must be countersunk. The blocks fit on the opposite side of the former to the ebonite tablets, and are screwed thereto, two being screwed to the primary (one each end), and one to the secondary at its extreme or hinged end. The secondary block has the centre hole countersunk to take a No. 4 B.A. nut. The ends of the matchsticks are now snipped off almost flush with the former by means of a pair of sharp "side

No. 4 B.A. rod may be removed, as it serves no further purpose.

Hinging the Coils

The coils are held together like the leaves of a book by two small hinges as commonly used for fretwork (see Fig. 1). A thick piece of cardboard is inserted under each of the hinges, between them and the secondary coil, so as to allow room for the coil to fold exactly parallel to the primary when the coils are close together. The slightly projecting matchsticks make this imperative, and if it is not done the hinges are likely to become "spring" when in use. The secondary coil must also have fitted to it means for varying the coupling (see Fig. 6). These consist of a No. 4 B.A. threaded rod, condenser knob, phosphor-bronze spring, three nuts and a large washer. The oak block on the secondary which is mounted near the hinge end of the former has a hole countersunk on the outside sufficiently large to allow of the entry of one of the No. 4 B.A.

the left-hand corner of the sketch is inserted for the arrangement for varying the coupling of the coils. It is cut out of the ebonite by means of a fretsaw, and will be found to be an easy job. Subsequently it may require slight modifications which can be carried out by means of a half-round file when finally mounting up the coils (see Fig. 6, which illustrates the method of attaching a piece of No. 4 B.A. rod and condenser knob for varying the coupling).

The coils should first of all be "fitted" to the panel. They are secured thereto by the simple expedient of screwing two screws through the panel into the oak block of the primary. The oak block on the secondary coil is for the attachment of the coupling knob as described above and seen on the left of the panel in the photograph. A piece of stout cardboard is placed between the oak blocks of the primary and the panel before screwing up, to allow the hinged secondary to have sufficient "clearance" from the panel when varying the coupling between it and the primary. Next the knob and nut with No. 4 B.A. screwed rod and phosphor bronze spring and the large surface washer are fitted and adjusted for smooth movement (see sketch, Fig. 7).

Wiring Up

Having "fitted" the coils and mounted up the condenser, switches, and terminals, it is as well to remove the coils whilst the wiring is being carried out. Owing to the fact that the secondary coil covers a fairly wide arc when it is loose-coupled, care must be taken to get any wiring which comes within this arc close against the panel. It may be found desirable to cut off the surplus ends of the tune-stand-by switch (switch No. 2, the lower one of the two on the panel), as a part of this comes within the arc mentioned.

The aerial circuit diagram shown in Fig. 8 should be carefully followed out and special care taken in wiring up the switches, as it is easy to make errors in this part of the circuit. The easiest plan is to follow the wiring exactly as shown on the diagram, commencing from the aerial terminal and completing each portion

(Continued on p. 100)

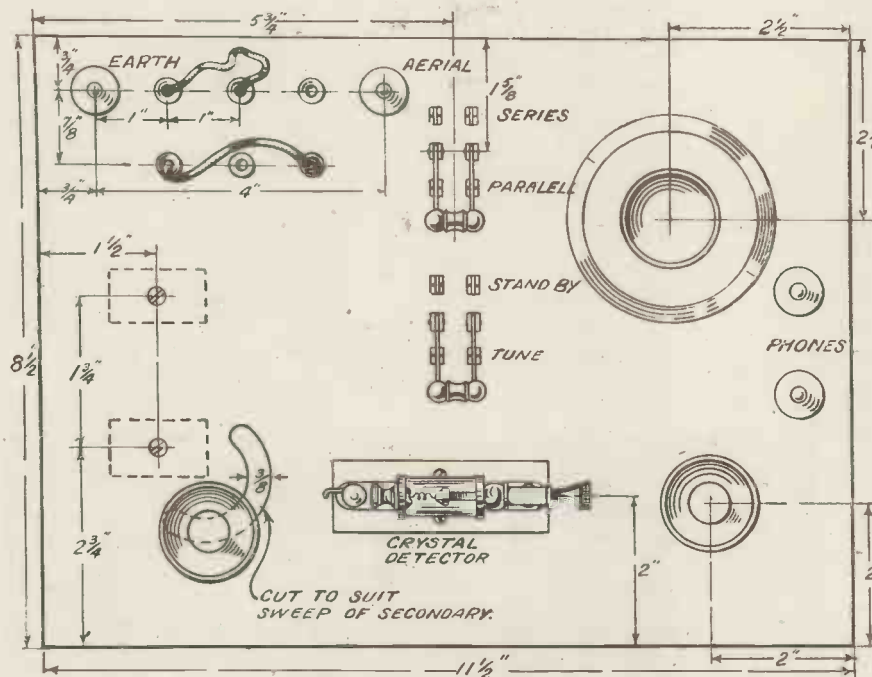


Fig. 7.—Layout of Panel.

cutters," and the coils are completed.

The photographs illustrate coils prepared as described. If the wire has been tightly wound it will be found that a rigid structure has been obtained. After the coils have been bolted up for twenty-four hours the

nuts. The length of No. 4 B.A. rod is fitted to it and secured on either side by means of nuts, and the sketch illustrates the arrangement of the remainder of the components.

The panel should be of the size and layout as shown in the diagram (Fig. 7). The curved hole seen to

SHALL THE THEATRE BE BROADCAST ?

An Enquiry by "The Wireless Magazine" Commissioner

TO broadcast or not to broadcast? That is the question which is agitating theatrical managers throughout the country. As the outcome of this controversy will be of interest to readers of this magazine, a description of the situation, and of its latest developments, will, no doubt, be welcome.

The Recent Crisis

Most people are familiar with the crisis that arose recently. In spite of the opposition of the Theatrical Managers' Association, the British Broadcasting Company was able to broadcast one act of "Patricia," which was being presented at His Majesty's Theatre, and one act of "Primrose" from the Winter Garden Theatre. The theatrical managers, however, were able to prevent the arrangements for broadcasting an act of "Poppy," from the New Gaiety Theatre, from being carried out.

Plays Banned

As this broadcasting of "Patricia" and "Primrose" threatened to make a serious breach in their defences, the West End managers called a meeting of provincial managers, and at this meeting it was decided that these managers would not book any play for presentation at their theatres of which any portion had been broadcast.

This, apparently, meant that any play of which any part had been broadcast would be barred from about a hundred provincial theatres—a serious matter for those who might endeavour to book tours for such plays.

So much for the initial stages of the controversy. But as few people know how this struggle commenced, and why it has been carried on for so long, the details are worth relating.

In the Early Days

The conflict dates from the very earliest attempts to establish a regular broadcasting service. At that time theatrical managers, controllers of concerts, music publishers, composers, and authors, formed a league against the new enterprise.

The British Broadcasting Company, however, was able to make arrangements with the music pub-

lishers and most of the composers and authors by agreeing to pay royalties for performing rights. But the Theatrical Managers' Association and the concert people remained obdurate. The managers refused to allow any part of a performance to be broadcast from a West End theatre, and declined to enter into any negotiations on the subject.

This rule was made absolute. When Mr. Basil Dean was producing Elroy Flecker's fine play, "Hassan," at His Majesty's Theatre, the B.B.C. suggested that he should broadcast a short lecture upon this notable work; and Mr. Dean was quite willing to do so.

Excerpts

But when the B.B.C. suggested that as a concomitant to this lecture they should broadcast an excerpt, however brief, from the play; permission was refused, and, in consequence, the lecture was never delivered.

This attitude did not prevent operas and plays, or parts of them, being broadcast from various theatres. The B.B.C. made arrangements whereby listeners have heard opera and Shakespearean plays from the "Old Vic," parts of "The Beggars' Opera" and "Midsummer Madness" from the Lyric Theatre, Hammersmith; an act of "The Farmer's Wife," from the Court Theatre; various operatic works sung by the British National Opera Company at Covent Garden and His Majesty's Theatres; and Pavlova's ballets from Covent Garden Theatre.

"Little Nelly Kelly"

But such performances were more or less outside the West End managers' scheme of things. When, however, the B.B.C. arranged with Mr. C. B. Cochran to broadcast part of "Little Nelly Kelly" from the New Oxford Theatre that was a different matter, and the arrangement was finally cancelled.

The B.B.C.'s Attitude

So much for the facts. Now let us consider the arguments.

The B.B.C.'s attitude may be, briefly, summarised as follows:—

There is no doubt that excerpts from some plays are popular

with our public, and therefore, as a matter of course, we wish to broadcast them.

We are willing to discuss terms and conditions upon which such broadcasting shall be carried out, and have every desire to avoid the remotest possibility of doing harm to any theatrical production.

Beneficial Effect

Experience has proved, beyond all question, that, far from doing harm to any production, broadcasting is of the utmost benefit to it. This is confirmed by the fact that managements whose productions we have broadcast, such as those of the British National Opera Company, the "Old Vic," and the Lyric Theatre, Hammersmith, have welcomed repetitions, while our broadcasting of "Patricia" and "Primrose" was immediately followed by very considerable increases in the bookings and the receipts at the doors.

In reply to this the following may be given as a fair summary of the case for the Theatrical Managers' Association:—

It is no argument to say that, because one or two plays have benefited through being broadcast, the general practice would be beneficial to the theatres.

If the custom became general it would ruin the theatres, because people would stay at home to listen to the plays.

We are, therefore, utterly opposed to anything of the kind, and the music-hall managers are of our opinion and will be equally opposed to the movement.

Inconclusive

It will be noted that this is not a conclusive rejoinder to the contentions of the B.B.C., because it refers to the broadcasting of plays, whereas the B.B.C. has only been broadcasting single acts from plays, has expressed no wish to broadcast complete plays, and has stated that it was willing to negotiate, presum-

(Continued on page 88)

Permanent Wiring Without Solder

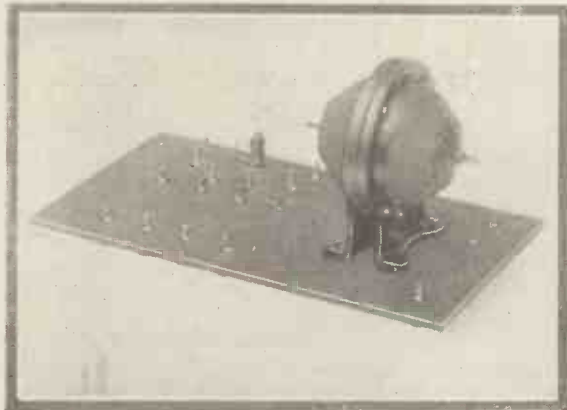


Fig. 1.—Panel Ready for Wiring.

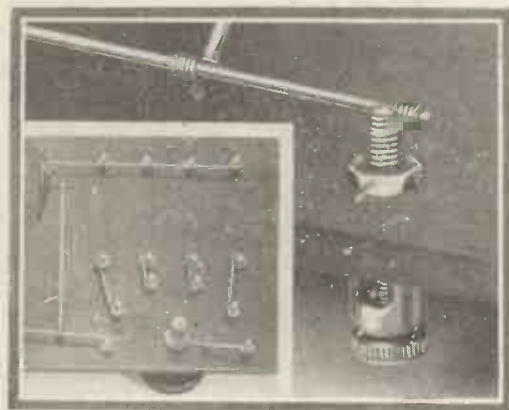


Fig. 2.—Panel Wired by New System.

THERE must be thousands of earnest wireless men who are interested in wireless and its various branches who never contemplate actually making a set themselves because of that necessary evil—soldering.

I think that perhaps I may be permitted to anticipate criticism at this point by mentioning that the above does not apply to the simple crystal set or even the one-valve set, as the connections are so very few that only a few minutes need be spent in bending the necessary connections and then fastening them under the nuts holding the various terminals on to the panel (Fig. 1).

Troubles of Soldering

It is when we come to the multi-valve or reflex circuits that the average amateur leaves the wiring to the expert, or, at least, a friend who likes soldering.

There is always the danger that "blobs" of solder will fall into inaccessible places between valve legs, etc., taking a liberal supply of soldering fluid or paste to spread around and percolate into the ebonite, thereby destroying, to a certain extent, the insulating properties of the panel just where this insulation is required more than anywhere else. He will notice that great care has to be taken to keep the terminal from heating up excessively, lest this terminal should become loose in the panel, and will certainly realise that the job can only be efficiently accomplished in a workshop of some sort.

Now we come to our new system of wiring. First of all, what is our aim? Efficiency combined with simplicity with an added advantage that no tools are needed except the means of cutting various lengths of thick wire.

It will be noticed at once from the photograph of a close up of one of the connections (Fig. 2) that the length of the wire actually connecting the terminal stem to the thick wire is less than an eighth of an inch, and is perfectly straight. The coils of the spring being in contact with the whole of the length of wire on which it is sprung effectively prevents any suggestion of added inductance due to this method of joining.

No Loss of Efficiency

I would again anticipate further criticisms in respect of the loss, or, rather, possible loss, of efficiency through these connections having a small cross-sectional area comparative with the thick wire used when all joints are soldered. As a matter of fact, the resistance of the wire used for the springs in the lengths between the thick wire and the terminals could hardly be measured accurately, so small is the amount, and however small the resistance of a soldered joint, the all-copper joint would assuredly be smaller.

Owing to the common use of massive wire for connecting wireless sets most readers have assumed that this is the most efficient by a long way, because, and only because, it

has a large sectional area. This is by no means its most important asset. Far greater importance lies in the fact that this stiff wire can be handled to fit into corners which would be inaccessible if using insulating materials requisite with the wires of smaller gauges.

Spacing Important

Also, the spacing of conductors under the panel is most important, and this wire allows us to space our leads equally without insulating sleeve, allowing us more scope in the elimination of capacity effects. If such a wire existed that had the same strength as this thick wire but was even an eighth as thick, our sets would not only be free from any faults consequent upon this alteration but would actually be more efficient on account of the elimination of a great amount of capacity. As such a wire does not exist, we must not build up our hopes in this respect.

It will be noticed that every connection is a straight piece of wire joined to other wires or terminals, etc., by a spring of peculiar shape. This connection is so designed, by virtue of the natural tendency of any spring, that the more the set or panel is shaken the tighter the connections will become; therefore, we need have no fear that the wiring is likely to fall to pieces. (As a matter of fact, in passing, the wires connecting the various components cannot be pulled off once they are

(Continued on page 91)



Wireless Femininities

broadcasting because her husband is such an efficient wireless hobbyist. "Which means that whenever there's grand opera, which I adore," she sighs, "he's taking down the old set, or putting up a new one, or sitting in front of it twiddling buttons and things to make it work better for listening-in. Listening-in!"

Limitations of Dance Music

People who are always grumbling at the B.B.C. programmes confess themselves self-centred folk who forget how many other different tastes than their own must be catered for. But without thinking for a moment that the programmes can be arranged exclusively to suit little *me*, I do feel sad sometimes that I don't have the same leisure hours for listening-in as the average wireless enthusiast.

There's something on the programme I'd thoroughly enjoy every single evening, but so seldom at the *time* when I could enjoy it. Journalists don't keep ordinary office hours, but work much later in the evening than other people; so items at 7 or 7.30, however delightful, must be sternly disregarded.

By the time I'm free, as often as not, there only remain the news

bulletin and the Savoy bands—and is there anything more exasperating, on the whole, than foxtrots when you can't dance 'em? Some folk seem able to enjoy just listening-in to dance music, but regarded as music only it seems to me singularly unsatisfying. An accompaniment of movement is essential; and the better the tune, the more restless it makes those who hear it.

Couldn't the occasional extensions of broadcasting until midnight be given now and then to an ordinary programme, instead of invariably catering for those who are lucky enough to possess a dancing floor at home?

Before the Microphone

Delivering talks from a broadcasting station is paralytically nervous work the first few times.

In the big studio (I must tell you some other time how exquisitely furnished it is) the announcer for the day, when your turn comes, asks you whether you prefer to stand or sit. You hardly know whether you'd rather have the extra height and confidence of being on your feet or whether your trembling knees

(Continued on page 106)

EVERY woman must have noticed how different her point of view about wireless is from that of her husband or son or any other male belonging. To women wireless is a joy, a distraction, a companion, or an excitement; but it is never what it is to men—a toy.

It seems to women that the last thing men want to do with their wireless set is to listen-in. They want to play with it and fiddle with it incessantly, just as they do with their cars. Putting it up is a huge joy, and what a ruthless one! The friend who installed mine heartlessly hacked a corner out of each door from sitting-room to kitchen, so that he could earth to the sink water-pipe.

Those Inspirations

And then, as I went busily about brushing the cushions his boots had trampled on to reach the tops of the walls, picking up shavings, retrieving oddments of wire and stray insulating hooks, and putting away hammer, nails, and hooks, he expected incessant loud congratulations on his skill! But I'm afraid my tears rusted the nails as I reflected on what the landlord is going to say when he sees those doors!

But the putter-up, like a child with a precious toy, doesn't understand this materialistic point of view at all. He'd be quite willing to hack another corner out of each door if he had a new inspiration for installing the set.

Another visitor always pulls out the set every time he comes and plays with the catwhisker, "to see how it's working to-day." But I've never known him listen-in for five consecutive minutes—with the grand exception of the last election night.

My sympathies go out to a friend of mine who says she never hears any



The Woman's Hour.



Dr. Lee De Forest with his Phonofilm Apparatus.

Broadcasting Sound and Sight

It is only natural that the enormous success of broadcasting sounds should make inventors wonder whether the same general principles of wireless transmission and reception cannot be adapted for broadcasting pictures, and more particularly for broadcasting motion pictures. The idea of doing this is by no means a childish dream. Certainly you cannot transmit pictures, or even single light pencils upon the wings of a wireless wave, but a key to the picture-broadcasting problem is supplied by the knowledge that you can quite easily transform sound impulses into light impulses, and vice versa, or rather you can use the one as an accurate and automatic record of the other, which amounts in practice to the same thing. Starting along these lines picture broadcasting may be boiled down as a problem of sound broadcasting at one move.

Let us see first how sounds may be recorded as an accurate tracery

of their wave forms in black and white. M. Lauste was one of the first, if not quite the first, inventor to make a record of this kind upon motion picture film. He succeeded in tracing the wave forms so truly that his film was capable of rebuilding

phone. Sounds caught by the microphone were converted, as usual, into small differences of electrical potential, and upon the potential differences passing to the ribbon-like strips of electro-sensitive foil they behaved like the leaves of an

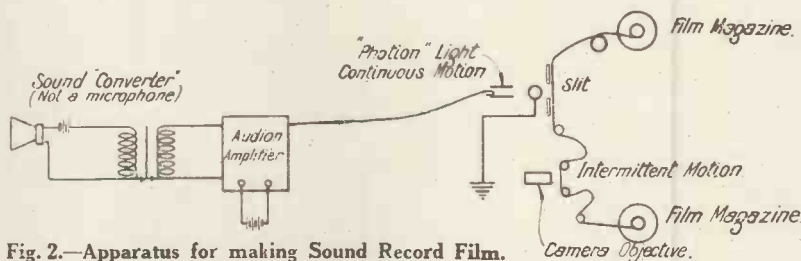


Fig. 2.—Apparatus for making Sound Record Film.

them into sound again so that, in effect, a motion picture projector could act as a gramophone. The Lauste system was to concentrate a powerful beam of light behind a narrow slit in an opaque plate. Close to this aperture plate were arranged two strips of metal foil, connected in circuit with a micro-

electroscope, being repelled more or less from each other according to their varying state of charge. The position of the foil-strips relative to the light aperture was so arranged that their vibration intercepted more or less of the light beam passing through the illuminated slit to a running band of sensitive film behind it. So the originally received sound waves were recorded upon the film-strip as a tracery of black and white—see Fig. 1, which is taken from an actual piece of Lauste sound record film, and shows a note or two of that now almost forgotten jazz melody, "The Temptation Rag," played upon the piano.

The real interest of this record lies in the fact, already stated, that

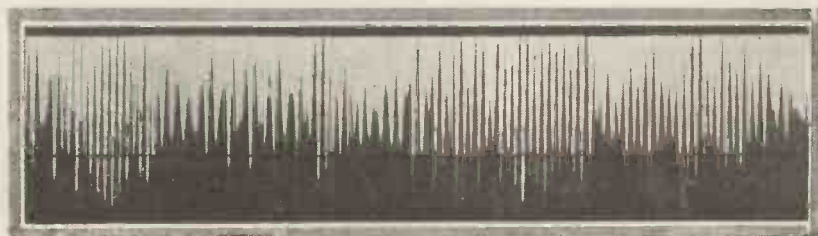


Fig. 1.—Sound Record Film.

by suitable means it was possible to turn it back into music again. Enquiry into how that was done brings us at once to a remarkable electrical device which not only has made possible the successful use of light for reproducing sound but which brought about the whole of present-day experimental success in the direction of transmitting and receiving pictures by wireless. The

it. Think a minute and you will realise all the possibilities bound up in this. For instance, suppose you have translated a sound record into a record of light and shade (Figs. 2 and 3), if you then pass that record of light and shade before a photo-electric cell (Fig. 4) you may reproduce your original sounds by connecting the light-sensitive cell with a telephone receiver. But that is not the only

generally do) we may feed them similarly to a photo-electric cell and by it energise a light source with varying current impulses to re-form the light and shade drawing of the original picture.

Admittedly it is rather a far cry from transmitting and receiving a single light impulse to transmitting and receiving a picture composed of widely varying areas of illumina-

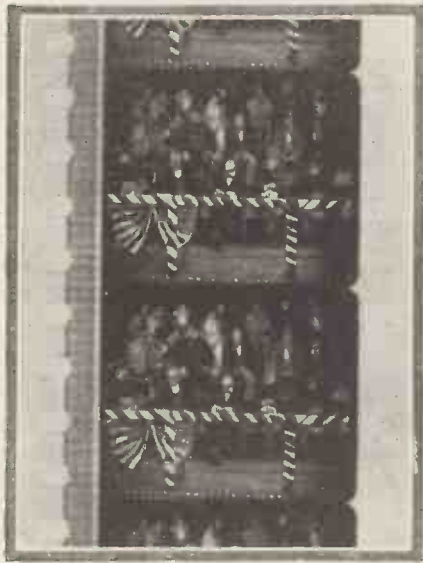


Fig. 5.—Piece of Film with Sound Record.

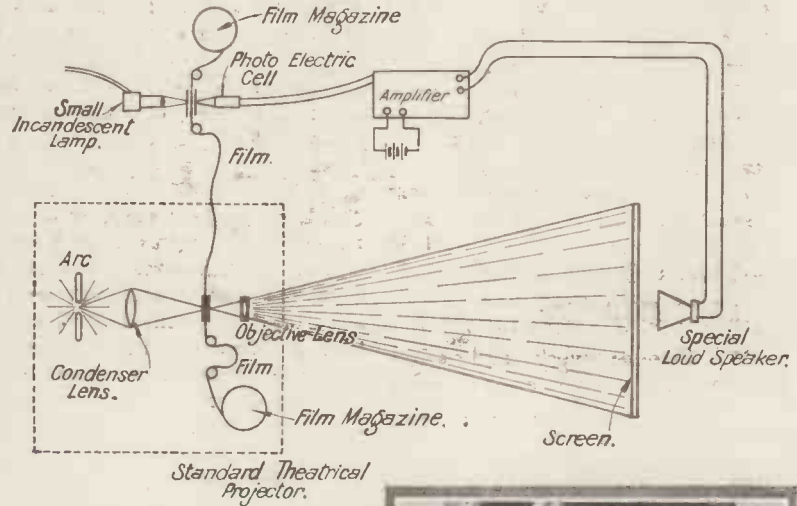


Fig. 4.—Reproducing Sounds from Film.



Fig. 6.—Another Piece of Film with Sound Record.

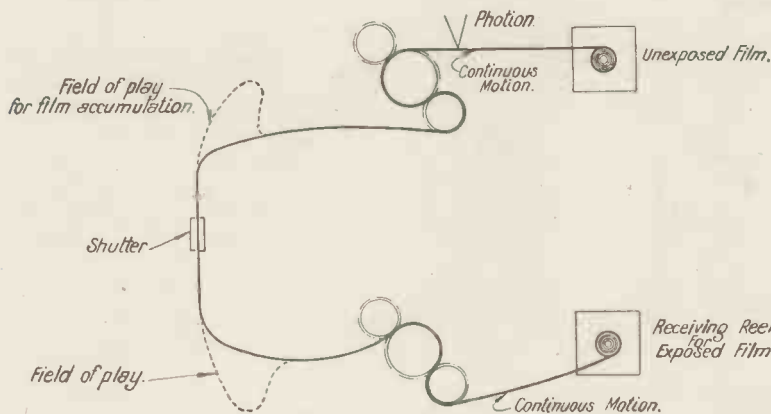


Fig. 3.—Arrangement of Film for Recording.

device is named a "photo-electric cell."

Photo-electric cells are of several sorts. In some of them the photo-electric element is selenium, in others, metallic potassium. In the De Forest photo-electric cell the sensitive substance is a compound of the element thallium. Whatever it may be, its value for the purpose in hand lies in its possessing a different electrical conductivity in the dark from what it has when a light is playing upon

possibility. As an alternative for picture broadcasting you may start with a record of light and shade, translate it into small varying electric potentials and feed them to the grid of a thermionic valve. In that second way you possess a means of sending out picture records via wireless. The same possibilities apply at the receiving station. Instead of taking our received potentials back from the aerial as musical notes (which is what we

tion. But look with a magnifying glass at the illustrations in this magazine and you will soon understand one way by which inventors are to-day hoping to solve the remaining difficulties of the wireless picture problem. You will see that all reproduced photographs in this or any other illustrated paper consist of a large number of minute and closely grouped black and white dots and spaces of varying size.

(Continued on page 95)

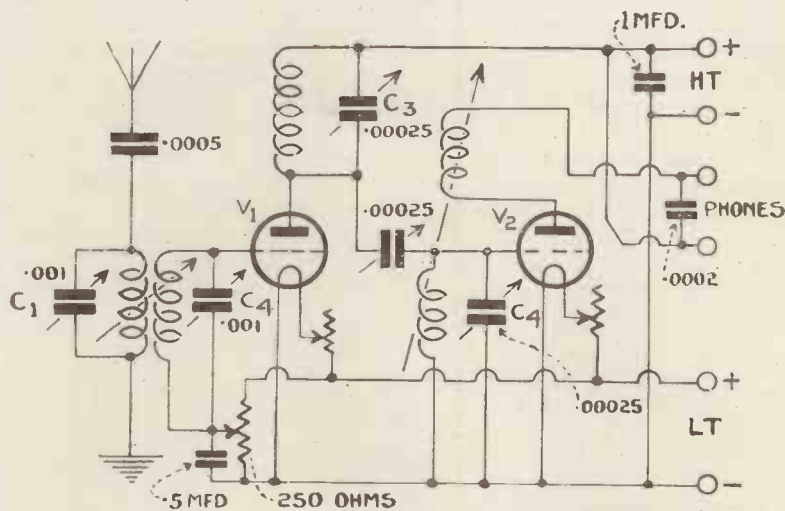


Fig. 1.—Two-valve Circuit.

1.—TWO GENERAL PURPOSE CIRCUITS. By 20M.

FOR distance work and selectivity, I have a preference for the circuits illustrated in Figs. 1, 2, and 3. In the circuits illustrated in Figs. 1 and 2, bottom-bend rectification is employed, which does away with much of the distortion attendant upon grid-leak rectification. The coils may be varied at will for reception of the different wavelengths. The H.F. choke coils consist of L 750 coils, which are suitable for all wavelengths up to 5,000 metres. Square-law condensers should be used throughout. In the circuit illustrated by Fig. 1, reaction is controlled by both potentiometer and magnetic coupling. Reaction in the circuit Fig. 2 is controlled by potentiometer.

Short Wavelength Circuit

Fig. 3 is a circuit designed specially for short wavelength work. In this

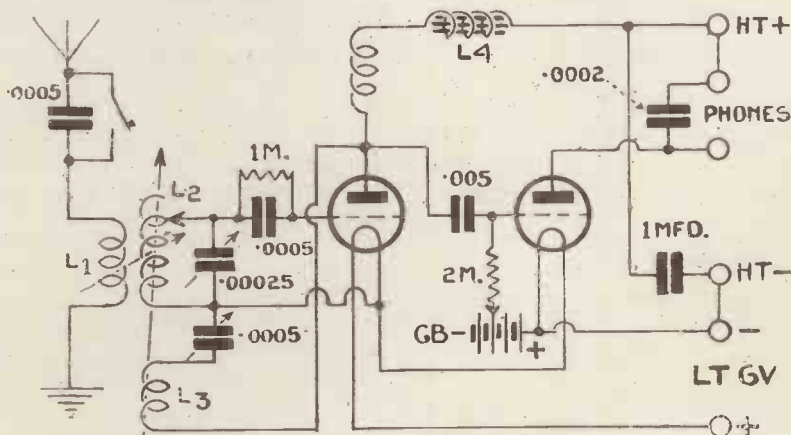


Fig. 3.—Circuit for Short-wave Work.

circuit the coupling between the coils L1 and L2 should be very close, and the coils should be air-spaced solenoids. In this case reaction is obtained by varying the capacity of the variable condenser C3 and mutual relation of the coils, L2 and L3. Dull-emitter valves are used in each circuit, but bright-

*My
Favourite
Circuit*

emitters may be used providing the L.T. supply, rheostats, etc., are adjusted accordingly.

Some Details

The condensers C1, C2, C3 and C4 in Fig. 1, and those in Fig. 2, are all fitted with fine-tuning adjustment. The choke coil illus-

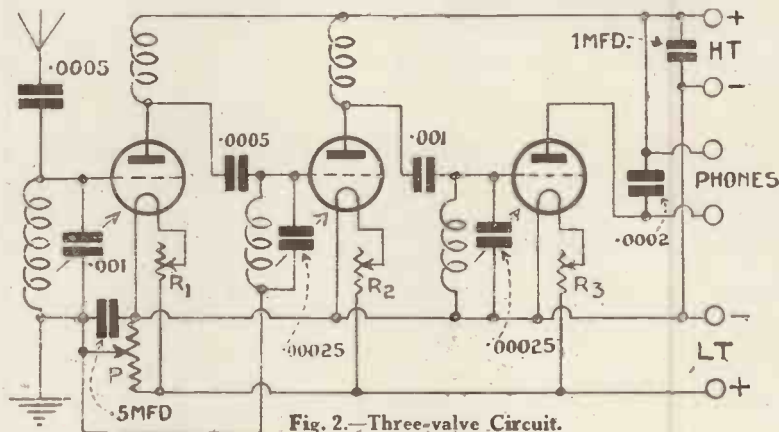


Fig. 2.—Three-valve Circuit.

trated by L4 (Fig. 3) is of 150 henries inductance and may be an interval transformer with the primary and secondary windings

YOUR MOST AMUSING WIRELESS EXPERIENCE!

Tell us of it in a brief letter

To the writers of all letters published we will present a Cossor Valve.

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connected in series. The grid battery is a small battery of about two volts.

2.—AN ALL B.B.C. STATION CIRCUIT

THE circuit diagram shown in Fig. 1 illustrates my favourite circuit for the reception of broadcast signals from a long distance. Its desirable features in my opinion are ease of manipulation, stability and extreme sensibility. When I say that practically all the B.B.C. stations have been received by its aid at good strength on a loud-speaker, this will perhaps convey some idea of its sensibility. Many American broadcast stations have been received many times at good strength in the phones, and also most of the Continental ones which make any pretence at moderately long-distance transmission.

Set Described

The condenser C1 in the aerial is a .001 microfarad and the condenser C2 a .0001 microfarad with fine-tuning adjustment. The fixed condensers C3 and C4 are .001 micro-

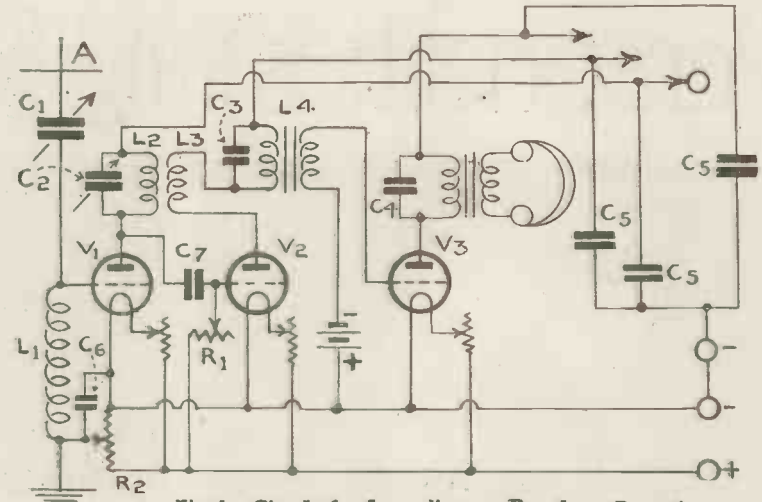


Fig. 1.—Circuit for Long-distance Broadcast Reception.

negative potential is applied to the grid of valve V3 by means of a 3-volt dry cell. Signals of increased strength and clarity are obtained thereby, if a suitable valve of plate potential is used.

The valves V1, V2 and V3 have each a different value of potential applied to their anodes from a common H.T. battery. This is invaluable

selective for all ordinary purposes, and it will be seen that apart from the use of an extra tuning inductance L5, and two extra condensers C8 and C9 combined with the fact that reaction is taken against the tuned secondary circuit instead of against the tuned anode circuit, it is similar to the circuit used for long-distance reception shown in Fig. 1.

MEMORISE THESE SYMBOLS →										
	Valve	Battery (low-tension)	Battery (high-tension)	Grid Leak and Condenser	Loud-speaker	Transformer (high-frequency)	Transformer (low-frequency)	Fixed Resistance	Variable Resistance	Switch

farad each and the condensers C5 are of 2.0 microfarads each. Condenser C6 is a .006 microfarad and C7 .0002.

The resistance R1 is a variable grid leak and R2 a potentiometer wound to a value of 300 ohms which is used to apply a slightly positive potential to the grid of the valve V1, thus preventing it from falling into self oscillation.

The tuned anode inductance L2 is two sizes larger than the inductance required for L1, and the reaction coil L3 may be fairly small—two sizes smaller than L1.

Parts Used

The valves V1 and V2 are generally Cossor valves, and for V3 I use practically any valve that is at hand. The transformer is the best one it is possible to buy. It is foolish to begrudge a few shillings on a good transformer here. Normally I have a "Royal" or Marconi "Hedg-hog," but as I am an experimenter, all makes find themselves in the circuit sooner or later. It will be noted that a

able and I find that no common feed has yet given the same results even when special valves are used to perform special functions. In passing, I might mention that for short-wave reception (broadcast and amateurs) I use "low loss" coils whenever possible.

Selective Circuit

Figure 2 illustrates my favourite selective circuit. It is sufficiently

Separate H.T. Supplies

Inductance L5 is always kept high and the condenser C8 low (about .00025 microfarad). The condenser C9 is a fine adjusting 3-plate condenser. Separate values of H.T. are applied to the anodes of the valves V1, V2, V3, as in Fig. 1, but for the sake of simplicity these have been omitted from the diagram.

5 T R.

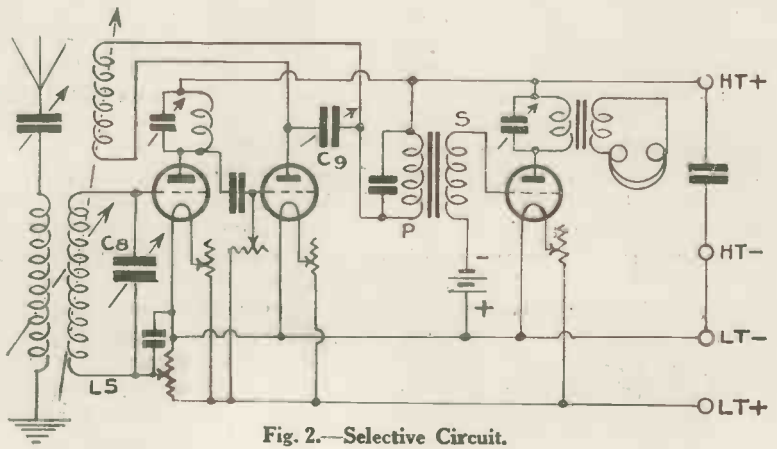


Fig. 2.—Selective Circuit.

Personalities in the Programmes



"John Henry."



Miss Daisy Kennedy.

The Ambassador of Mirth

PROBABLY the hen-pecked husband has been a standing object of mirth from the days when the first cayeman got clouted with a chunk of mammoth for bringing home the wrong skins, but I think "John Henry" has brought the subject to a fine art. "John Henry" and "Blossom," his wife, are in reality one of the most devoted pairs in the country, but their differences have become a household word "over the ether." The name of a well-known actor is hidden under this nom-de-plume, and "John Henry" admits that he has been everything a man may be, speaks more languages than on the Continent, including "Yarkshire." Trained as a journalist, he has been reporter, editor, actor, producer, traveller, and soldier. It was during his war experiences that he was called upon to form a military

concert party, and this eventually brought him to the B.B.C. to become the chief ambassador of Mirth.

From Shakespeare to Cockney

Co-partner in a "John Henry" programme is Miss Helena Millais, whose Cockney studies as "Our Liz" are apt to make people forget that she is one of the finest Shakespearean actresses, while her light comedy work and variety work in the big London halls made her name long before the era of broadcasting.

Early Stars

When the early history of wireless music comes to be written I think people will feel more grateful to the famous artists who refused to be "hide-bound" by the prejudice of their agents. Realising that wireless had "come to stay," they determined to give it a friendly lead and meet it half-way. Amongst these is Miss Daisy Kennedy, the great

Australian violinist, whose solos were given as far back as the days of Marconi House, and since the inception of 2 L.O. Miss Kennedy has given many recitals, and once even came down to the Children's Hour. At her most recent broadcast recital late in December, she had as coadjutor Maurice Cole, a clever young pianist scarcely out of his teens when he walked into Marconi House and demonstrated his ability to play wirelessly as well as brilliantly. Miss Kennedy was recently married to Mr. John Drinkwater.

Miss Doris Vane

Another early singer is Miss Doris Vane. I heard her, too, from Marconi House, and most people have made a point of hearing her ever since, for she possesses a voice of exceptional range and a clarity of diction that makes the words of her songs a joy to hear, instead of a guessing competition.



Miss Beatrice Harrison.



Mr. Reginald Whitehead.



Miss Helena Millais.



Miss Irene Scharrer.

Manchester Scores Again

The provinces have been particularly fortunate with their vocalists. Mr. Reginald Whitehead is well known there, and especially in Scotland where he has just completed his third tour. The possessor of a bass voice of remarkably fine quality, he has been signally honoured by royalty throughout his concert career.

Stars of the Opera

Thanks to the work of the British National Opera Co., most of their famous singers have become equally familiar names in the studios. Chief amongst them is Mr. Walter Hyde, who was heard again at Manchester recently. In the course of a long career commencing at the age of six, and in which he has sung every tenor rôle known, he has had many strange experiences. He tells of a performance of *Taust* when no less than three different Marguerites appeared in one evening. On another occasion he says, "I was playing Laertes to the Hamlet of Clarence Whitehall. In the carefully rehearsed duel scene, I drew my sword in a fine frenzy, when, fixing me with a mournful eye, Hamlet whispered, 'I've left mine in the dressing room.' There was a painful pause, then, enveloping me with his cloak, he said, 'Let's quit.' And quit we did, leaving the astounded orchestra and the audience to their fate."

With him on many occasions has appeared Miss Beatrice Miranda. Like many other great singers she is of Australian birth. Though she has sung most rôles, she will not admit to any particular favourite, but I think in *Aida* she is at her best, while in the studio she "radios" finely.

Another singer equally at home in hall or studio is Captain Herbert Heyner. One of the most popular baritones, there are few of the great popular concerts which are complete without him, and his coming is always hailed with satisfaction at all stations.

Continued on page 94



Mr. Maurice Cole.



Mr. Walter Hyde.



Miss Marjorie Hayward.



Miss Sidonie Coossens.



Mr. Albert Ketelby.



Miss Doris Vane.



Mr. Herbert Heyner.



Mr. Fred Spencer.



Miss Gladys Palmer.



Miss Beatrice Miranda.

BOTH in wireless shops and at the White City Exhibition held recently, I have been very greatly surprised indeed at the attitude of Mr. X when he

wants to buy a valve. Mr. X, I should explain, is the wireless "man in the street"; he is the average enthusiast, neither expert nor yet absolute beginner, who uses his set on most evenings of the week for the purpose of receiving broadcast transmissions. He knows quite a bit about wireless; the three-, four-, or even five-valver that he has made at home is a piece of work that no one would be ashamed of. He may have views of his own upon such subjects as loud-speaker distortion, reaction, and the shunting of audio-frequency inductances. Yet when he goes out to buy a valve he is apt to set about this important business as lightly as if he were purchasing a box of matches or a new pair of bootlaces.

Buying a Valve

He enters a wireless dealer's shop. "I want a valve," he says. "Yes, sir. What make did you want?" "Oh, just let me see what you've got." The assistant produces various standard types, and possibly a few cheap (and frequently nasty!) importations from the Continent. Mr. X looks them over, selects one, asks if it is a good laster, and on being told that it is, buys it. To him, apparently, all valves are alike so far as their performances are concerned; the only important difference is that some expire, after a momentary display of bluish-purple light, in a shorter time than do others.

Now does the man who buys valves in this haphazard kind of way get the best out of his set or the greatest value for his money? Most emphatically he does not. If he is lucky, quite respectable results may come his way; but in the majority of cases, though he saves nothing in the original cost by buying in happy-go-lucky fashion, his reception is never more than mediocre.

What a Valve Does

Consider for a moment what valves do. They have three quite separate and distinct functions in the set. The high-frequency amplifier receives upon its grid oscillations whose frequency, even upon the broadcasting

Will "Any" Valve Do?

band of wavelengths, may be anything up to one million a second! The higher the incoming frequency the more noticeable are the evil effects of inter-electrode capacity within the valve.

If a valve with a high capacity between its grid and plate is selected for the radio-frequency side of the set, reception on the shorter waves can never be satisfactory. Then there must be a certain flow of grid current when the grid is at its normal working potential in order that stability may be obtained. Without it the set is perpetually falling into self-oscillation.

The rectifier has an altogether different duty to perform. It receives magnified oscillations at radio frequency from the valve or valves in front of it and converts them into rectified pulses at audio frequency. For successful grid leak and condenser rectification a heavy flow of grid current is essential when the grid is set at a slightly positive value.

Note-Amplifiers

The note-amplifiers deal with rectified impulses at speech-frequencies, their rôle being simply to magnify them without any trace of distortion. Here, since oscillations take place at a comparatively low frequency, inter-electrode capacity does not greatly matter; but it is of vital importance that the valve should be capable of working about a point in its characteristic curve at which there is no flow of grid current. Should the straight portion of the curve be too short, or should grid current pass, there will be distortion of the most horrid kind.

The man who does not care to devote a little of his spare time to the study of the little idiosyncrasies of the various valves on the market will perhaps do well to confine his purchases to "general purpose" valves made by a manufacturer of repute. With these, if they are intelligently used, quite good results are obtainable.

But since there are now "special purpose" valves available at no greater cost than others, why should

we not make use of their particular qualities? The general purpose valve can, at best, never be more than a compromise. One can imagine a non-

descript dog of fair size being trained to course hares, to kill rats, or to retrieve. All of these things it would do fairly well, but a greyhound, a thoroughbred terrier, and a retriever would beat him handsomely every time if matched against him in its particular speciality. The general purpose valve performs the three functions required of it about as well as the lurcher dog acquits himself at coursing, ratting and retrieving. The special valve has one definite duty, and performs it as well as the specialised dogs mentioned perform theirs.

Special Valves

Both the Mullard Company and the Cossor Company are now making special valves at the same price as those of the ordinary type. The latter firm is also making specialised dull-emitters at the price normally charged for the unspecialised. The M.O. Valve Company has recently put on the market in the DE 5 b a valve designed particularly for resistance-capacity coupled low-frequency amplification—again not at a fancy price. Lastly, we have the small power amplifiers made by many firms solely for work as note-magnifiers.

For Special Purposes

The wise amateur will select valves intended for particular purposes, just as he uses a pair of strong boots on a wet day, light shoes in hot weather, and comfortable slippers in the evening. No one form of foot-gear could give complete protection and comfort on all occasions, and no single type of valve will produce the best results in all parts of the set.

Advice

My advice to the thinking amateur is this: Go for the specialised valve. Use it sensibly and your results will show an enormous improvement. Use something designed for the purpose that you want it to fulfil. Be discriminating in your choice, and do not take the first thing that is offered to you. Above all never buy a valve just because it is cheap.

R. W. H.

BIRMINGHAM calling—that is the warning and the slogan which stirs the Midland ether day after day and night after night. It has sounded now well over two years, and there is every prospect of it sounding for many years to come.

Judging from the letters and post-cards which daily make some luckless postman of the Birmingham General office climb that exhausting flight or rather series of flights of stairs which lead to this broadcast eyrie perched high above New Street, "Birmingham calling" is a phrase which really matters in the lives of a multitude of people who live in the Midlands and in places farther afield. But behind this phrase there is, of course, so much that those who hear it do not know or at least only dimly realise.

Two years of speaking this slogan into the microphone that seems the intimate confidant of a broadcaster has after all been only part of the daily life of the station. It is of just the past year of that daily life at 5 I T that I would like to write.

Those Letters !

Since broadcasting has become an important interest of the public so the broadcasters have become targets—though, fortunately, targets of praise as well as of criticism. We like both, we get both. We get letters of all kinds, wonderful letters at times, rich in their human interest. Broadcasting is an impersonal kind of business unless one has a lively imagination, and it would be more impersonal still were it not for our unknown correspondents who day after day write to us and tell us what they have enjoyed, tell us what they would like, tell us what they think, ask us what we think. And reading these letters has always been one of the bright moments of broadcasting, although there is so much more to do besides.

It was long ago realised that



By Mr. Percy Edgar, Director of the Birmingham Station

broadcasting was one of the wonders of the age. It is daily to be realised that the broadcast station is one of the wonders of any town in which it is located. 5 I T must be one of the wonders of Birmingham, for we have visitors from every suburb of this great city, visitors from every town and village in the Midlands, visitors who have heard us in some far-off place.

And so letters and visitors must rank among the matters of the day. As I write my desk reminds me how much more there is. It is true that organisation which public support has made both necessary and prac-



Bedtime Stories !

ticable has made the day run easily. Yet there are interviews, vital conferences with the staff, important arrangements for telephone lines, discussions with the engineers, both our own and those of the post office, a persistent telephone that is scarcely ever silent, letters to dictate, letters to sign, and

always, in the studio just beyond, that microphone which is certainly never out of my mind.

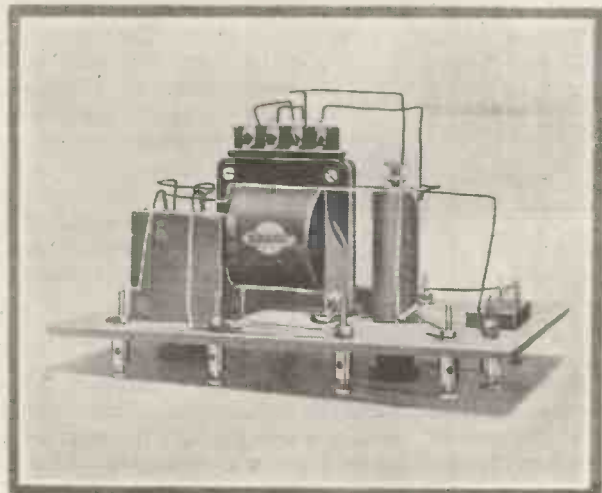
"The Children's Corner"

Yet I have not mentioned that section of broadcasting, that department of a broadcaster's life which, so far as I am concerned—and this, I imagine, is true generally of everyone on the station—provides the greatest charm and perhaps the greatest appeal—the Children's Corner. Broadcast "uncledoin" is no sine-cure, at least it is not at the Birmingham Station, and from its very earliest days as much attention has been paid to this side of broadcast work as to any other, and just as we have striven to improve the merit and technique of our broadcast programmes so have we striven to improve and develop the Children's Corners.

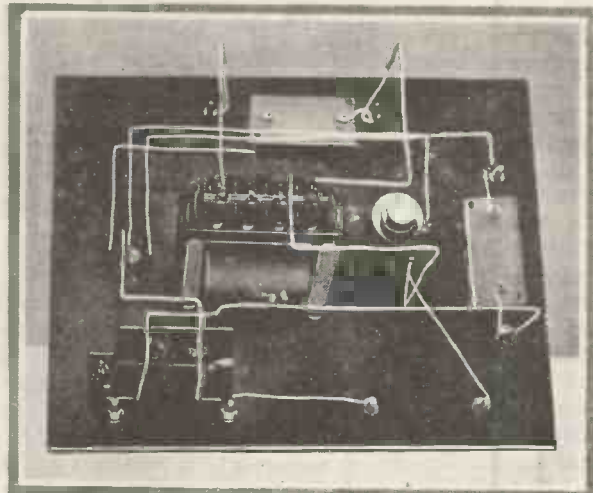
I am not sure whether the lines upon which we work in many instances are to be found in the Children's Corners which are run in connection with the other stations. It is our frequent practice to put over during this important hour of the day a self-contained "playlet," specially written for the aunts and uncles of 5 I T, and introducing also a lively personality who has long figured in the sequence of weekly stories which Auntie Phil, one of the Aunts, has broadcast. This is Snookie, and with him and with the aid of the Fairy Godmother, who, so it is found, appears in the Studio whenever she is most needed, the Uncles and Aunties, including myself, have the most exciting adventures on land, sea and in the air.

(Continued on page 108)

Building a One-Valve Amplifier



Under View of Amplifier Panel.



Disposition of Components.

THE amplifier described in this article is specially designed for use in conjunction with a crystal set, but is equally efficient if added to an existing valve set.

The following is a list of the components used in the actual instrument shown in the photographs:—

- 1 Radion panel, 9 in. by 7 in.
- 1 L.F. transformer (Igranic, 1 to 5 ratio).
- 1 Lissenstat, "Universal" type.
- 2 fixed condensers, each .002 microfarad (Lissen).

- 1 Mansbridge fixed condenser, .5 microfarad.
- 8 Refty terminals.
- 1 valve holder (Goswell).
- 6 No. 4 B.A. countersunk brass screws $\frac{1}{2}$ in. long.

- Square tinned copper wire.
- 4 No. 4 $\frac{1}{2}$ -in. brass wood screws.
- 1 dull- or bright-emitter valve (Mullard DF 3).

- 1 60-volt H.T. battery (Ediswan).
- 1 L.T. battery (4-volt Exide Accumulator).
- 1 polished mahogany case, inside measurements being 8 $\frac{1}{4}$ in. by 6 $\frac{1}{4}$ in. by 4 $\frac{1}{2}$ in. deep, made of $\frac{3}{8}$ -in.-thick mahogany.

The panel should be laid on a piece of flat board and marked out as shown in Fig. 1. It should be noted that the panel layout is only suitable for use with the components described in the list. The sizes of the necessary holes are also given in Fig. 1.

The various components are mounted as shown in Fig. 2, which is a plan of the back of the panel, and gives the method of connecting the various instruments together. Fig. 3 is a circuit diagram.

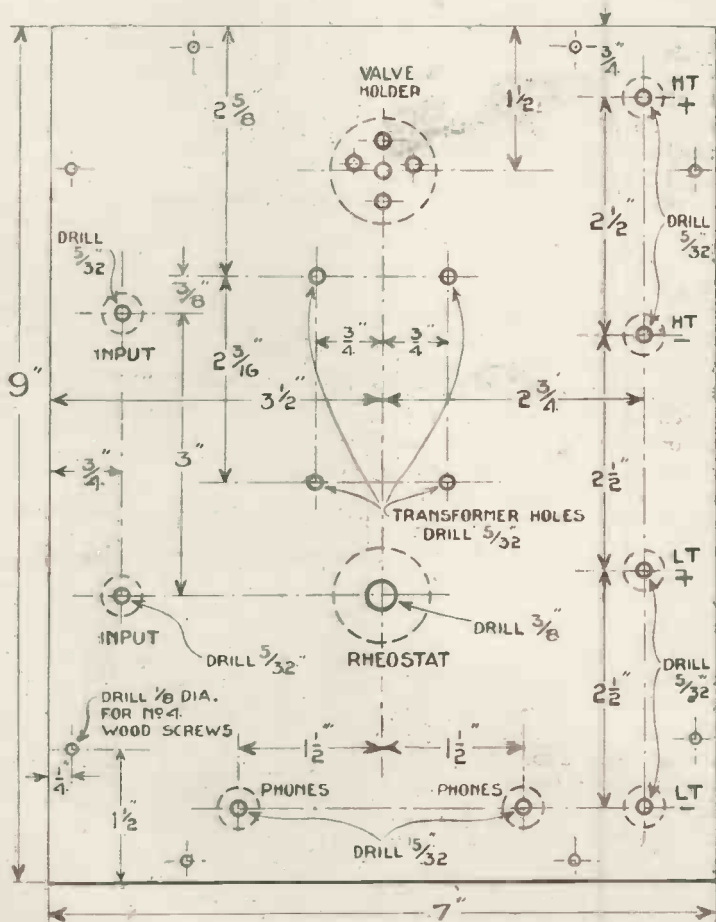


Fig. 1.—Layout of Panel.

HAND-CAPACITY EFFECTS

MANY amateurs will no doubt have experienced difficulty—especially when operating at some distance from a broadcasting station—in tuning owing to hand-capacity effects. Usually they may be almost entirely eliminated by observance of a few simple precautions.

Care must be taken to connect up the tuning condensers and inductances in the right manner. In the case of an ordinary series condenser in an aerial tuning circuit, the moving vanes are connected to the grid of the valve and the fixed vane to the aerial.

Should a series-parallel switch of the usual double-pole double-throw type be used, it will be found impossible to arrange this for both positions of the switch, and the condenser should be connected so that the moving vanes are connected to the grid in the series position.

This will be found advantageous on account of hand-capacity effects being usually more pronounced on the short wavelengths.

Where high-frequency valves are in use and a condenser is used to tune the anode circuit, the moving vanes should be connected to the plate and fixed vanes to the H.T. + end of the anode inductance.

In the case of a condenser tuning a secondary circuit the moving vanes should be connected to the low potential side, that is, to the negative filament lead.

Where hand-capacity effects are extremely pronounced the writer advocates the use of mica variable condensers. With these the insulated terminal may be regarded as corresponding to the moving vanes and the other on the fixed.

If trouble is still experienced, the only remedy lies in the use of long anti-capacity handles.

A. R.

TESTING THE WIRING FOR "SHORTS"

WHEN wiring up a new set, it is always advisable to test for any shorts between the L.T. and H.T. circuits. Otherwise, one or more valves may be burnt out by reason of the H.T. current passing through the filaments. Complete the wiring of the L.T. and H.T. circuits. First, connect the accumulator and test the L.T. circuit. Then disconnect and place the accumulator across the H.T. terminals. On turning the rheostats, the valves should not light up, but should they do so, it will immediately prove that there is a short somewhere, and the high-tension battery must not be connected until the fault has been found.

S. W.

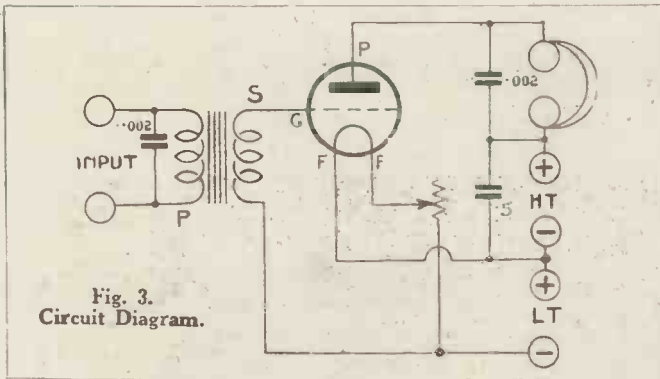


Fig. 3.
Circuit Diagram.

Mounted in the centre of the panel is seen the transformer, and beside it the filament rheostat. Connections to the valve holder are shown on the other side of the transformer.

The four terminals on the left of the panel, reading from top to bottom, are for + H.T., - H.T., + L.T., and - L.T. The fixed condensers seen between the input and phone terminals have a value of .002 microfarad each, and the H.T. condenser has a value of .5 microfarad.

The wiring completed, the amplifier may then be screwed down into its case, and the batteries and phones connected up to their respective terminals. As already stated, the input terminals are connected to the output terminals of the crystal set.

The beauty of a low-frequency amplifier is its simplicity in operation. No extra tuning is necessary. Connect up as explained, plug a valve in the valve holder, and turn the rheostat until the optimum reception is obtained—that is all.

D. C. R.

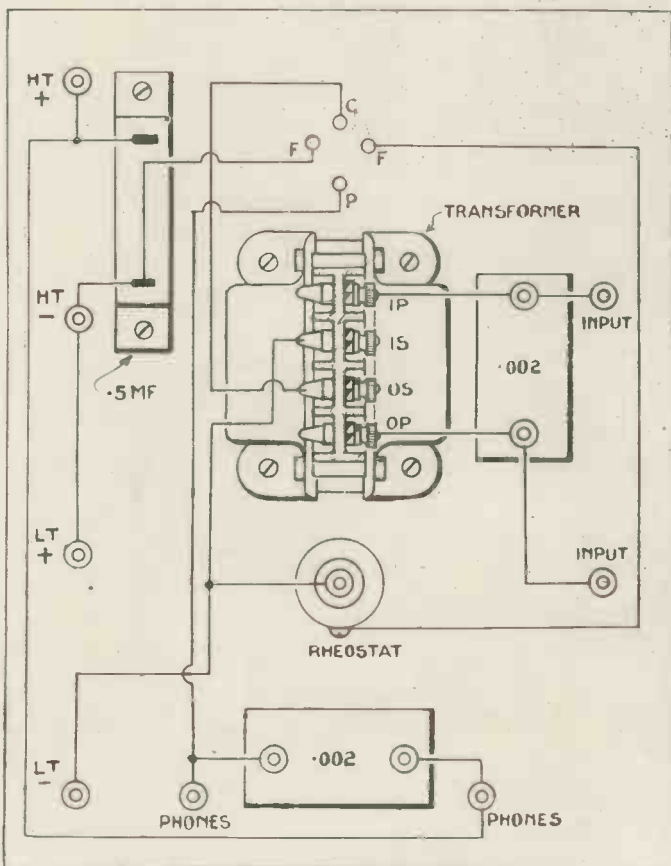


Fig. 2.—Wiring Diagram.

Some Wireless Pictures of the Month.



1.—Mr. E. J. Simmonds, who communicated with Australia. 2.—Building a set while in hospital. 3.—An enthusiast erecting his aerial 4.—“Whimsical Walker” at 2 L.O. 5.—Listening with the smallest (?) set in the world. 6.—A wireless set in a shoe. 7.—Mr. Leslie Henson tuning in.

More Wireless Pictures of the Month.



1.—Reporting a broadcast lecture. 2.—“The Wireless Magazine” aerial. (Note “Justice” in the background.) 3.—Mr. F. G. Kellaway, the new Managing Director of Marconi’s. 4.—A pouffe wireless set. 5.—Broadcasting Tibetan Music. 6.—Frame aerial on the s.s. “Leviathan.” 7.—The “Leviathan’s” chief wireless officer broadcasting.

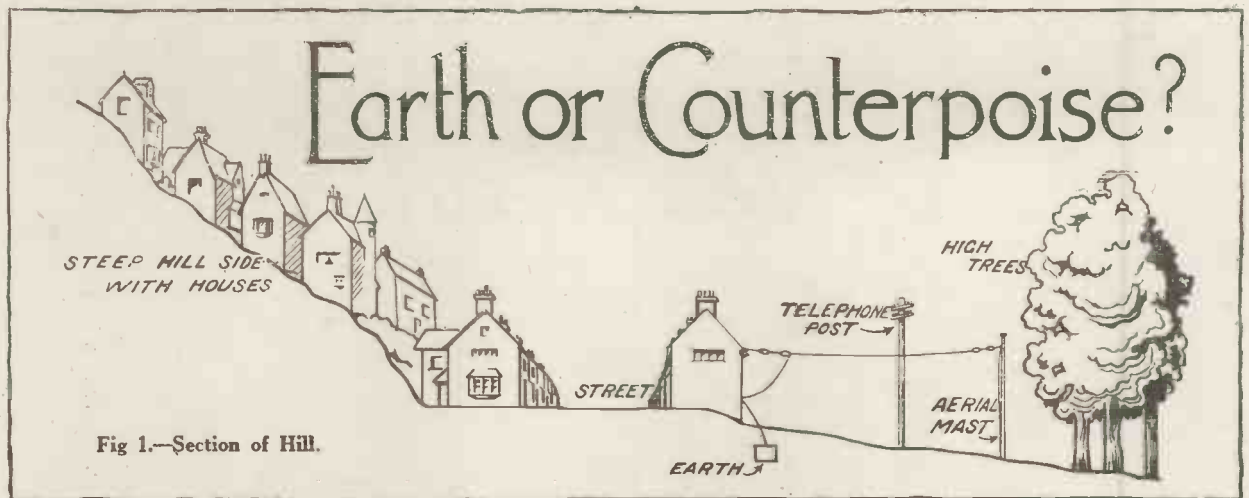


Fig. 1.—Section of Hill.

ONE often finds references to the counterpoise in both books and articles dealing with wireless, but so far as I can remember I have never come across any account of actual experiences or of practical results of the use of a counterpoise in conjunction with a broadcast receiving set. Recently in an attempt to secure greater efficiency with an aerial which is of necessity a bad one I have been making a series of experiments with the counterpoise, and I think that the results may be of interest to a good many readers.

Situation of Station

Let me describe first of all how my station is situated. Fig. 1 shows a rough sectional drawing of the ground. The house is in a small town some thirty miles to the north-west of London. To the south the hills rise steeply to a height of 250 ft. above the level of the house. To the north the garden slopes rather sharply down towards the bottom of the valley, and half a mile away there is another range of hills rising about 150 ft. At the bottom of the

garden are many tall trees. The aerial is thus effectively "blanketed" from the south, which is the direction of 2 LO and 6 BM, and from the north, in which direction lie all the other main broadcasting stations with the exception of Cardiff. Four sets of telephone wires are carried on poles across the garden about 50 ft. from the back of the house. It is therefore impossible to improve matters by using a high mast. The effective height of the aerial is actually only about 15 ft. I do not suppose that much worse conditions for reception could be found anywhere.

Aerial and Earth System

Naturally one saw to it that the aerial should be of the maximum length allowed, and that its insulation should be thoroughly efficient. The earth, too, is a good one, consisting of a large metal bath buried in damp soil immediately under the aerial. Even with this poor system fairly good results were obtainable with carefully designed sets. I have always found, though, that 2 LO

cannot be picked up on a crystal, and that even 5 XX comes in faintly unless at least one valve is used. My actual results are about a valve worse than those obtained by friends who live in higher parts of the town and are so situated that they can erect better aerials. For example, I need one high-frequency valve and two note magnifiers to give respectable loud-speaker results with the transmissions of 2 LO and the nearer broadcasting stations. If I take the set to the houses of certain friends I can get results that are just as good without the use of the high-frequency valve.

On the whole the reception of British stations was not too bad, but the difficulties arose when it came to dealing with American broadcast transmissions. Here it was necessary to use two high-frequency stages, and anyone who has used such an arrangement knows that searching is a matter of considerable difficulty and that the set is hard to control when finely tuned as it must needs be to pick up weak and distant signals. Most of the U.S.A. stations

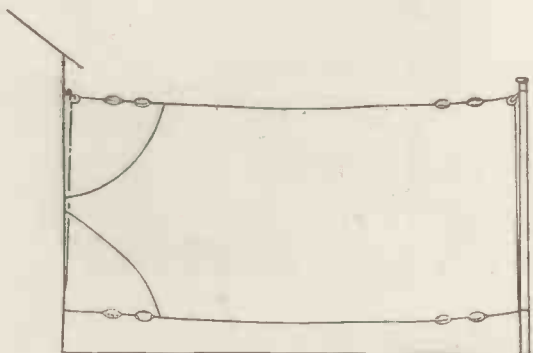


Fig. 2.—First Arrangement of Aerial and Counterpoise.

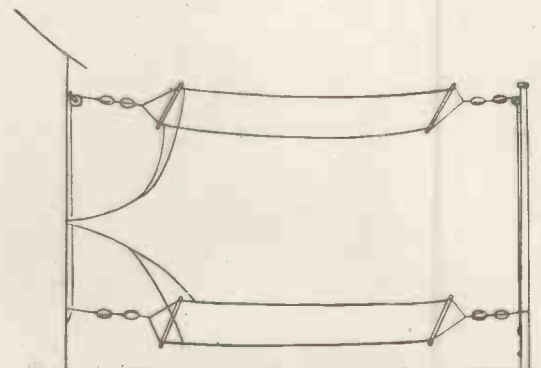
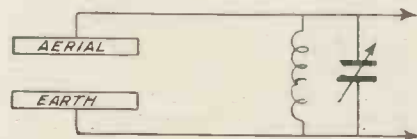


Fig. 3.—Improved Arrangement of Aerial and Counterpoise.

that are heard in this country have been picked up from time to time, but it was never easy to get them, and a good wavemeter had always to be used.

Constructing a Counterpoise

The aerial and the earth being as good as they could be under the circumstances, only one way of obtaining greater efficiency was possible, and that was in the use of a counterpoise; which at any rate seemed



worth while trying out. The statements made on the subject of counterpoises are rather conflicting. Some authorities write that both for transmission and for reception they are much less efficient than a good earth; others again state emphatically that for medium and short-wave work the counterpoise is often better than the earth when used in conjunction with either a transmitter or a receiving set.

Luckily a counterpoise is neither difficult nor expensive to erect. The materials needed for the first trial were a 100 ft. length of copper ribbon—ribbon was chosen because its large surface area makes for big capacity—and four shell insulators. As the aerial was a single one consisting of a length of 7/22 cable a single ribbon was used in the first instance. With this arrangement, which is shown in Fig 2, the results were distinctly interesting. There was a marked increase in both selectivity and in signal strength. The set in fact, if

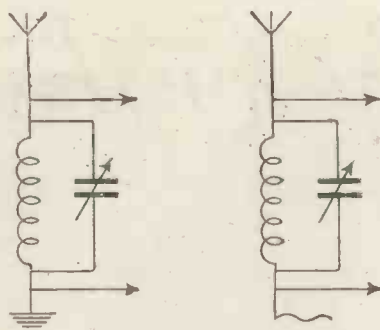
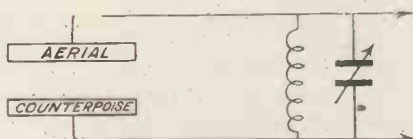


Fig. 4.—Comparison of Aerial-earth (left) and Aerial-counterpoise (right) Systems.

type described as being well worth the attention of any readers who are so situated that they cannot obtain a really good aerial and earth system. Besides the increase in strength which the counterpoise gives in many places it also diminishes the effects of atmospheric and of induction noises; but do not forget that the aerial-counterpoise system is used by many amateur transmitters because they find that it is a very powerful radiator. If, therefore, you



not a valve better than it had been, was very nearly so. There was, however, one great drawback—the aerial-counterpoise system made the set rather difficult to handle.

Damped Grid Circuit

Whereas with an earth a bias of about .5 volt positive supplied to the grid of the high-frequency valve was sufficient to prevent any tendency to oscillation, it was now found that the potentiometer had to be adjusted so as to damp the grid circuit very heavily in order to steady the set. As much as 3 volts positive on the grid were needed to make it possible to search round for various stations without squeaking or squealing in the process. It was noticed, too, that the A.T.C. scale reading was very much higher with the counterpoise than when the earth was used.

This showed that the new system gave less capacity in the aerial circuit. It was therefore decided to try the arrangement shown in Fig. 3, in which two lengths of 7/22 cable are used with spreaders 4 ft. 6 in. in length for the aerial. The counterpoise is made of two lengths of 1/2-in. copper ribbon hung on spreaders of the same length as those used for the aerial. This arrangement is most satisfactory, giving really excellent reception of good quality and strength. The set still requires a little extra positive potential on the high-frequency grid to steady it, but the amount is not great enough to introduce so much damping that either selectivity or signal strength suffer.

A Danger to Watch

With certain reservations I can recommend the counterpoise of the

are one of those who cannot tune in broadcasting stations without first picking up the carrier wave, and then finding the silent point between squeaks, do not try the counterpoise, for if you do so you will undoubtedly cause your neighbours to suffer a great deal of interference. In any case do not attempt to employ a counterpoise until you have made yourself quite familiar with tuning an aerial-earth system.

How does the counterpoise work? Fig. 4 shows a diagrammatical representation of the two systems as well as a convenient way of thinking of them. In the aerial and earth system we have a large condenser—large, that is, in size though its capacity is small—which acts as a collector of oscillations. The two "plates" of this condenser are the aerial itself and the ground. In the counterpoise arrangement we have again a collecting condenser, but this time the lower plate is formed

(Continued on page 114)

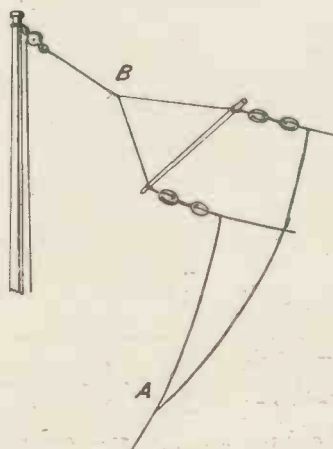


Fig. 5.—Wrong Positions of Insulators.

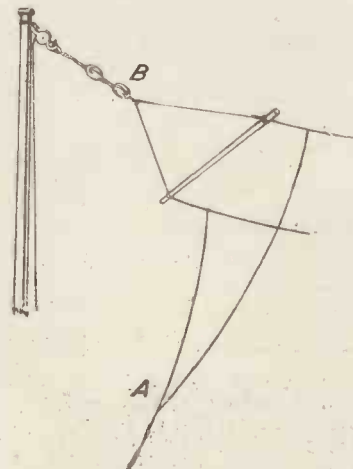


Fig. 6.—Correct Positions of Insulators.

Absolutely for the Novice!

YOU have been to a friend's house and listened to a wireless concert, or your wife or your children have done so, and are keen on having a wireless set. It is said wireless is not difficult to manage, and you argue rightly that it can't be or so many people would not have mastered it. There you make a trifling misjudgment. Though in Great Britain alone about half a million people listen in, probably not one-fifth of them get the best they can out of their sets. Still to get anything at all is much better than nothing. You feel ready to inquire further? Very well, then.

The Simplest Set

The simplest kind of wireless receiving set is the crystal set. To get it working you need no other auxiliaries than an aerial and earth wire, either separate or combined, the set itself and a pair of telephone receivers, or if there are three or four people who will be wanting to listen at once, sufficient pairs of telephones to provide one for each listener.

An aerial is a length of wire of not more than one hundred feet, which should preferably be stretched in the air out of doors, as high up as possible, and roughly horizontal. The near end of the wire carries an extension, called the leading-in wire, which comes indoors and has to be taken to the terminal of the set marked "A" or Aerial. Except for this connection the aerial must be carefully insulated by seeing that wherever it is hooked up or fastened it touches nothing but porcelain, ebonite or rubber. The details of this we will go into later. For the moment we are out to get a general grasp of wireless reception as a whole.

Near to the aerial terminal on the set will be found a second terminal marked "E" or Earth. This takes the earth wire. Insulating any part of an earth wire is not so important.

It may even be bare and allowed to touch what it likes over the whole of its length, though this makes tuning less constant. Ordinarily, this earth wire should be taken to the nearest exposed water pipe, such as the pipe of a bathroom or scullery tap, and after the metal of the pipe has been cleaned and brightened the end of the earth wire should either be soldered to it or twisted on tightly.

In this series of articles our contributor deals with the principles of wireless in as simple language as possible.

Although, in consequence of the treatment of a highly scientific subject such as wireless in this manner, certain analogies may not be absolutely correct, any departure from the actual truth is not serious enough to prevent the novice gaining a sound practical knowledge of the subject.

Next month: "Choosing a Wireless Set."

We have now got a wire hanging suspended between props somewhere up skyward. This wire connects with the wireless set, and from the set a second wire goes to the water mains, which as we know, run most of their distance well sunk in the earth. We shall hardly help seeing the analogy between the arrangement and an ordinary lightning conductor. As with lightning, so with wireless waves, energy is to be caught out of the air and assisted along a carefully arranged path of copper wire down into the earth. Only, unlike ordinary lightning, the wireless energy is caused on its way earthward to pass through a box wherein it does work, just as water from a leat is taken over a water wheel and made to perform work on its way to the sea. The work the wireless emanations, or "waves," do is to actuate telephones so that they reproduce the music being performed in the

broadcasting studio of the station being received.

How is it Done?

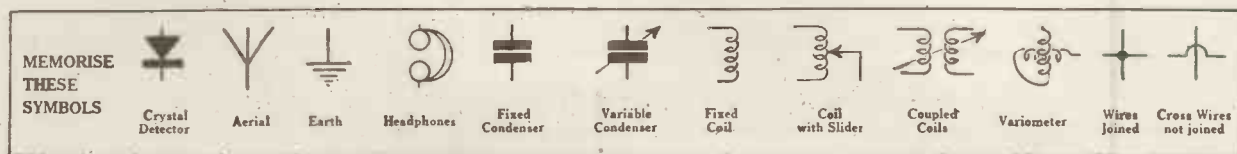
How do the waves accomplish it? Put very roughly and baldly, the original sounds made by the musicians transmitting in the broadcasting studio are allowed to fall upon an instrument called a microphone, which converts them into minute impulses of electricity. These electric impulses in their turn are fed into transmitting valves and turned into an oscillatory electric discharge having a "frequency," or number of go and return vibrations, of somewhere about a million a second.

Then this oscillatory discharge ascends into the transmitting aerial slung above the broadcasting station and energises its wires so that they start an invisible game of rackets with the ether, batting it, as it were, and starting it pulsating too.

Don't ask what this "ether" is, for nobody knows, except that it is supposed to be entirely intangible and unweighable, and to penetrate the whole of space. We are not to think of it as atmosphere, or air, for it is something infinitely more scientific, and we shouldn't be doing it justice.

To come back to the effect of the energised aerial upon the ether, we may think of it sending out waves of energy as a stone sends out ripples when thrown into a pool. But the ripples made by a stone hitting water only flow along one level surface, or "plane," whereas wireless waves flow out promiscuously in all planes, on which account they are truly described as broadcast.

Meanwhile our set is waiting to pick the waves up. This happens in the following way:—Just as it was oscillatory electric energy that caused the transmitting aerial to generate wireless waves in the ether, which waves are now flowing out in all



directions, so when they in their turn hit upon a stretched wire they generate in it weak corresponding oscillatory electric impulses, having a similar formation (modulation) to the original ones.

Insulation

I want to make it plain that such faint-echoes, as it were, of the original oscillatory discharge are set up anywhere when wireless waves strike upon metal, no matter whether the metal is a proper aerial, or whether it is a metallic clothes line, piece of ordinary electric light or bell wiring, or even the bars of a metal railing or the wire netting of a fowl run or hen coop. Only if the metal is not insulated at all points but one, and connected at that one point with a wireless receiving set, the energy it catches from the ether will run to waste. What we pick up by means of our aerial, however, instead of dissipating itself anyhow, can only travel to earth by one path, which is through the wireless set, on its way to final discharge.

Now we have arrived at the point where the internal arrangements of the set must come under review. In a simple crystal set the parts are few and easy to follow. In fact there need only be these: An inductance, a small fixed or variable condenser and the crystal detector, with, of course, the telephones. Since all inductances have a certain condenser action as well, there need not necessarily be a separate condenser in a simple wireless set.

Inductance Coils

An inductance is just a coil of wire having its turns wound close together and at least moderately well insulated from one another. A suitable inductance for broadcast reception can be made by winding sixty turns of No. 22 gauge enamelled copper wire closely and evenly in a single layer upon a three and a half inch tube either of ebonite, compressed fibre, or wax, or shellac-impregnated cardboard.

As the electric impulses from the aerial pass through this inductance they generate in it an induced current at sufficient voltage to oper-

ate the crystal detector. The inductance must be wired up directly between the set's aerial and earth terminal, the wire to the crystal of the detector being taken as a branch from the aerial end of the inductance. This crystal, of which so much is heard in short range wireless reception, is usually a piece of the mineral called "galena," a native lead sulphide. Galena has the property that it will allow an oscillatory current to pass in one direction between it and a fine metallic point, but will not let it pass in the other direction. The complete detector consists of the galena crystal held firmly in a metallic cup and a piece of fine pointed springy wire so adjusted as to touch lightly upon the crystal's surface. The springy wire is called a "catwhisker." With the crystal connected with the aerial terminal the upper end of the catwhisker must be connected to a terminal to which is attached one of the wires from the telephone receiver or receivers.

Phone Terminals

The other telephone wire connects with the earth side of the inductance through another terminal. On a commercial set these two last terminals are plainly labelled with the word "phones," so there can be little mistake.

Now we will trace out what happens in the detector and phones, and we shall then have a sufficient outline of the method of wireless reception to be able to bring a good heart to the absorption of further details upon the practical side of running a wireless set. Well, then, besides oscillating round the inductance and going to earth through the earth wire, a portion of the energy from the aerial prefers to take the branch route through the rectifying crystal and phones. This it does because an inductance when properly tuned to the wavelength of the received impulses takes to itself a relatively enormous "impedance," or internal resistance to oscillating (backward and forward) currents.

Hence the path through the crystal and phones becomes for that particular wavelength easier than the

path through the inductance coil. But at the crystal detector one half of each two-way current impulse is stopped, with the result that the current which gets into the telephone windings is a one-way, or rectified, current.

Diaphragm Vibration

Rectified current, when passed through the wire winding of the little magnet inside a telephone receiver can cause a momentary alteration of the telephone magnet's strength. That variation in magnetic strength brings about a corresponding alteration of pull upon the springy steel plate, or diaphragm, within the telephone sound box. The diaphragm is thereupon set vibrating. That microscopic tremor of the metal is what reproduces the beats of sound and so builds up a faint replica of the original music or speech transmitted.

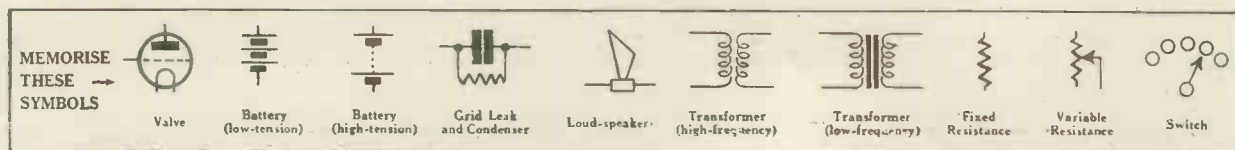
That completes, in outline, the whole chain of broadcast reception and transmission. And so, having mapped out broadly the tract which we have set ourselves to explore, we shall be ready, as occasion may arise, to reinforce our knowledge bit by bit, as though by consultation of larger scale maps. C. N. B.

(To be continued)

A B.B.C. correspondent says that broadcasting leads to less reading. But not of THE WIRELESS MAGAZINE.

PEOPLE with whom we sympathise: The listener who discovered that his wife hung the week's washing on his new aerial.

PRESENT-DAY listeners-in should be thankful they did not live in Shakespeare's time. This is what he made Prospero say to the Ariel he employed in *The Tempest*:—"Thy groans did make wolves howl and penetrate the breasts of ever angry bears; it was a torment to lay upon the damned." Still, we occasionally encounter aerials like that, even nowadays.



CROOKS *and* WIRELESS

by
William Le Queux



HAVING for some years been interested in criminology and criminal methods both here and on the Continent, and having, by means of my inquiries in the underworld of the European capitals, formed the personal acquaintance of crooks of both sexes and of various grades, I am naturally interested in all and every method of investigation pursued by the police.

First Arrest by Wireless

For years past I have urged upon the Paris Sûreté—with whom I have often been in close touch—the desirability of using wireless in their hue-and-cry. Indeed, in more than one instance they have, at my advice, broadcast news of serious crime, and descriptions of suspected persons. The first arrest effected by a wireless message was, of course, that of the notorious Dr. Crippen, for the murder of his wife, Belle Elmore. With that arrest I had nothing to do, but curiously enough I knew Crippen well—under another name, that of Doctor Adams—and he gave me certain material concerning secret poisons which I used in a novel of which I will not here give the name because, after its publication, I withdrew it, fearing lest it might induce some people to poison in secret!

Poison is so easily administered by those skilled in toxicology that the crime of murder can, too frequently, be accomplished by those who “know,” without leaving trace. For that reason I suppressed what I thought to be an outstanding book. Had I allowed it still to be sold I would, no doubt, have reaped a very rich harvest in royalties both here and in America, and from the various Continental translations.

Let us, however, dismiss the case of Crippen, who was, after all, an expert poisoner, and who, I have no hesitation in saying, had murdered a number of people for gain, and turn to the future of the police

hue-and-cry after the elusive culprit, and how it can best be assisted by the use of wireless.

Photos by Wireless

When we come to police alarms and requests, we are faced with many great difficulties. The chief is the fact that any formidable gang of crooks will, if the police use wireless, establish a sensitive set of their own, and listen attentively to any police alarm.

Photographs of criminals—or even of honest persons for that matter—can, thanks to the new photo-electric cell, be transmitted by wireless or land-line over great distances. This will, in future, no doubt, be of greatest advantage to the police authorities of the world. Without the photo-electric cell television would be impossible. A technical description of it would occupy too much space in these columns, but it is sufficient to say that the cell—German, of course—is constructed of a material which is a conductor of electricity when light is shining on it, but is a non-conductor when in darkness, so that as a photograph moves to and fro the light shining through it varies the electrical current in accordance with the light and shade of the photograph. This makes a series of dots of varying intensity, which break up the photograph very much in the same way as a “screen” does when a picture is being reproduced in a newspaper.

Finger-prints

Now by this means I had my own finger-prints sent by wireless from Paris to Lyons about three months ago. And when the wireless photograph was returned it corresponded exactly with the impression of my finger-tips in the possession of the Prefecture of Police in Paris.

I contend that while the transmission of the actual photograph of the face of a wanted person of either sex may not be sufficiently distinct

to warrant an arrest, yet the transmission of finger-prints—which we are told cannot lie—will in the very near future be of the greatest use to Scotland Yard, and, indeed, to all the police of Europe.

Suppose that a crime is committed in London by a man suspected by the Criminal Investigation Department and known to be a criminal whose finger-prints are on file. From Whitehall the photograph of the curved lines upon his finger-tips is sent out by wireless to various capitals, together with a description of the wanted man.

The alarm and description will be awaited by the escaping criminal's friends, who are listening and will give him warning. But the gang will certainly miss the finger-print photograph because they will not be in possession of the necessary recording apparatus which will no doubt soon be installed in every capital.

Wireless-telephony, such as our present-day broadcasting of sermons, jazz-music and entertainments, will be of no account in dealing with the escaping criminal. Indeed, to telephone openly would be playing into the enemy's hands.

A Famous Detective's View

And here we arrive at one of the most important points of the detection of crime, the rock upon which so many great detectives have split. The great Goron, ex-chief of the Paris Sûreté, and perhaps the greatest detective of our time, once said to me with much truth:

“In detective work one is constantly subjected to all kinds of experience, and I do not believe there is another profession to be found anywhere where a general knowledge of things is to be found of such advantage.

“It would be impossible for any person, even the most experienced and skilled detective, to set down a list of rules and regulations governing the conduct of a person engaged to

make an investigation of a criminal case. What might apply in one case would probably be entirely inadequate in another. It is possible, however, to remember that after all experience is the best teacher.

"In reading detective stories or in reviewing a film drama relating to detective work I have been often amused at the strange plots and situations developed from the author's brain. Most of them are impossible. We want wireless to assist us in our work."

In the Future

Well, wireless has come. The great Goron who has now retired, but who has to his credit the capture of several of the greatest and most desperate criminals of the past half century, was perfectly right. Wireless is wanted, and wireless will be the greatest aid in the future in the detection of serious crime.

How will it be accomplished? In every country in the world tests have recently been made, but it has been found that by broadcasting, the publicity of it all has defeated its own ends. The transmission of photographs or finger-prints can be absolutely secret from the ordinary listener, no matter how selective be his set, because he has no proper receiver to "screen" and record the received images. Hence police messages must be in morse, and not in open language which any broadcast receiver may pick up.

Ninety-nine per cent. of those who possess receiving sets have no adequate knowledge of morse. Only those applying for transmitting licences are required to know morse, hence the average wireless listener does not take the trouble to learn it. That fact is most important in considering future police arrangements. The police can have a simple prearranged code which can be changed at will by the prefix letters or numbers, a code which will defy any listener to de-code the message, even though he may know morse.

A few weeks ago I sent a morse message from my own research set on the south coast to Brest in a most simple code, but rendered most complicated on account of its prefix, and it was read quite easily at the French port. I sent it as a test as to what could be accomplished by Scotland Yard when

necessary. A friend was staying at the Hotel Continental in Brest, and within half an hour the operator at the other end called upon him and, to his great surprise, delivered my message that I "wanted" him.

Thus as far away as Finisterre I proved beyond doubt the value of a simple but ingenious code, a couple of lines of rhyme, which could be committed to memory and the key of which could be changed at will so as to form nearly twenty thousand variations, and be a complete puzzle to any listener on behalf of the fleeing criminal. In my own tests I told a friend a few miles away the secret of the code but not the key. He listened to my morse to Brest and took it down, but his description was utterly hopeless. He made it out to be prices of fish at Billingsgate market!

Value of a Code

Very soon, with morse messages in the constantly changed police-code, which will be arranged by an international conference at Berne combined with the transmission of photographs, the net drawn around a fleeing criminal will be tightened from the first moment after his crime. His description, his photograph, his finger-prints and his signature, will all be broadcast within an hour, to every police centre all over the world, and news received by those requesting his detention from any spot where he

may be recognised and consequently watched.

In the very near future the escaping criminal will be doomed to a very thin time, for every day his sphere of operations is being narrowed down.

Knowing more than one member of a criminal gang—as it is my purpose to know them in order to write mystery novels—I am fully aware that they already realise the peril of wireless, and are quite prepared to remain hidden in a populous district at home, rather than attempt to get abroad.

Criminal Sanctuaries

In our big towns there are many criminal sanctuaries, where landladies ask no questions and where, if lodgers take exercise only at night, the fact is not mentioned. A criminal can lay low, and is safer in such a sanctuary than anywhere else in the world, for he can obliterate himself for months, even years, while the police may be searching for him in every corner of the world. The professional criminal knows this, and knows where to find safety. To-day there are many men who have big balances at their banks, and who are living as lonely souls in poor surroundings in the cheaper suburbs of London and other great cities. While they are content with their sordid surroundings and daily squalor, no danger threatens them. But if they become daring and move, then their friends will too often betray them, and Scotland Yard is at once ready to pounce upon them unawares. I know of several such cases.

After thirty years of study of police investigations and regulations, and knowing the firm determination throughout the whole of Europe to cope adequately with the clever post-war criminal—for the present-day criminal is one whose ingenuity knows no bounds—I feel convinced that within the next few months the Powers will combine upon a system, not only of alarm, but of secret reports by wireless, so that Scotland Yard will be able to broadcast its requests to every capital simultaneously, just as it does to-day over the land wires to every police station, but in a code the simplicity of which is its greatest asset.

I only wish I were allowed to give the code on this page.



Erecting the aerial on a police car equipped with wireless apparatus.



The Author Listening-in.

THIRTY miles from the nearest B.B.C. station crystal scratching is not much of a game, even if one does occasionally get on to a station 200 miles away. On most nights reception can only be described as "weak" though readable.

For all that, I had a deal of fun out of it last winter, and when "summer time" ended I was encouraged by my small successes of the previous winter to embark on something more ambitious.

An Absolute "Dud"!

First let me explain that I am an absolute "dud" when it comes to doing things in a workshop; also if I start to make a set I want to see if it works that very night, and not spend months in designing, assembling, and doing cabinet work.

It is not much use making elaborate plans beforehand when one has to use what is available and buy according to pocket-money, but the idea was to make it as portable as possible so as to be able to connect it in another house if desired. Accordingly, a stout wooden box, 14 in. by 10 in. by 10 in., was found. I had no plan to scale, so any size box would have done. I used this merely because I had it. The ebonite panel of the crystal set fitted the breadth of this box loosely and covered about half the space.

Constructing a Set

Ledges were made for this panel to rest on, so that it was sunk right down in the box. The general arrangement of the components on the back of the panel, which can be seen from the photograph, has not been changed. Otherwise the set

the original home-made basket coils. Although I have found these coils more convenient, they really work no better than their predecessors. A DE 3 valve was bought, as these can be run off dry cells, and 12 pocket flash-lamp refills were connected up in series and put in the bottom of the box to supply the H.T. current. Two Fuller dry cells supplied the filament current.

Having got together the various bits necessary to make a one-valve set I lost no time in putting them together. When it was done I had only spent a few hours on the job, and you can guess it was a fine old muddle of wires and bits, but—it worked.

This gave me encouragement to go on and make it up neatly, with batteries, coils, and a space for phones and spare coils, inside the box. When it was together again, London, Chelmsford, and Bournemouth were heard excellently, and four of the other six main stations fairly well.

Breslau—700 Miles

Then one night a man was heard singing in German, and then "Breslau wünscht Sie ein gute nacht" ("Breslau wishes you good night"). Breslau is 200 miles S.E. of Berlin. That is over 700 miles with one valve! It can be heard almost every night now.

After about six weeks of continuous good reception I had the chance of borrowing a valve and an old ex-government transformer. An H.F. valve could have been added, but it would not have made the local stations much louder and would have made the set much more tricky

The School-Boy Listens-in

has been greatly altered since the days of its infancy, an L.F. valve being added, a coil holder and plug and socket coils taking the place of

to handle. Against these objections the only advantage was increased range, and with the set already bringing in signals up to 700 miles this seemed unnecessary, so the L.F. valve won the day.

Two switches were installed, one for switching the filament current to one or two valves, and the other for altering the position of the phones when cutting out one valve. If filament resistances are used for both valves, the first switch is unnecessary.

All B.B.C. Stations

On first connecting up no improvement was found, but after a wrong connection had been altered the reception from Chelmsford, London and Bournemouth was much too loud to be comfortable, whilst all the other B.B.C. stations were readable. Later the Brussels station and Madrid were heard quite clearly.

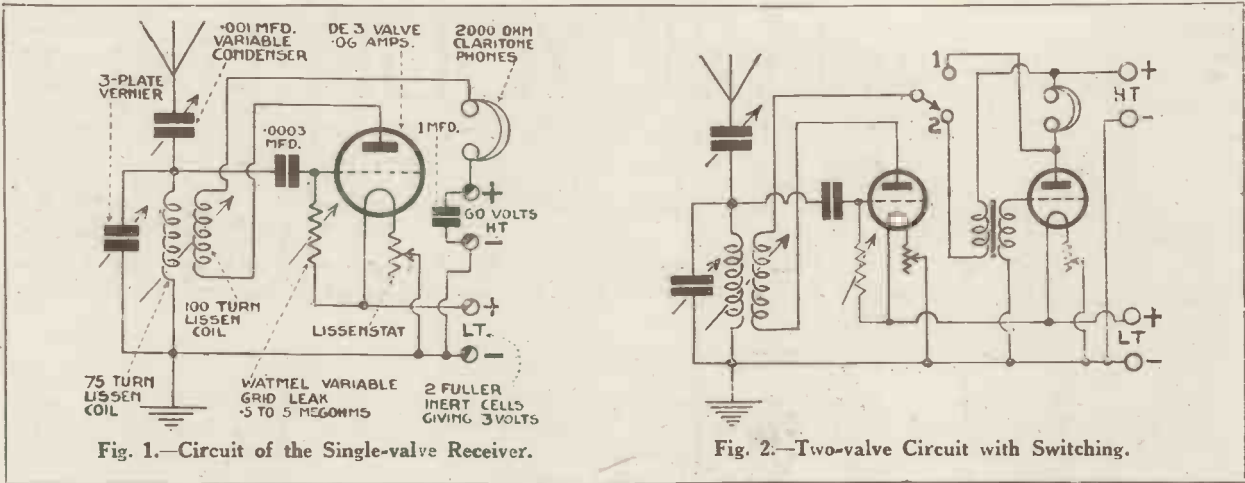
Chelmsford was so loud that everybody in the room could hear the concert plainly with the phones lying on the table, so a loud-speaker was tried and gave sufficient power for a fair-sized room.

The set was also quite successful as a portable receiver, and although rather heavy owing to the batteries, all necessities can be included.

Radio-Paris, the Eiffel Tower, and Königswusterhausen (Berlin) may also be heard by including suitable coils, 150 aerial tuning and 200 reaction for the former station, and 300 and 400 for the last two being found suitable.

Operating the Set

The circuit of the one-valve receiver by itself is shown in Fig. 1 and is the circuit still used when the switch is in the right position. I find, however, that the one microfarad condenser across the H.T. can be left out altogether and a one megohm fixed grid leak can be substituted for the variable leak without altering the results in the slightest.



Great care must be taken, when tuning-in the broadcasting stations to see that the reaction coil is not brought too near to the aerial coil, or the carrier wave of the station will be heard, and this means that you are probably spoiling other people's enjoyment of the concert.

The variable condenser is shown in series, as it is generally used in this position on the broadcasting wavelengths, but for the reception of Chelmsford, Paris, etc., it must

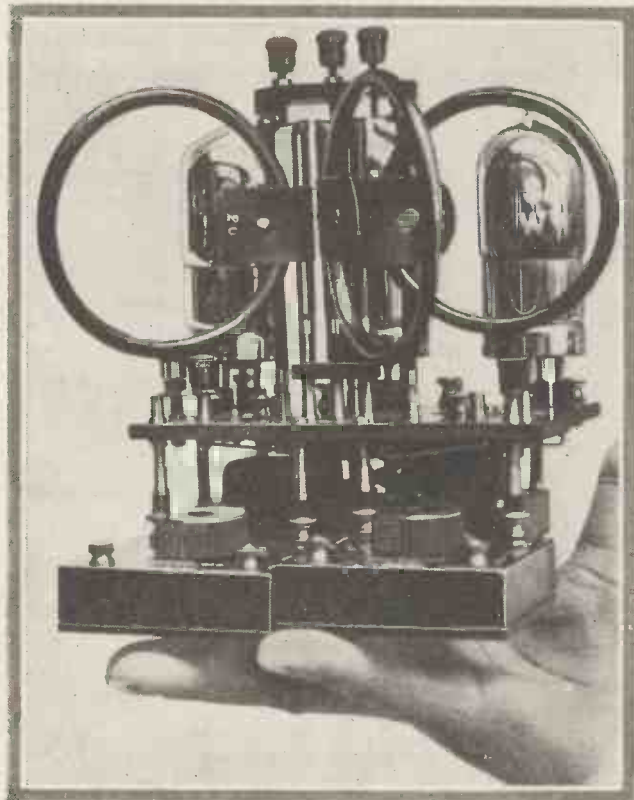
be placed in parallel, that is, in the same position as the vernier. Fig. 2 shows the circuit for the two valves and the switch for using both or only one of the valves.

When using one valve 30 volts H.T. are quite sufficient on this set, but for getting loud-speaker results all the 60 volts are needed, and it is probable that 100 volts on the second valve would make it better still, but with less on the detector valve.

In conclusion, I would not like

to guarantee that this set would receive distant stations everywhere. The aerial with which these results were obtained is high, being 55 feet at the far end and 40 feet at the lead-in. It is the full 100 ft. in length, including the lead-in, and is unshielded. However, I do think that anywhere within 100 miles of Chelmsford with any aerial worth calling an aerial, fair loud-speaker results could be obtained with this set.

DENNIS M. ROBINSON.



A Three-valve Set small enough to be held in the hand. Note the special French coils.



Another French novelty—a Crystal Set in a telephone stand.



Ordinary Valve.

WHAT YOUR VALVE DOES

1-How it "Detects"

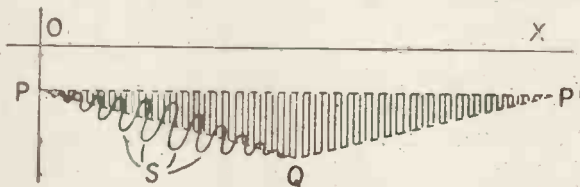
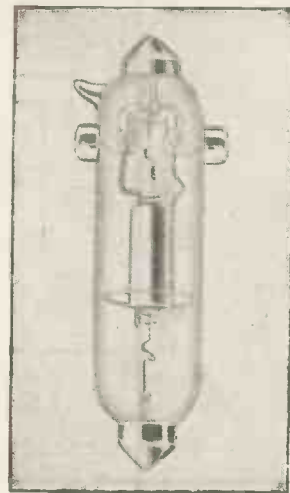


Fig. 4.—Diagrammatic Representation of Rectification.



Anti-capacity Valve.

BEFORE the filament of a valve is lit up there is no connection inside the bulb between the three electrodes, plate, grid, and filament. All three are perfectly insulated from each other by the internal vacuum. When the filament is heated by the passage of an electric current, and the plate is "charged" with electric pressure from the high-tension battery, there is still no apparent link inside the tube between the three electrodes. Nevertheless an invisible stream of electrons is now flowing from the filament past the grid on to the plate, providing a sensitive control medium between the grid and plate.

Amplify or Rectify?

In other words, when incoming ether waves are impressed upon the grid from the aerial, their effect is transmitted *via* the electron stream to the plate, causing variations in the otherwise steady plate current. The effect on the plate current, however, is not always strictly proportional to the signal voltages applied to the grid. In some cases steps are taken to ensure that the plate response is directly proportional, and the valve then operates simply as a high or low frequency amplifier. At other times

special means are used (of which the leaky grid is one example) in order to distort or modify the plate response. In this case the valve operates primarily as a detector, and to a certain extent, as an amplifier too.

Characteristic Curve

If the separate experiment is tried of applying different grid voltages to a valve in a succession of increasing steps, measuring the resulting values of plate current at each step, and then plotting these two related values out on squared paper, a curve will be obtained similar to that shown in Fig. 1. It will be seen that the curve is not a straight line (except for a short distance near the centre), but shows two pronounced bends or "knees" at *x* and *y*. In order to emphasise the formation of the upper and lower bends they are shown exaggerated in the curve, Fig. 2.

Grid Bias Rectification

By placing a source of negative voltage (grid bias cells) in the grid circuit, we can, so to speak, "set" the grid at the point *x*. This is one device by which the valve can be made to operate as a rectifier. Consider, for example, Fig. 2, and imagine signal impulses to be applied to the point *x*. The signal waves will cause the initial grid voltage to fluctuate for equal distances on each side of the point *x*. The negative half-waves move it to the left, and the result will be no change in plate current. The curve simply travels in a straight line parallel to the base, i.e. it maintains a constant value. On the other hand the positive half-waves move the "operating point" to the right, and

immediately the plate current jumps upwards.

In other words the positive half-waves have been made effective in the plate circuit whilst the negative half-waves have been nullified. The same process takes place if the grid potential is stabilised at the point *y*, only in this case the positive half-waves are cancelled, whilst the negative half-waves act to decrease the average plate current.

Drawback of Bias Rectifiers

It will be observed that in both these cases the valve is operating at one or other of the bends of the curve, i.e. near points at which the normal plate current is either almost zero or is approximately at a maximum. Neither of these points gives the best result so far as amplification is concerned. In fact, the phone response will be very little superior to that obtained from a crystal.

Grid Leak Rectification

The use of a grid, shunted by a high resistance, enables rectification to be secured at a point approximating to zero grid volts, *k*, Fig. 1, i.e. on the straight-line part of the

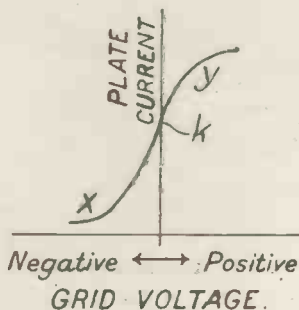


Fig. 1.—Characteristic Curve.

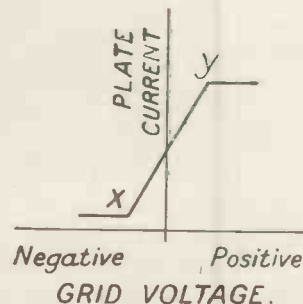


Fig. 2.—Curve with Exaggerated Bends.

characteristic curve. This gives a higher degree of amplification (combined with rectification) than the first method, particularly when reaction is used. Consider in the first place the effect of inserting a .0003 microfarad condenser c alone in the grid circuit, without any shunt resistance, as shown by Fig. 3. The condenser will clearly insulate the grid from the filament so far as any direct current flow is concerned. High-frequency impulses from the aerial can, of course, pass across the condenser c and reach the grid, but no direct current can flow in the grid circuit.

Negative Charge on the Grid

Next consider the effect of a succession of incoming high-frequency signal waves. If the first half-wave

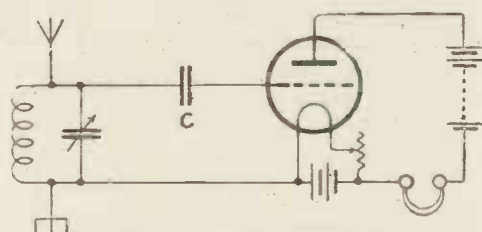


Fig. 3.—Circuit with Grid Condenser alone.

makes the grid positive, it will immediately attract a certain number of electrons from the filament. These will, so to speak, neutralize the momentary positive grid charge due to the incoming wave. If the condenser c was absent the captured grid electrons could escape along the aerial inductance back to the filament in the form of "grid current," and the initial grid voltage would thus be restored. Owing to the presence of the grid condenser, however, this path is not open to them and they consequently have to stay where they are. Their presence must clearly lower the initial grid voltage.

The next signal half-wave is negative. No additional electrons are attracted from the electron stream, but the negative charge upon the grid is momentarily increased. The next signal half-wave is positive, and captures a further small bunch of stream electrons, throwing the grid still more negative.

End Point of Rectification

And so the process goes on, the grid continually getting more and more negative, until it reaches a point where the applied signal varia-

tions do not make the grid sufficiently positive to attract any further electrons. The grid would then be left permanently charged to a steady negative potential and rectification would cease.

As the grid potential sinks, the plate current naturally falls in sympathy. But it will be observed that the net plate current change is a relatively slow or low-frequency effect. It takes very many high-frequency waves to reduce the plate current from its initial to its end value.

Grid Leak Restores Sensitivity

The object of shunting the grid condenser c with a resistance or leak of from 1 to 2 megohms (a megohm is one million ohms) is to enable this

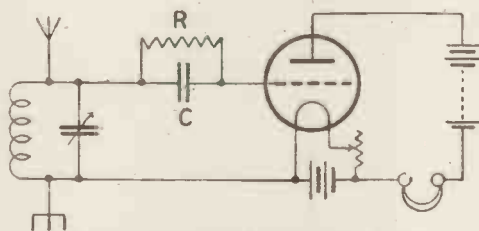


Fig. 5.—Grid Condenser with Leak.

low-frequency change in the plate current to take place, whilst at the same time providing a means of restoring the grid voltage to normal after it has fallen to its maximum negative value. The leak resistance simply opens up a relief path between the grid and the filament. It ensures that when the grid has accumulated a certain charge of electrons, the excess negative pressure can discharge itself across the leak, and so re-set the grid to its original sensitive condition.

Fig. 4 shows the state of affairs diagrammatically. ox is the zero potential line. $p p^1$ represents the normal grid potential (slightly negative). The effect of the high-frequency signal waves is shown at s . The grid voltage first sinks from p to a point q , passing through the middle of the signal fluctuations s . From the point q to p^1 the acquired

grid potential is being discharged through the grid leak until the point p^1 is reached, at the same level as p . The average effect on the plate current is measured by the shaded area $p q p^1$, and is a low-frequency or audible effect. On this low-frequency plate-current variation are superimposed minor fluctuations or ripples corresponding to the secondary grid changes s .

These secondary or high-frequency ripples are utilised in the plate circuit of a back-coupled detector valve to strengthen or boost the incoming signals in the grid circuit.

Telephony Reception

In applying the explanation of the grid leak effect to the case of telephony it must be remembered that

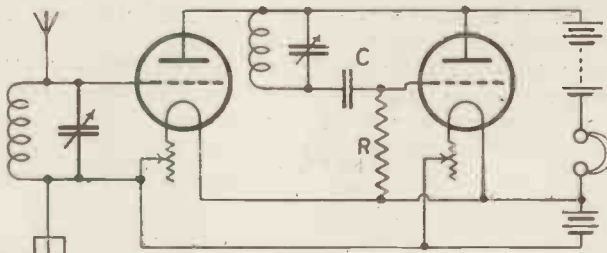


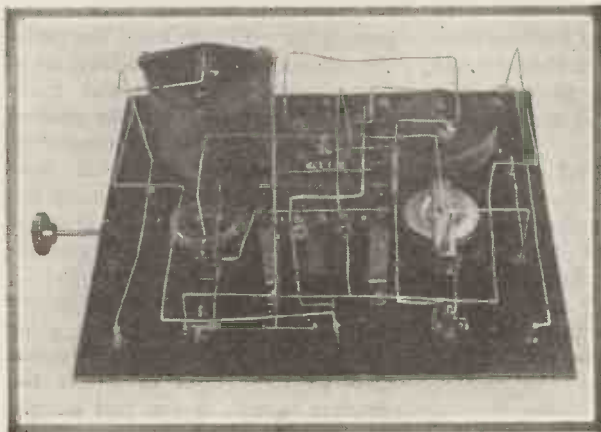
Fig. 6.—Two-valve Circuit.

the very highest audible note covers the time interval of several hundred ether waves of the frequency used in broadcasting, and that only a relatively small number of these are effectively modulated, so that there is ample time for the leakage effect from q to p^1 to take effect without interrupting the continuity of the received sound.

Usually the high-resistance leak R is connected directly across the two plates of the condenser, as shown in Fig. 5. In the case, however, of a detector valve coupled to a high-frequency amplifier through a choke coil, high-resistance wire, or tuned-plate circuit, the leak is connected straight across from grid to filament, as shown in Fig. 6. The reason is that in these cases the condenser c also serves to protect the grid from the high plate potential of the preceding valve, and this object would be defeated if the condenser plates were directly bridged by the leak.

B. A. R.

It was rather appropriate that many of the people who had their aerials blown down during the recent gale were those who had been blowing-up the B.B.C.



Two-valve Reflex Set Wired Up

A Reflex Set with Valve Detector

as Designed, Built and Tested by
"The Wireless Magazine"

IN the two-valve reflex described in this article the majority of readers will appreciate the absence of the crystal detector which is apt to give trouble in adjustment. Referring to the circuit diagram, Fig. 1, the first valve acts as a high- and low-frequency amplifier, and the second valve as a detector. Tuning

is easily accomplished by the rotation of the condenser dials on the panel. The reaction coil is coupled to the tuned-anode coil of the first valve.

List of Components Required

One Radion panel, 12 in. by 10 in.
2 variable condensers, .001 and

.0002 microfarad (Bowyer-Lowe square-law).

2 filament rheostats (Igranic).

1 low-frequency transformer (Radio Instruments).

1 variable grid leak, .5 to 5 megohms (Bretwood).

5 fixed condensers, .0003, .0003, .002, .002 and .05 microfarad (Lissen).

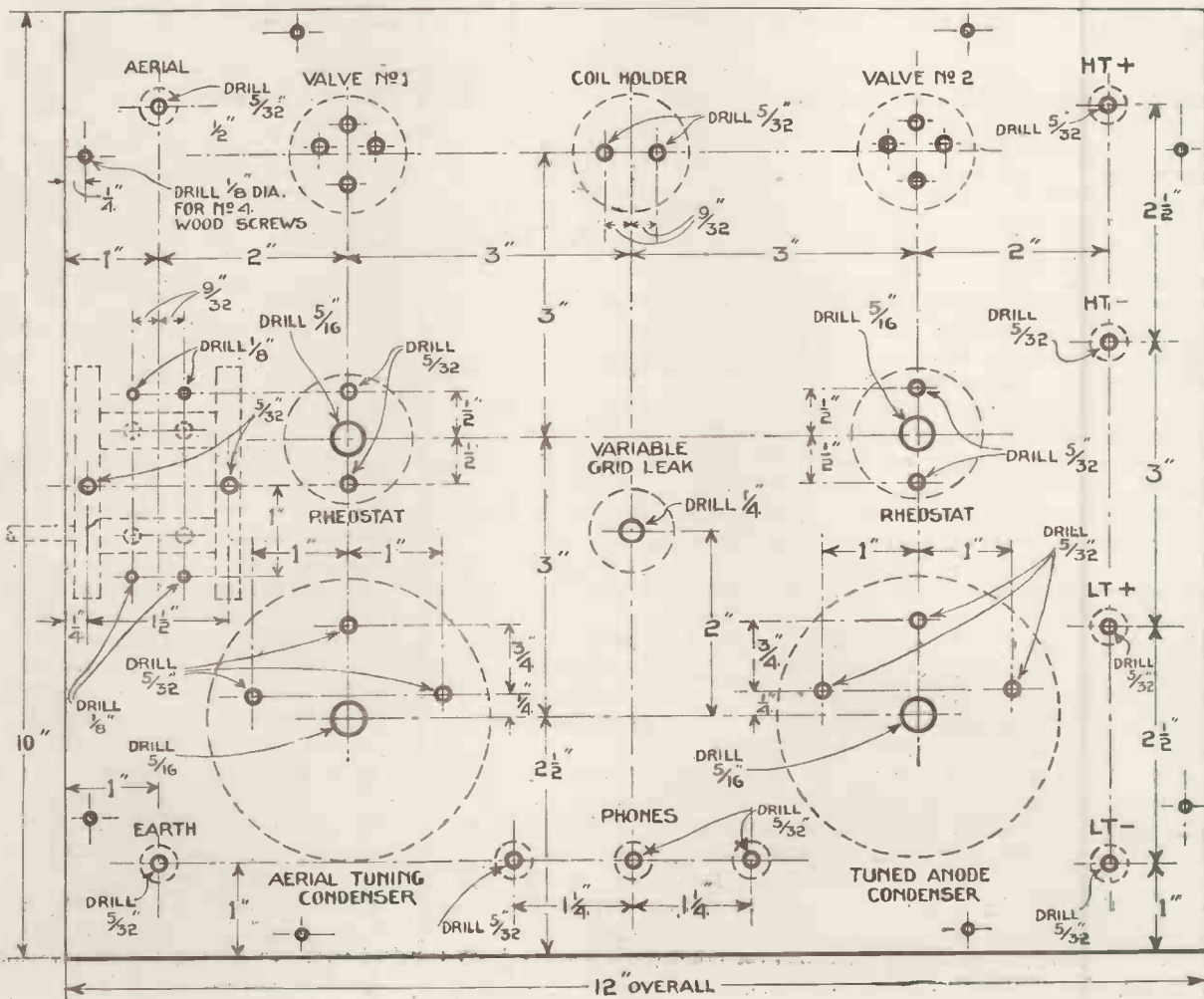


Fig. 3.—Drilling Layout of Panel.

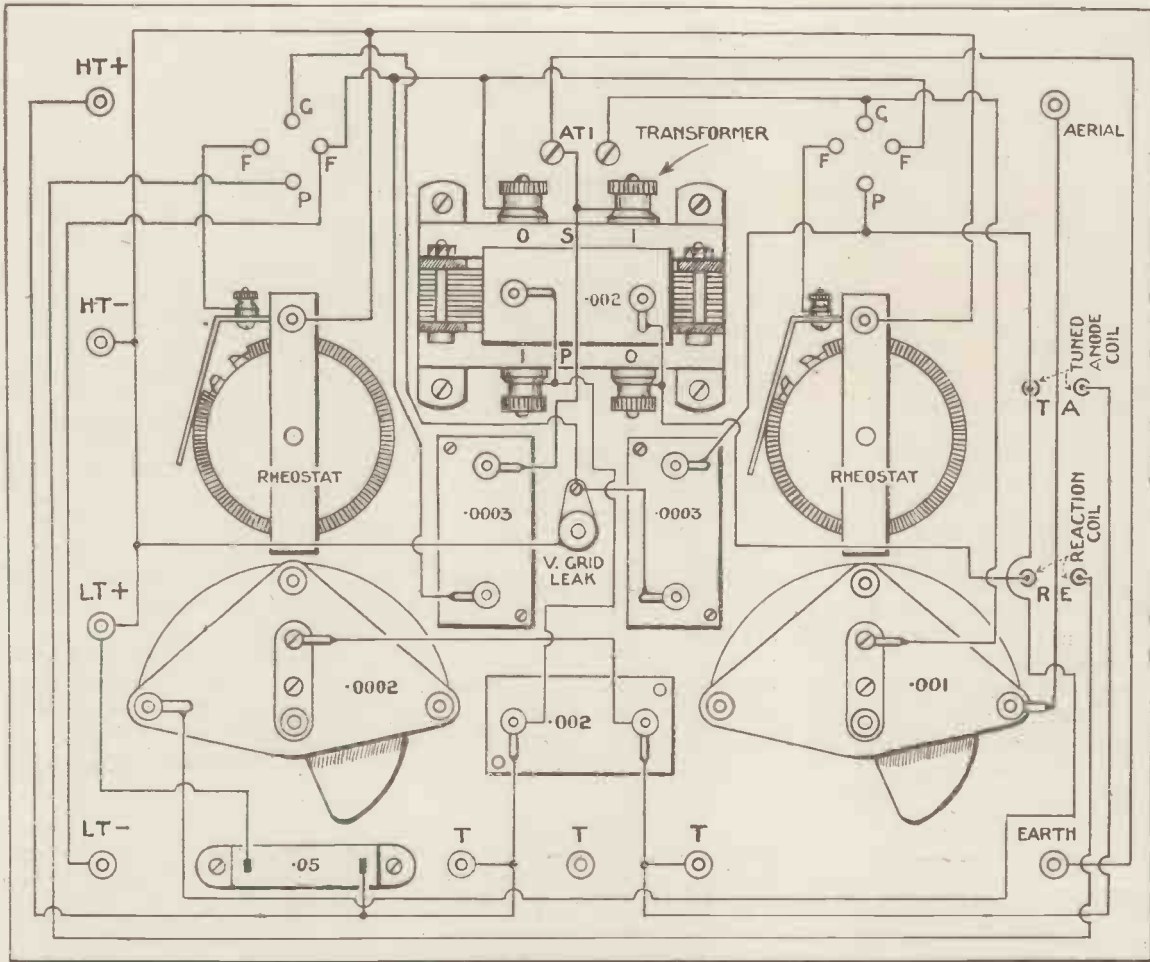


Fig. 4.—Complete Wiring Diagram.

- 1 fixed coil holder (Ediswan).
- 1 two-coil holder (Polar).
- 9 terminals (Refty).
- 2 valve holders.
- 2 valves (Ediswan A.R.).
- Square tinned copper wire.
- 18 in. of lighting flex.
- 4 B.H. nuts and screws.
- Igranic or Lissen plug-in coils.
- 1 mahogany case.

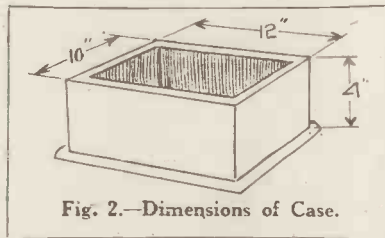
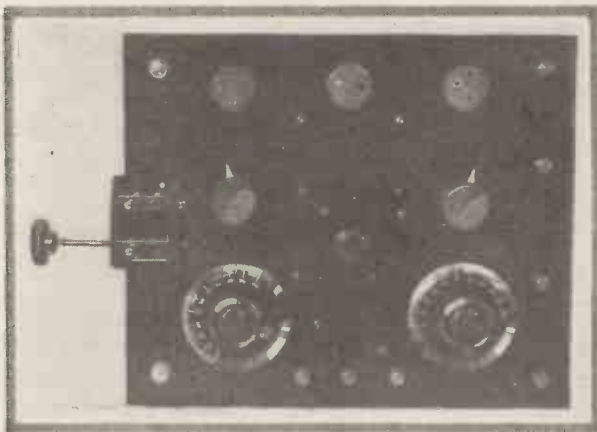


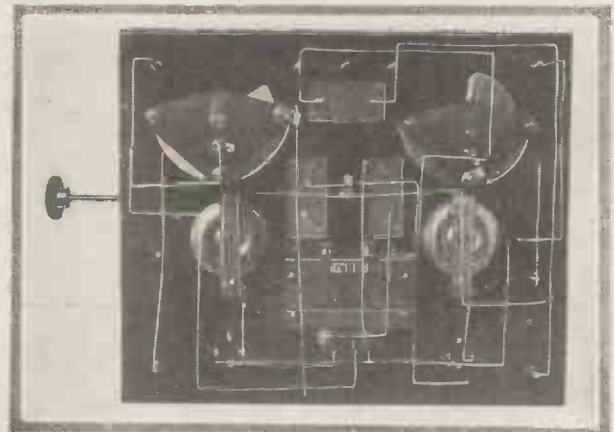
Fig. 2.—Dimensions of Case.

The construction of a case hardly comes within the scope of a journal devoted to wireless, but for the benefit of those who would like to make their own case, a dimensioned sketch is given in Fig. 2.

A Radion ebonite panel may be obtained ready cut to size and ready for marking out. The positions and sizes of the holes are shown



Front View of Panel.



Back View of Panel.

on the panel drilling layout given in Fig. 3. The four terminals on the right of the panel (from top to bottom) are for + H.T., - H.T., + L.T. and - L.T. The top and bottom terminals on the left of the panel are for aerial and earth respectively. The loud-speaker is connected to the two outside terminals of the three on the bottom of the panel. If two pairs of phones are used, one tag of each pair is connected to the centre terminal, and the remaining two tags to the outside terminals.

Tuning Coils

The aerial tuning coil is now plugged into the socket mounted between the two valve holders on the top of the panel. The anode coil and the reaction coil are plugged into the fixed and moving arms respectively of the two-coil holder on the left. The aerial tuning condenser is on the left and the anode coil tuning condenser on the right. Filament rheostats are seen above

each of the variable condensers. The grid leak is mounted in the centre.

No holes have been shown for fixing the transformer and the fixed

network of wire formed above them. The complete wiring diagram is given in Fig. 4. Flex should be used for connections to the movable reaction coil.

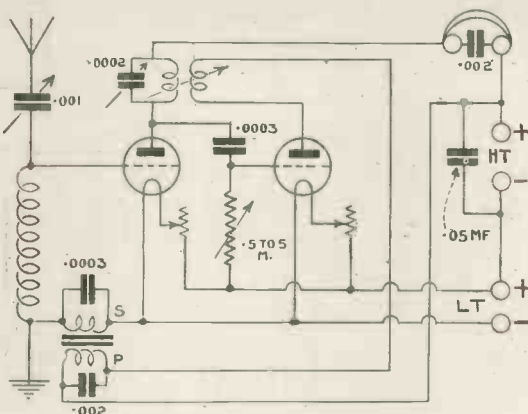


Fig. 1.—Circuit Diagram.

condensers. The constructor is advised to use the instruments themselves as templates for drilling.

It is advisable to wire up first the fixed condensers and rheostats, otherwise these instruments may become inaccessible, owing to the

Operating the Set

For broadcast wavelengths, a No. 60 coil should be plugged into the single coil holder and a No. 75 into each arm of the two-coil holder.

The L.T. and H.T. batteries, aerial, earth and phones should now be joined to their proper terminals. Keep the reaction coil at an angle of about 45° from the anode coil, and having turned the two rheostats until the valve filaments are bright, search round for signals by slowly turning the two variable condenser dials.

When signals are received, tighten the reaction coupling until reception is comfortably strong. In an actual test the best value of H.T. was found to lie between 60 and 80 volts. If the set is inclined to "howl," loosen the reaction coupling and vary the filament current.

A COMBINED LEAD-IN AND AERIAL CONDENSER

A DEVICE for directing the aerial currents to the receiver, and one that obviates the necessity of boring holes in the woodwork or glass of the window is certainly an innovation, but the piece of apparatus shown in the accompanying photograph does even more than this. It acts as a fixed condenser and, being in series with the aerial lead-in, forms a "constant tuning" arrangement for the aerial system.

As will be seen, it consists of two metal plates, each having a terminal at its centre. An insulated arm is attached to each disc, and a thin springy metal yoke is bolted to the further end of each arm. This yoke, when in position around the top bar of the window frame, does not interfere with the closing or opening of the window.

When in use, the two plates are separated by the glass of the window, which acts as a dielectric, the whole

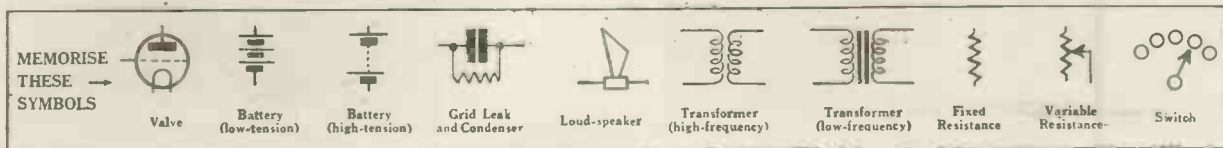


The Device in Position.

forming the condenser. The aerial lead-in wire is attached to the terminal on the outside plate, whilst a lead from the receiver joins the inside plate.

One possible disadvantage when using this component is the probability of moisture creeping between the outer plate and the glass during rainy weather. This could be remedied by packing a thin rubber washer around the edge beneath the outer plate. The capacity would then remain fairly constant and the plate would be doubly insulated from leakage down the window should the latter be a little wet and dirty.

Patent rights have been applied for by the inventor, Mr. A. H. Guinness, of Everton Cottage, East Sheen, London.





Mr. Albert Sammons.

Music

OF THE

Month

a very fine performance they made. Miss Blyth has been one of the most indefatigable singers before the microphone, and her voice "radios" finely by reason of its clarity. Miss Bennie



M. Ernest Ansermet.

I THINK most people will agree on one point this year, and that is the excellence of the musical fare given us by the B.B.C. throughout the country, and particularly over the holidays.

The Spirit of Youth

A happy thought was the performance of Humperdinck's fairy opera *Hansel and Gretel* at 2 L.O., both for the S.B. programme and in the Children's Hour on Boxing Day, for this is one of the few operas that appeal to children both young and old.

The British National Opera Co. have always made a special attraction of this pretty play, and amongst the stars who have danced to the Witch's tune are Miss Maggie Teyte, Miss Doris Lemon, and Miss Lillian Standford, and recently in the studio again two other B.N.O.C. stars sang the title-rôles, in Miss May Blyth and Miss Eda Bennie, and



Mr. Nelson Jackson.

is, like so many other famous singers, of Australian birth.

Second Symphony Concert

The chief event for January was, of course, the second of the International Symphony Concerts broadcast from the Opera House, Covent Garden, and conducted by M. Ernest Ansermet.

The inclusion of Stravinski's *L'Oiseau de feu* is possibly a delicate compliment to M. Ansermet, who, by his intimate association with the Russian Ballet *Serge Diaghileff*, all over the Continent, United States and South America, came frequently into contact with the Russian composer.

Other items in his programme were Debussy's now familiar *L'Après Midi d'un Faune*, Beethoven's *Sym-*

phony No. 5 in C Minor, and Elgar's *Violin Concerto* with Albert Sammons as soloist.

England's Leading Violinist

No better choice could have been made in this instance, for both player and composer are typically English, and Mr. Sammons invariably seems to become the very spirit of the composition. Both tone and phrasing are impeccable, and his association again at Manchester recently, for the Symphony Concert, with Mr. Walter Hyde, another famous English artist, gave ample proof that there is abundance of musical art in this country, despite the national liking for the foreigner.

I was glad to get our old friend Nelson Jackson in the holiday programmes. His artistic net is wide, and he has the happy knack of imparting personality to whatsoever story he tells.

(Continued on page 93)



Miss Eda Bennie.



Miss May Blyth.

PRACTICAL COIL WINDING

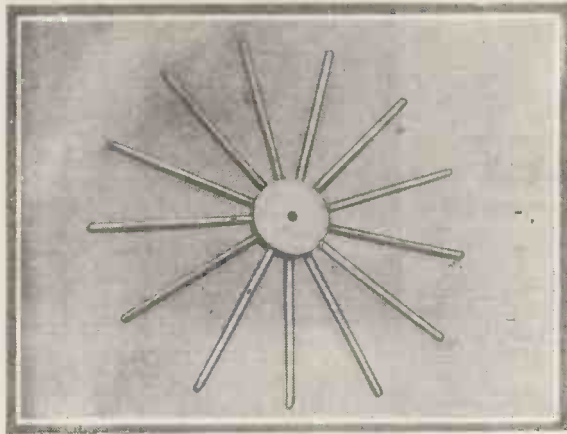


Fig. 1.—Peg or Spider Former.

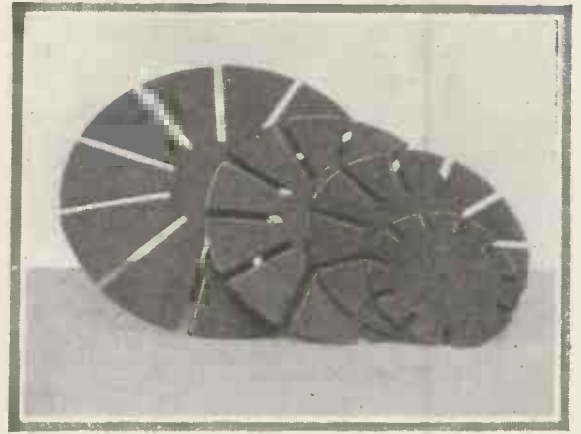


Fig. 2.—Slotted Card or Fibre Former.

MUCH of the literature that is available on the subject of inductance (tuning) coils is devoted largely to the design of coils rather than the practical difficulties of winding. It has, therefore, been decreed by the Editor that the following notes, and others which may succeed them, shall be devoted to the ways and means whereby the amateur wireless constructor can produce coils with the least trouble and with the greatest mechanical efficiency.

Efficiency

In some respects the mechanical efficiency with which a coil is wound reacts on the electrical efficiency, and in making special winding experiments the writer has himself started from a zero line in the matter of experience. Hence it may be that

results obtained will be all the more acceptable from the novice's point of view.

The various rig-ups that have been made—for courtesy called winding machines—are of a character that any amateur can construct from his workshop scrap, and odds and ends

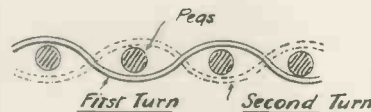


Fig. 4.—Single Basket Winding.

of gear wheels. Elaborations which would only be employed where a machine is intended for the commercial production of coils, have not been introduced. It would be easy, after the first mechanism has been made and its practicability proved, to prepare drawings of an engineer-

made piece of apparatus which no one but a professional could make or afford to make. The writer does not, however, intend to go so far as this. The apparatus described, while capable of elaboration for commercial purposes, is such as the amateur would make for the purpose of winding the few coils he requires and which he can easily fabricate with the simplest of tools.

Basket Coil Winding

The overall efficiency of basket coils hardly needs mentioning here, and the only serious objection to this type of inductance appears to be its general fragility. As in other tuning coils, the use of wax or varnish in any appreciable quantity is objected to on the score of increasing the capacity between the turns of wire—i.e. the self or internal capacity of

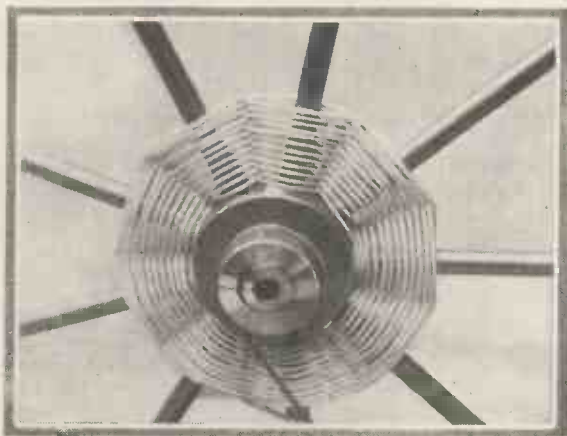


Fig. 5.—Partly-wound Coil.



Fig. 6.—Fully-wound Coil.

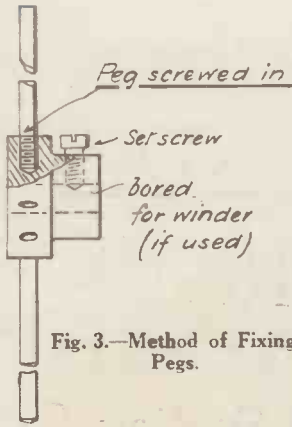


Fig. 3.—Method of Fixing Pegs.

the coil. Enamelled wire is said to be unsuitable because the covering is so thin that the condenser effect—i.e. capacity—is increased by the wires being so close together.

However, with all fabric-covered wires the necessity of damp-proofing arises. This is a process which is eliminated by the use of enamelled wire. Cotton-covered copper wire is considered to be better than silk-covered, if employed without the protection of wax or varnish, as it is likely to absorb less moisture from the atmosphere than the silk-covered wire, under the same conditions.

Both the waxing and varnishing processes are employed in basket coils as a means of rendering the coil more stable and robust. Hence one often sees coils with the inside of the interlaced wires almost completely filled with wax, and to eliminate this source of reduced efficiency other methods of support will be suggested in the course of these notes.

Methods of Support

The basket coil is so named because its scheme of windings resembles the woven reed basket. There are two more usual methods of supporting the coils during the process of winding, viz. (Fig. 1) on a peg or spider former and (Fig. 2) on the slotted card or fibre disc. The limit of usefulness of the basket coil would appear to be a wavelength of 2,500 metres, that is, a coil with about 200 to 250 turns.

Simple spider formers can be improvised or purchased. The making of a substantial metal former such as those illustrated requires some skill and a fair equipment of metal working tools, if any pretence to accuracy in the radiation of the spokes is to be obtained. They are usually made by drilling a disc of metal or hard wood (box or beech),

or fibre, with an unequal number of holes—9 for small coils and 11 or 13 for larger ones, these holes being equally spaced and truly radial to the periphery of the hub. The pegs or spokes are fitted into the holes to produce a spider 2½ in. to 4 in. in diameter according to the requirements of the coil. A nine-spoke spider would have a hub about 1 in. in diameter and a thirteen-spoke former at least 1¼ in. in diameter.

Where a metal disc is employed as a hub, the pegs are usually ¼ in. or ⅜ in. diameter, and are screwed into tapped holes (see Fig. 3). Of course, other methods can be used for securing the spokes during the operation of winding.

Uneven Winding

For small coils with 25 to 40 turns (forty turns give a coil 3 in. in diameter with No. 26 d.c.c. wire) a nine-spoke spider is quite satisfactory when used with No. 26 or No. 28 wire. As shown in the illustration (Fig. 6), when a larger coil is attempted the distance between the



Fig. 7.—Double Basket Winding.



Fig. 9.—Another Double Winding.

spokes at the outer edge is comparatively wide and the crossing of the wires which gives the mechanical stability to the coil is not so satisfactory. The falling off in the regularity of the winding is distinctly visible in the photograph (Fig. 6), but is perhaps most noticeable in the actual example. Hence, for large coils it is necessary to increase the number of pegs and to reduce the gauge of the wire. A larger number of pegs also means a larger diameter of hub.

There is also more than one method of arranging the windings. In what is termed the single basket coil winding the wire passes on alternate sides of the pegs, as shown in Figs. 4 and 6, and the photograph (Fig. 5) of a partly wound coil.

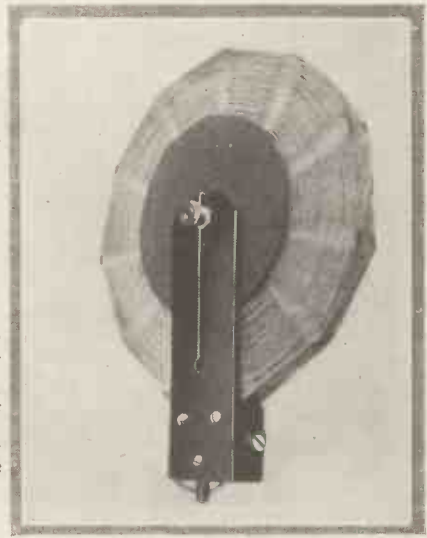


Fig. 10.—Completed Double-wound Coil.

In both systems of "basket coiling" the crossings of the wires—which interweaving gives the mechanical stiffness desired and also reduces the insulation, the covering of the wires only touching each other for a small portion of their total length—form truly radial lines.

The double basket system is illustrated in Figs. 7 to 10. Here the wires embrace the outsides of each adjacent pair of pegs, and cross each other at every alternate two spokes.

As shown in the edge way view the crossing points are alternate. At each turn the crossing point moves back one peg only, but at every four consecutive turns the cycle of operations is repeated. This is illustrated by diagram Fig. 7. On four turns being completed any given pair of pegs has a pair of wires embracing them and another pair of wires crossing between the pegs. H. G.

(To be continued)

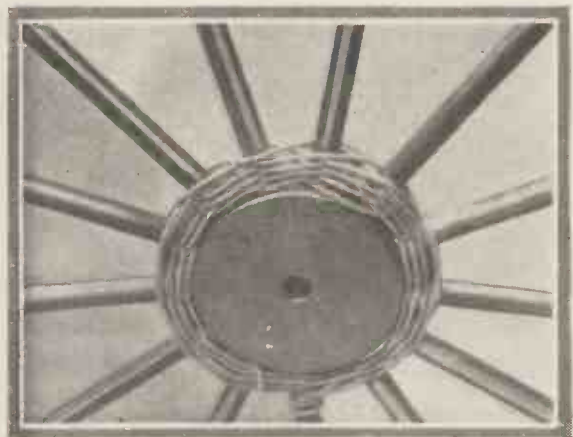


Fig. 8.—Part of Double-wound Coil.



Young Dan Godfrey listens to the 2LO Band conducted by his father

COUSIN CRYSTA'S CORNER

A Section for the BOYS & GIRLS

"FELIX" AS A WIRELESS SET

ONE of the latest entrants to wireless is our old friend Felix. He is not a listener, of course, but he has made himself capable of enabling others to listen. That is, he has made himself into a crystal set. And a good job, too, he has made of it.

The crystal is held in one of his paws, while the catwhisker is, would you believe it, one of his own! Tuning is accomplished by exercising one of his front legs.

MAKING HOLES IN EBONITE

When you wish to make holes in your ebonite panel for fixing the various wireless parts, you may not always be able to obtain the use of suitable drills. Don't despair, however, for quite a lot can be done with the aid of various thicknesses of knitting-needles heated till red-hot.

One advantage of making holes by

this method is that there is no risk of the ebonite cracking or splitting. The needles should not be made too hot or the insulating properties of the ebonite may be impaired.



CHILDREN'S CRYSTAL SET

YOU can make this little crystal set for less than three shillings, including the aerial, and it will work just as well as many of the more expensive kinds of receiver.

Of course you will have to obtain a pair of phones before you can listen in with the set, but you can make the

receiver first and then see about the phones afterwards.

As you will see from the illustrations, the set is fixed on a cardboard box lid which you can obtain from an old shoe box, or the lid of a ½-plate negative box will do nicely. If you cannot obtain either of these a plain piece of stiff cardboard will answer, but will not look so neat.

From a wireless dealer's you should purchase a ¼-lb. reel of number 26 d.c.c. copper wire, which will cost about 1s. 2d., 5 telephone-pattern terminals fitted with nuts and washers costing 1½d. each, a small crystal cup fitted with screws costing 1½d., and a catwhisker and crystal obtainable for 1s.

If you look at illustration No. 1 you will see what the disc, or "former" as it is called—on which the wire is wound—looks like. It is cut out with a pair of sharp scissors from a



Edwin Wyld, a Nottingham schoolboy only 8 years old, is very proud of the crystal set he has made himself

Dear Boys and Girls,

Don't you think it is a great idea for the Editor to allocate one page entirely to you? For you must remember this is your page and yours alone. I don't want any grown-ups here, for, although they would laugh if we told them, we know quite a lot about this wonderful wireless and are quite able to conduct a page of our own.

Really, you know, I am supposed to write this page each month, but, between you and me, I am a dreadfully lazy man and I simply hate writing. In fact I am so lazy that I am going to ask you to write it for me! Don't you think that will be jolly? You will be able to say then, This is my page because I help to write it.

Of course, I would not dream of

letting you work for me for nothing, so I have decided to give 10s. 6d. each month to the reader who sends me what I consider the most interesting contribution. Even though yours may not be the best, don't be down-hearted, for if I print it on this page you will be paid 5s. for the use of it. So go ahead right away and send me anything you think fit—hints, personal experiences, in fact, anything that will help or even amuse your fellow-readers. I don't bar even verses if they are clever or funny. But, of course, everything must have a wireless flavour.

So let me hear from you. You know my address? Just

COUSIN CRYSTA,

"The Wireless Magazine,"

La Belle Sauvage,
London, E.C.4.

A CRYSTAL SET FOR THE BOYS AND GIRLS.

piece of stiff cardboard and measures 5 inches in diameter. You should draw the circle with a pair of com-

but on a different arm of the disc, preferably the one following the arm on which the first loop was made.

you should follow this exactly, or your receiver will not work. It is quite simple, however, and if you

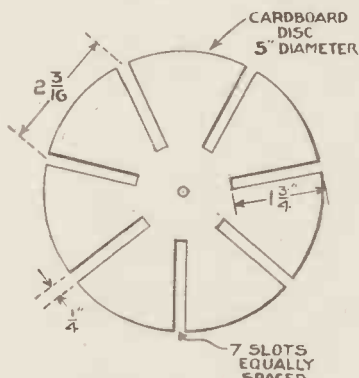


Fig. 1.—Disc for Coil.

passes. Around the disc 7 slots, each $1\frac{3}{4}$ in. long by $\frac{1}{4}$ in. wide, are to be cut, as these slots are equally spaced you can set your compasses to $2\frac{3}{16}$ in. and space off the slots round the edge of the cardboard.

Winding the Coil

With a pair of sharp scissors make a small hole in the centre of the disc and thread the end of the wire through it—then begin to wind on the wire, passing backwards and forwards between each slot (Fig. 2) until 30 complete turns have been put on. You can easily tell when this is so by counting the number of wires which appear on one side of any of the arms of the disc. If you can count 15 then you will know that you have wound 30 turns altogether, because there will also be 15 turns on the other side of the arm.

At this point you should make a small loop in the wire and twist it round once or twice in order to prevent it coming undone. A view of the loop is given in the photograph and you will see that they are about $\frac{1}{2}$ in. in height, but the height does not really matter so long as the loops are there.

After making the first loop continue winding on the wire until you have wound on 5 more complete turns, then make another loop—similar to the first—

Winding on the wire and making the loops in every 5th turn should be continued until you can count 10 loops altogether—the disc will then be entirely filled with wire, the end of which, after making the 10th loop, should be tied through a small hole made with the point of the scissors in the edge of the cardboard.

This completes our tuning coil, as it is called, and the preparation of the other part of the set may now be proceeded with.

Looking at the illustration of the finished receiver you will see that the tuning-coil disc is fixed by means of a paper fastener in the centre of the cardboard box lid, four of

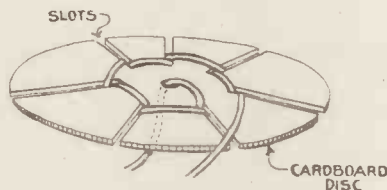


Fig. 2.—Method of Winding.

the terminals being placed on one side and one terminal and the crystal cup on the other; you can make the holes for these with the point of the scissors—the exact position is not important so long as they are approximately as shown in the illustration.

Now turn the box lid over and connect up the different parts as you see shown in illustration No. 3;

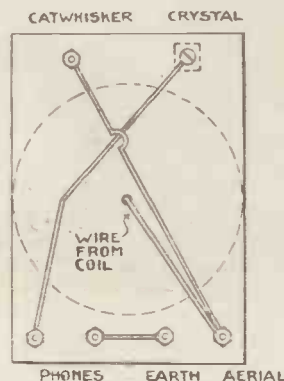


Fig. 3.—Wiring Under the Lid.

screw up the nuts tightly all will be well.

Working the Set

To work the receiver a pair of phones will be required, which should be of the high-resistance kind—that is, having a resistance of 4,000 ohms.

The phone cords should be connected to the two terminals marked PHONES..

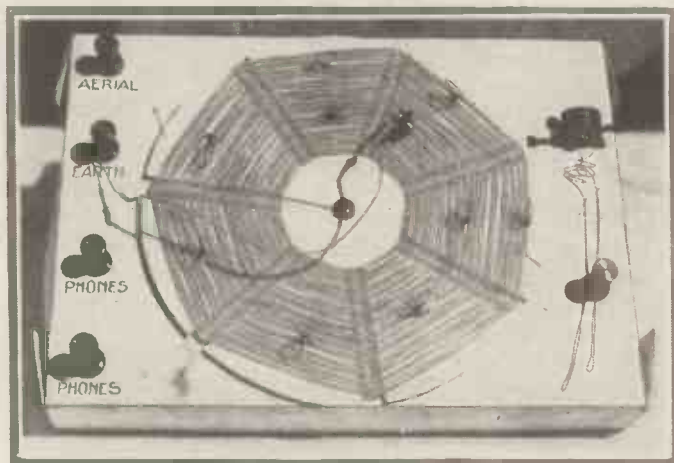
The earth terminal should be joined by means of a piece of the cotton-covered wire to the nearest water-pipe or tap, while to the aerial terminal the down-lead from the aerial should be connected.

If you do not possess a proper outdoor aerial slung on high poles or on the roof of your house, you should put up an indoor aerial in one of the top rooms, using the remainder of the insulated wire for the purpose;

at the points where the wire is fastened to the wall or picture rail it will be best to fix a piece of elastic band in order to act as an insulator.

When you have successfully fitted up your aerial and earth,, place the phones over the ears and see that the wire from the earth terminal is connected to one of the tapping loops on the tuning coil. Now bring the point of the catwhisker into

(Continued on page 112)



The Receiver Completed.



How can I become a Transmitter?

BEFORE the novice can become a transmitter he must have a fair grounding in electricity, and this is easily acquired by the aid of a valve receiver and liberal doses of reading and experiment. The same rules and principles apply both to the valve transmitter as to the receiver.

Having acquired this knowledge and decided that he can afford the expense involved in setting up the necessary plant (the expense for a low-power transmitter is not great), the question of obtaining his licence is the next matter for study. The writer has known cases wherein fully scientifically equipped men have applied for a licence for transmitting purposes with negative results, and great was their disgust.

The Licences

The truth of the matter is that there are three classes of licence issued by the P.M.G.: firstly, the commercial transmitting licence issued to private firms for the transmission of messages in the public service; secondly, the experimental licence, a full licence for the use of an open or outdoor aerial; and thirdly, the artificial or dummy aerial licence used for laboratory work only.

Ruling out the first class of licence, the amateur has available for his use the second and third classes, and this is where the trouble begins. Should the applicant aspire to transmit messages either by speech or in the morse code over any distance, he must have a thorough working knowledge of the code and be able to transmit and receive messages at the rate of 12 words per minute. This is an essential qualification, whether the experimenter wants to use the code or not. Unless the

applicant is in possession of a Postmaster-General's certificate of efficiency, he must pass an examination on this point.

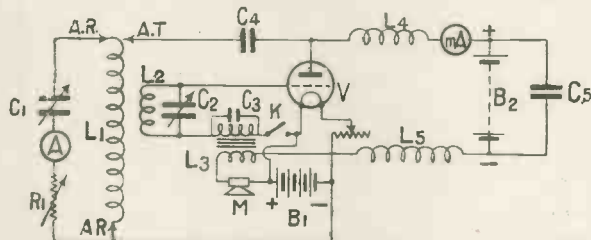
Alternatively he may secure the services of an approved operator to work his station, but this is hardly likely to appeal to the reader as a satisfactory solution to his difficulty.

If he follows this procedure, however, he must give the name of the operator on his application form, and must also give an undertaking that the operator will be present on all occasions when the station is working.

The reason for this regulation is apparent to all who appreciate that the ether has very serious uses apart from the transmission of broadcast matter, etc. Should the operator not understand the morse code sufficiently well to read an S O S call or messages transmitted from

The third main consideration is for what reason the licence is desired. The answer to this question is certainly not the same as that given by the applicant for a gun licence, who, when asked for what reason he desired a gun, replied, "To shoot with, of course!" It must be remembered that the licence is a licence to conduct experiments, and that therefore the applicant must have some idea of what experiments he wishes to carry out. Such things as testing microphones, the elimination of static disturbances, testing different makes of transmitting valves, trying to see how far one can get with a given power, and the like, are not sufficient reasons of themselves for the granting of a licence for the use of an outdoor aerial transmitter. Microphones are very easily tested on the land line, getting as far as you can has had plenty of attention devoted to it by

more experienced experimenters, and the elimination of statics is purely a matter of reception—at least, so it is believed. Experiments can, however, be usefully directed on the lines of directional wireless, research in television, and duplex telegraphy. Other matters will probably readily occur to the ap-



Grid-control Transmitter for Dummy Aerial. The letter references are: A, ammeter; AR, aerial-coil switch; AT, anode tap; B₁, L.T. battery; B₂, H.T. battery; C₁, tuning condenser; C₂, grid tuning condenser; C₃, grid condenser; C₄, anode condenser; C₅, H.T. condenser; K, key; L₁, tuning coil; L₂, grid coil; L₅, modulation transformer; L₄ and L₅, H.F. chokes; M, microphone; mA, milliammeter; and R₁, artificial resistance.

Government or commercial stations, his jamming and ignorance might have serious results.

Other Requirements

The next consideration is technical knowledge. Here the Postmaster-General desires to be satisfied that the applicant has sufficient knowledge to operate his gear without interference to others. Here, again, it is apparent that the condition has been framed in order to protect the community, and is, therefore, no hardship on the individual.

applicant, but the reason given for the acquisition of the licence must be bona fide.

Providing that the applicant is of British nationality, and has a clean sheet as regards previous licences for wireless work held by him, and can satisfy the P.M.G. on the above-mentioned points, he will, in due course, receive his permit, a call sign, and a receipt for the 30s. which he will have to pay for the joint transmitting and receiving licence. If he already holds a receiving licence, this

(Continued on page 74)

LISSENIUM

THE LATEST RADIO MAGAZINE

and the newest thing in radio condensers

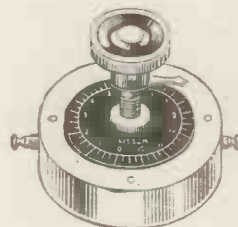
Have you ever wished you could get one condenser in your set which could give you every change of capacity you would ever need?—a condenser which would banish all that painstaking care necessary when tuning in critically on short-wave work—a condenser you could use one minute as a vernier, and another minute as a .001, or for any intermediate capacity between a negligible minimum and that maximum? Have you ever wanted a condenser which you could use in your set or on the table without a moment's time spent in alteration—a condenser with an open scale—a perfect capacity curve—tuning along a straight line wavelength curve—a condenser dustproof, immune from stray capacity effect—a condenser giving you delightfully easy tuning on the most critical spots, and on distant stations, helping you not to miss the "carrier" if it is there at all.

If you would like to know what a perfect condenser means to your tuning, what it is like to use, get a LISSEN MARK 2 MICA VARIABLE CONDENSER (patent pending).

Negligible minimum capacity, conservatively rated maximum of .001—LISSEN, ONE-HOLE FIXING, OF COURSE—table or panel mounting without alteration.

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THE MOST PERFECT TUNING COMBINATION THERE IS—LISSENAGON (pronounced LISSEN-AGON) coils and the LISSEN MARK 2 MICA VARIABLE CONDENSER.

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HOW CAN I BECOME A TRANSMITTER? (Continued from page 72)

will have to be returned for cancellation, and a fresh one will be issued to him. The cost of a 10-watt licence after the first year will be £1, inclusive of transmission and reception.

The Dummy Aerial

If, on the other hand, the applicant has failed to satisfy the P.M.G. on the points above referred to he may still receive a licence for what is technically known as a "dummy aerial."

This means that the experimenter will have to erect gear which will not radiate beyond the holder's premises; in other words, his experiments will be confined to laboratory experiments. Such a licence is of considerable value to the beginner from several points of view, and the amateur would, perhaps, be well advised to take a non-radiating licence for the first year of his activities, after which he will be better qualified to operate a transmitter in the open ether, and, in fact, will probably be able to obtain his full licence with a minimum amount of trouble. It must be remembered that the "dummy" licence does not give the holder the right to operate his gear on any aerial suspended in the open air, or, in fact, on an indoor aerial.

If he should do so and his action comes to the ears of the responsible authorities, his licence will probably be cancelled, and he will experience considerable difficulty in obtaining another. The holder does not have to pay a fee for the use of a dummy aerial.

A dummy or non-radiating aerial consists of resistance and capacity, and is not a frame aerial. It may be constructed to comply with the Postmaster's requirements by the aid of a variable condenser and a potentiometer, where the condenser will represent the aerial capacity, and the resistance of the potentiometer the aerial system resistance. The constants will, of course, be designed by the experimenter to resemble actual working conditions.

A sketch of a suitable circuit is shown on page 72. It will be noted that the non-radiating set is not connected to earth, as this is against the requirements of the licence.

Uses of the Aerial

Many useful and informative experiments may be conducted by the aid of the dummy aerial. Although the aerial is non-radiating, to a large extent it will be found possible to transmit messages from one room to another quite easily by using a valve set as a receiver. The transmitter may be of simple construction, and the sketch illustrates a suitable grid control transmitter.

Experiments may be carried out with different adjustments in the circuits, different values of components and types of microphones.

Tests may be made on the strength of signals with different values of H.T. supply, and C.W. morse transmission may be carried out; in fact, practically every test which may be carried out on the open aerial may be carried out by the aid of the gear under what might be considered miniature conditions.

Knowledge Gained

It might be safely said that the knowledge gained by the use of this gear will be superior in many cases to that gained by transmitters with an open aerial.

J. A. J.

WIRELESS IN THE VILLAGES

MANY novel means have been devised of bringing to the notice of the public the fascination of wireless. Demonstrations and lectures have both played their part, but it has been left to a Horsham firm to take wireless, literally, into the homes of the people. Situated close to a village where listening-in is a rare treat, this firm hit upon the happy idea of equipping a motor van with a complete receiving set, and paying periodical visits to the

village in order to enable the inhabitants to enjoy a wireless concert and, incidentally, to bring to their notice the wireless apparatus supplied by the firm. Demonstrations and lectures are incorporated in the bill of fare.

The great pleasure given to the young folk by these visits is clearly written on the faces of the children in the accompanying photo who are listening-in to a broadcast concert.

E. M. M.

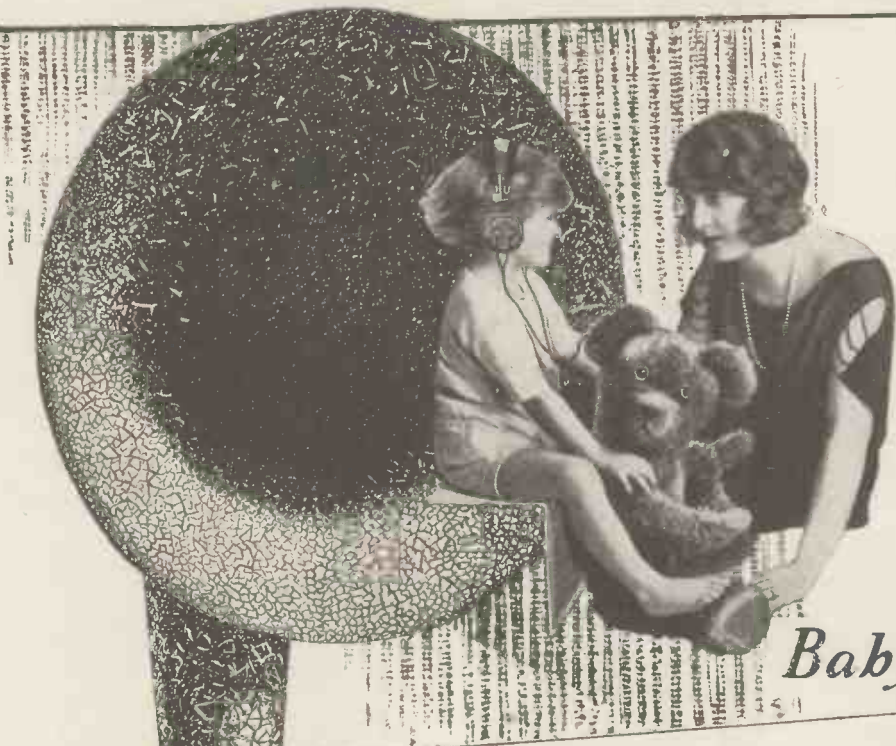


Enjoying a Broadcast Concert

Brandes

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All Brandes products carry our official money-back guarantee, enabling you to return them within 10 days if dissatisfied. This really constitutes a free trial.



Baby's Choice

No longer will it be a problem to keep him contentedly amused—Brandes "Matched Tone" Headphones fit the tender head with ease and comfort, and the clarity of reception they ensure will enable him to grasp the Bed Time Stories with quick appreciation—and they are constructed to withstand his immediate curiosity to find "where the music comes from."

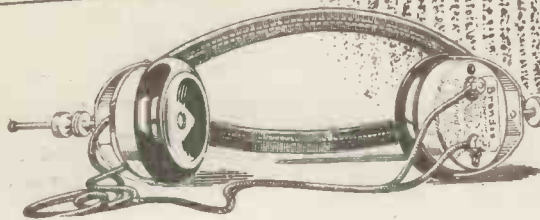
The *Table-Talker* speaks gently and most naturally to him. He is able to catch the kindly inflexion of the deep friendly voices and is enchanted. Get Brandes for the home—any good Dealer has them.

Tune the Table-Talker

42¢

—with the Matched Tone Headphones

25¢



The Accumulator-Charging Worry

THE one objection that can be, and is, advanced against the use of a valve set is the necessity of maintaining a charged accumulator. Certainly the accumulator may be dispensed with if dull-emitter valves are used, but even for these it is the most satisfactory source of current, and that which most users of dull-emitters eventually fall back upon. Granted, then, that the accumulator is, practically speaking, essential, how can the charging worry best be met?

Charging from the Mains

Briefly there are three methods by means of which the amateur can

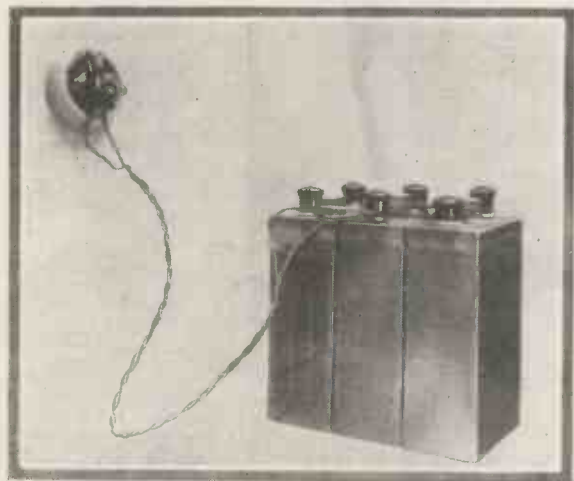


Fig. 4.—Accumulator connected to Switch for Charging.

charge his own accumulator, and these are (a) from power or lighting mains, (b) from primary batteries, and (c) from self-contained generating sets. Of these methods it is the first that will be used in ninety per cent. of cases.

The current supply from lighting mains is of two kinds—direct current and alternating current. The terms are self-explanatory—in the first the current flows in one direction, but in the second it alternates in either direction, that is, it flows first one way and then the other. Now to charge an accumulator it is necessary to have unidirectional current, and therefore if alternating current is to be used a first essential is that it should be caused to flow in one direction only. How this may be

accomplished may be left for consideration in a later article, and attention given here to charging from direct current as being the more simple to understand.

There is, of course, the first need for learning the nature of the supply, and though there are many methods of finding this, probably the simplest is to make an inquiry at the offices of the supply company.

Considering the use of direct current it may be stated that the voltage of supply is immaterial providing that it exceeds the total voltage of the cells to be charged. What really matters is that the current that is allowed to pass into the cells be restricted to a suitable amount. This may be accomplished by means of a resistance.

The actual voltage or pressure does not produce any chemical or heating effect, but it has the power of forcing current through a conductor, and the object of using a resistance is to limit the amount of current. If an accumulator were put direct on to the mains, the voltage of the latter would be sufficiently high to force an almost unlimited amount of current through the cells, greatly to their detriment. This, of course, should be avoided.

The Charging Rate

The maximum safe charging rate of an accumulator is approximately one-tenth of its actual capacity in amperes; thus the charging rate of a 40-ampere battery would be 4 amperes, and this, it should be noted, is irrespective of the voltage of the accumulator.

In the case of a 40-ampere-hour accumulator, then, the problem is to pass an amount of current into it which shall not exceed 4 amperes. The current may be less than this, with a corresponding increase in the time taken for charging, but anything

in excess will cause heating and disintegration of the plates.

The simplest method of limiting the current is by the use of a resistance, and it will be apparent that the resistance to be used will depend upon the voltage or pressure of the

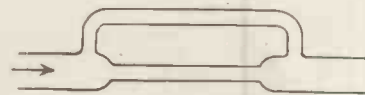


Fig. 1.—Main Pipe with Loop.

charging supply: thus, to pass the same amount of current, double the amount of resistance would be required on a 220-volt main than would be necessary on a 110-volt main.

An Ideal Resistance

Resistances take many forms; a usual type being a length of special wire. All resistances get hot to a greater or lesser extent, and an example of the former is the ordinary incandescent electric lamp, in which we have a comparatively short length of very fine wire, which by the passage of a small amount of current becomes white hot.

The incandescent lamp provides an almost ideal resistance for accumulator charging. Certainly the current that an average-sized lamp will pass is comparatively small, but this is of little consequence, as it is easy to use several lamps in parallel. How this may be done may best be explained by a hydraulic analogy.

A resistance may be likened to a

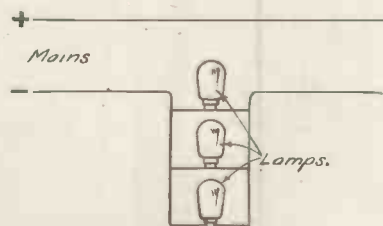


Fig. 2.—Lamps in Parallel.

pipe in which water is flowing, and in which there is a stricture. It is obvious that the flow in such a case can be increased by increasing the pressure, increasing the size of the

(Continued on page 78)

A.J.S.

for

RADIO PERFECTION

EACH of the three A.J.S. instruments illustrated comes easily first in its own particular class. Behind them are the vast experience and unequalled resources of a famous Manufacturing House.

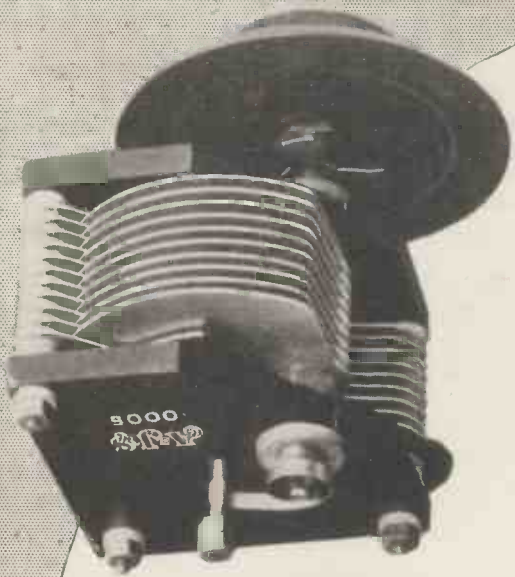
The A.J.S. Loud Speaker not only reproduces music or speech with a purity and volume that must be heard to be appreciated—appearance also has been considered. Its perfectly proportioned curves and artistic mat finish are a triumph of British workmanship.

Quite an exclusive idea is the A.J.S. "Unitop" 4-valve Cabinet Receiver. It is an exceptionally handsome and compact piece of furniture, easily portable and representing supreme wireless efficiency in the least possible space.

A.J.S. Variable Low Loss Condensers, with or without polished walnut case, merit the closest investigation. Ask the nearest dealer to show you these and other A.J.S. instruments, including the A.J.S. 2-, 3- and 4-valve Receivers, the "UNIT SYSTEM" 4-valve Cabinet and the Pedestal 4-valve Cabinet. Illustrated List free on request to:—

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

'Phone: 155a. Wireless Call Sign: 5 K.L. 'Grams: "Reception, Wolverhampton."



A.J.S. PATENT VARIABLE LOW LOSS CONDENSERS

Vanes shaped to give negligible minimum capacity and a greater maximum than with other types. No rubbing contact. Ebonite End Plates, adjustable brass bushes, knobbed dial, complete with 22 gauge aluminium vanes, .08 spaces.

	£	s.	d.
.0002 mfd. capacity	0	10	6
.0003 " " " " " " " " " "	0	11	6
.0005 " " " " " " " " " "	0	12	6
In polished walnut case with electro-plated terminals	1	5	0
	1	6	0
	1	7	6

THE UNITOP CABINET RECEIVER

Forms top section of "Unit System" Cabinet, and contains A.J.S. 4-Valve Receiver. Complete in itself, it may be converted into a pedestal cabinet by subsequent purchase of centre section to contain batteries and base section containing Loud Speaker. Used alone, the "Unitop" is a compact and attractive piece of furniture and a highly efficient Receiver, easily portable for outdoor functions. In Mahogany or Light, Dark, or Wax-polished Oak. Complete with all accessories, 30 Guineas. (Without accessories, £24 10s.)



THE A.J.S. LOUD SPEAKER

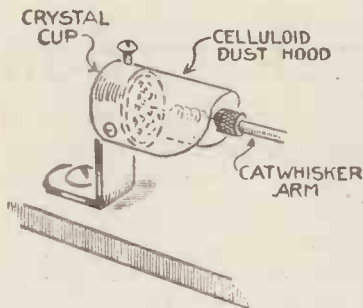
The accurate proportions of its non-resonant horn give to the A.J.S. Loud Speaker those correct acoustic properties which ensure true reproduction, while its extreme sensitiveness enables the utmost volume of sound to be produced with complete absence of distortion.
 Price: With Metal Horn and Electro-plated Fittings, £4 15s. 0d.
 With Oak or Mahogany Horn and Electro-plated Fittings, £5 10s. 0d.



More Gadgets, Hints and Tips (See also page 29)

Dust Cover for the Crystal

PROTECTION from dust is undoubtedly an essential requirement in getting good crystal results.



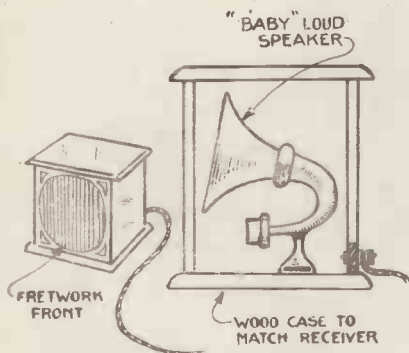
Dust cover in position.

A neat method of protecting the crystal and catwhisker in an open type detector is shown by the illustration; a piece of thin celluloid is cut to a semi-circular shape and secured round the cup by means of two of the crystal clamping screws, the third screw being left for holding the crystal.

G. B. W.

Unobtrusive Loud-Speaker

Most people dislike the appearance of the horn type of loud-speaker and make a compromise by placing the instrument in as unobtrusive a position as possible.



Arranging the loud-speaker in an unobtrusive way.

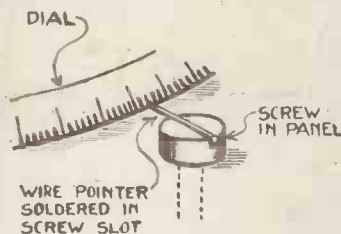
A more practicable method, and one which should recommend itself to the most fastidious, is to fit the loud-speaker into an ornamental box preferably of a type which matches the case of the receiver. The front of the loud-speaker case should, of course, be of the open fret-cut type to allow the sound to be projected outward.

B.

Simple Dial Indicator

THE illustration shows a simple method of fitting an indicator to a condenser or variometer dial.

A short length of wire is soldered into the slot of a round or cheese head screw, the projecting end of the



Simple dial indicator.

wire being bent so as to be level with the edge of the dial when the components are fixed in position on the panel.

F. R.

"THE ACCUMULATOR-CHARGING WORRY" (Continued from page 76)

striction, or by providing a branch pipe looped on to the main pipe as shown in the diagram (Fig. 1).

The electrical counterpart of this is shown by Fig. 2, where it is obvious that the current passed by the three lamps will be three times the amount passed by one.

The number and sizes of the lamps required to pass a certain amount of current can be ascertained by applying the following rule: Multiply the candle power by $3\frac{1}{2}$ for carbon-filament lamps, or $1\frac{1}{4}$ for metal filaments, and divide the result by the circuit voltage. The answer will be in amperes or fractions of an ampere.

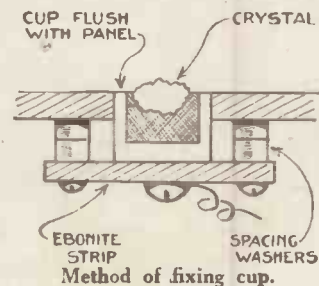
There now remains the consideration of passing the current that has passed through lamp resistances through the accumulator so that the latter may be charged. How can this best be done?

One method is to use a lamp-resistance charging board arranged as shown in Fig. 3. Here we have a number of lamps mounted in holders on a board and wired in parallel. The lamps are used simply and solely as resistances without any regard to the light they may provide.

It is equally possible, however, to use the light and also the current passing through the lamps. Two suggestions for doing this are given here.

Fitting the Crystal Cup

THE illustration shows a simple method of flush-mounting the crystal cup in a crystal set. The appearance of the completed receiver is enhanced by doing this, especially if flush-



Method of fixing cup.

mounted sockets are used in place of the usual type of terminal for external connections to the instrument.

A. S.

In the first the accumulator is placed in the circuit of a pendant lamp, and in the second the accumulator takes the place of the switch arm of a switch, that is, it serves to bridge the switch (See Fig. 4).

Both these last two arrangements are very simple and do not require any additional apparatus.

There is one point which must be observed in charging accumulators and that is the correct polarity of the mains—the positive main must be connected to the positive of the

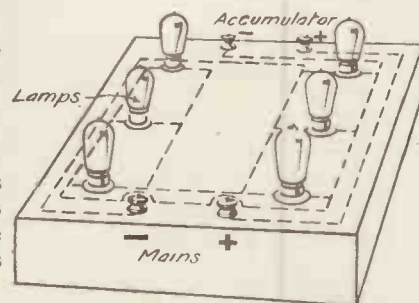
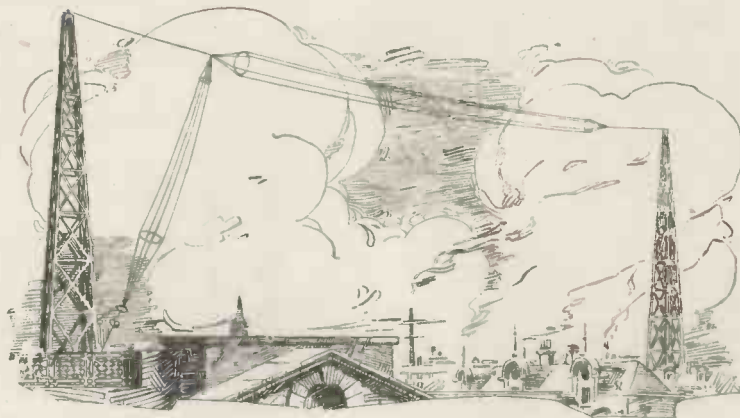


Fig. 3.—Charging Board with Connections.

accumulator and the negative main to the negative of the accumulator. The polarity of the mains may be simply ascertained by placing the two wires (with the resistance in circuit, of course) a little distance apart in a glass of acidulated water (vinegar and water will answer); bubbles will rise freely from the negative wire.

H.C.



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☞ The absolute efficiency of Sterling Headphones is a fact capable of proof—by test—by reference to any user—by inviting the opinion of experts.

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The British Wireless Trade

P. K. TURNER, Editor of "The Wireless Trader," "The Wireless Export Trader," etc, gives an Inside Peep.

WHEN my highly esteemed colleague, the Editor of THE WIRELESS MAGAZINE asked me to write for that journal some notes on the wireless trade in this country, I was at once intrigued and puzzled, for it had not occurred to me that the general public might be interested in a peep behind the scenes of the trade, though I know how keen they are on such a "peep" at the B.B.C.

The History of the Trade

It is usual to begin such a study by a sketch of history. The history of the wireless trade is a short one, but it has no lack of incident. I suppose it is simplest to assume that the trade came into being during the autumn of 1922, simultaneously with the rumours of broadcasting. Before that there were just a few firms specialising in wireless apparatus for the amateur experimenter. Curiously enough, few of those firms survived, probably because they were started and run by technical enthusiasts rather than business men. Among those who did survive were Messrs. Burnham and Co. (now Burndept, Ltd.), Radio Instruments, Ltd., Sterlings, Wates Bros., Fellows Magneto Co., Ltd., Leslie McMichael, Ltd., The Peto, Scott Co., Gent and Co., Fallon's, S. G. Brown, Ltd., and a few others. Various electrical firms, such as the Economic Electric, etc., handled a fair variety of wireless gear, and Gamage's always had a live department.

But with the formation of the B.B.C. an entirely new situation arose, at both ends of the scale. Very large firms, such as Marconi's,

Metro-Vick, G.E.C., and so on, organised wireless departments. Then the boom set in, and all sorts of people, some with money, some with little, few with knowledge, and many without, all rushed into the trade. Then, in the spring of 1923, came the slump—started by a quite unjustifiable agitation by interested persons—and there was a great weeding out, in which, unfortunately, many genuine firms, making good stuff, suffered extinction.

Now, however, things have settled down. The general public is satisfied with the B.B.C., and the sales of wireless apparatus are immense and still increasing. The great problem of course, from the trade point of view, is: Will the public, in the long run, buy sets or components? It is obvious, of course, that those who are interested in wireless *as wireless* will always buy components. But it seems likely that the even larger public who look on wireless simply as a means of getting entertainment and instruction will eventually buy complete sets. Of course, there has always been an idea that the price of sets is unduly high.

Reasonable Prices

At one time this was so; and even now there are firms who believe that the value of their name on a set is very high! But now there are also many sets of which the price is extremely reasonable. It is a common fallacy to estimate the proper cost of a set by the components contained. But those who do this forget that electrical apparatus of all kinds involves in its manufacture a great deal of skilled labour; the cost of components may not be as

much as 10 per cent. of the *fair* selling price of a set.

One direction in which nearly all present-day sets might, in my opinion, be improved is in the matter of tone, or musical quality; and this applies both to bought and home-made sets. I believe that some complete sets as sold are above the usual home-made set in this respect; but we are a long way still from perfection. But if all that I hear is true, we may congratulate ourselves on having much better tone in our sets than our cousins across the Atlantic—though one trader who has just returned from America told me that a non-distorting set would be no use over there, as the transmissions were too bad to notice any difference on it!

The Public and the Trade

At the present moment, the British trade and the public enjoy very satisfactory relations; but it is hardly betraying a secret if I say that there is not perfect accord within the trade. As is usual in British industries, various moves have been made in the direction of organising the trade for mutual protection, and the most powerful organisation which has been formed has adopted certain lines of policy which do not meet with unanimous approval. The details of our domestic differences, however, will hardly interest my present readers, and I will not go into them. There is, however, one point which should be made clear, as it has caused much confusion. This is the very wide difference between a "Ring" and "Price Maintenance."

(Continued on page 82)

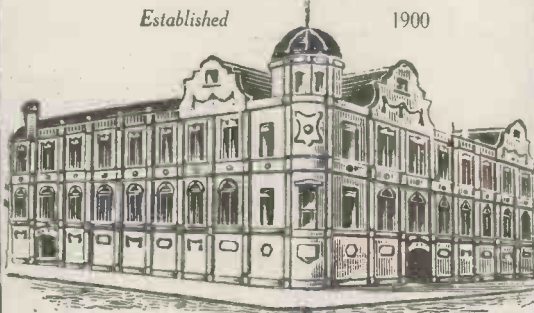
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of our students makes me feel sure that you will be interested in this advert.



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I then decided that I would become that expert adviser and universal father, and devote my life's work to helping and guiding those who are to a certain extent in the dark, or in the rut, also those who have ambition to take a real place in the world's affairs.

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TECHNICAL **SHEFFIELD** **COMMERCIAL**

Department 173.

Wireless Has No "Ring"

The former we all know. It is the forcing up of prices against the public, after entire control of supplies has been obtained. Such rings are in existence in many trades in this country, but not in wireless.

But "Price Maintenance" is usually taken to mean something different. It means that every individual manufacturer can say: "This article which I make—the None-such grid-leak, for example—has a retail price of 2s. 6d. I will sell it to a wholesale firm at such a price (less than 2s. 6d.), and to a retailer at such another price—larger than the previous. But it is intended to be sold to the public at 2s. 6d." And if there is a "Price Maintenance" scheme, the trade generally will adhere to that price. *Now it should be emphasised that a scheme of this nature does not increase prices against the public.*

The reason is simple. The difference between the retail, trade, and wholesale prices, i.e. the "trade discount," is just enough to give the trader a comfortable living if he is a reasonably good business man. If there were no such scheme in existence, each trader would have to decide for himself how cheaply he could sell. Prices would be different at every shop, and very soon there would be price wars between traders near one another. Sooner or later, this means the bankruptcy of many traders; this means bad debts for manufacturers, and to get them back they will raise their prices. So that, although it may seem very nice to go to a price-cutter's shop to-day, it is as well to remember that doing so entails the probability of an increase of all prices in a few months' time.

Another point in this connection is that in many cases such firms obtain their stocks by irregular means; such stock sometimes has not been through the makers' test-room, and it carries no guarantee.

Avoid the Price Cutter

I think my readers will agree with me that as a whole the manufacturers, wholesalers, and retailers of the British wireless trade all fairly earn the profits that they get. They supply goods which are admitted to be unequalled, so that they are now actually exporting to America, the home of broadcasting, as well as to most other parts of the world. There is just one way in which my readers can help them, and that is by avoiding the price cutter.



"Broadcast over Britain"

THE author of this wise and informing book, Mr. J. C. W. Reith, managing director of the B.B.C., is the son of a Scottish divine, well known and deeply loved in his day and generation among the Scots people. His memory is yet green and fragrant. The author is also the grandson of an idealist, and he cannot escape the influence of heredity. The ghosts of his fathers walk with him.

About two years ago Mr. Reith held a high position in a large engineering firm. Suddenly he was called upon to assume the directorship of the British Broadcasting Company, to occupy a post of responsibility and guidance such as no man had ever filled before. The work was new; it was quite unknown; from the very foundation stone Mr. Reith had to build it up.

No more fortunate thing could have happened to the British Broadcasting Company and to the ever-growing army of listeners-in than that a man of such high ideals, tempered with reasoned sanity, of such firm courage and such wide sympathies, should have been chosen to shape and mould the future of "wireless" in this country. In a series of chapters Mr. Reith tells us of difficulties and struggles, of hopes and fears, of aims and ambitions, and, as far as he can, he lifts the veil and gives us a vision of a future so full of possibilities and achievements that at this stage the mind cannot grasp it.

While Mr. Reith is at pains to prove that broadcasting can at best only be complementary to the newspaper, he has a vision of the fine place which "wireless" can fill as a provider of the world's news. He also disclaims any attempt on the part of "wireless" to supplant the theatre or the concert hall. There has been opposition from both these sources, which Mr. Reith deals with wisely and calmly. Contrary to the theatres, the gramophone companies have always worked in perfect harmony with the B.B.C.

Very interesting are the glimpses

Mr. Reith gives us of "the personalities behind the shrouded voices" which are heard by so many millions every night. These "announcers," as we all know who have listened to them, are men of culture, character, and correctness of speech. They require to be so. The mispronunciation of a single word, the vulgarism of a single phrase, would be heard by thousands and probably imitated by hundreds. But, as one critic has truly said, "the deliberate, well-bred, and careful enunciation to which the broadcasters have accustomed us" will permit us to say that "to the Authorised Version and to Shakespeare there has of late been added a third and promising 'well of English undefiled,' to wit, the Wireless." But Mr. Reith, though he has high ideals, is not a high-brow. He knows that you cannot uplift the taste of a nation in five minutes. There is no magic wand for such a feat.

The book is one to be bought and pondered by all who would study the influences which are shaping our times, among which "wireless" is one of the greatest. It is published by Hodder and Stoughton, at 6s.

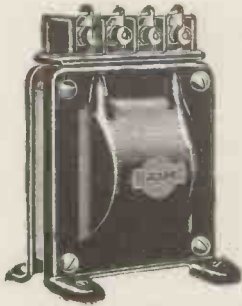
A. BAIN IRVINE.

"At Home with Nature"

No one who has heard Mr. E. Kay Robinson's wireless Nature talks can fail to be impressed with his book "At Home with Nature" (Hodder & Stoughton, price 3s. 6d.). The same intimate knowledge of the world of Nature which forms one of the characteristics of his wireless "talks," is manifested in his book, with the result that there is woven around the romances and tragedies of the denizens of the fields and hedgerows a fascination which makes one want to know more concerning these dumb creatures whom we know, but of whose habits we are lamentably ignorant.

"Pitman's Radio Year Book"

Profusely illustrated and containing much valuable information relating to the science, "Pitman's Radio Year Book, 1925" (Sir Isaac Pitman and Sons, Ltd., price 1s. 6d.), is a book which ought to be in the possession of every listener. Notable features of the publication are a résumé of the principal broadcast events of the year, list of stations, photographs of many wireless personalities, list of societies, and general information.

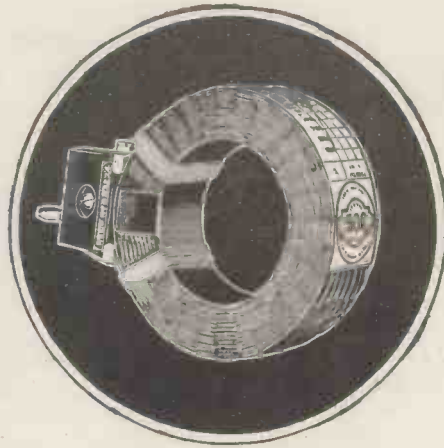


IGRANIC AUDIO-FREQUENCY AMPLIFYING TRANSFORMER
Pat. No. 205013.

Noted for its distortionless reproduction of speech and music. The metal shroud effectively shields from external interference so that a number may be mounted closely for multi-stage amplification. The impedance at speech frequency is suitable for most types of valves.

Made in ratios of 1.5 for first stage, and 1.3 for subsequent stages.

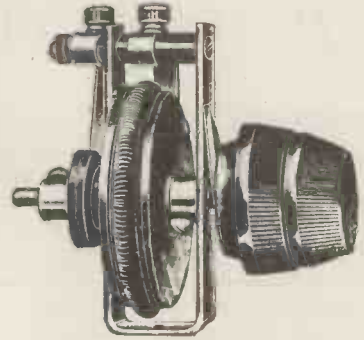
Prices (Shrouded Type):
Ratio 1.5 21/-
Ratio 1.3 19/6
(Open Type) Ratio 1.5 ... 20/-



IGRANIC HONEYCOMB COIL
(Plug mounted)

(De Forest Pat. No. 141344)

Low self-capacity—Small absorption factor—Minimum H.F. Resistance—No dead end losses—High self-induction—these qualities of ideal inductance are found to perfection in IGRANIC Honeycomb Coils. Obtainable in 19 sizes to cover wavelength ranges of 100 to 23,000 metres. Prices from 5/- to 15/- each.



IGRANIC FILAMENT RHEOSTAT
(Vernier Type)
(Pat. No. 195903)

The perfect "control" for Dull Emitter Valves operated by 2-volt battery and Bright Emitter Valves by 4- or 6-volt battery. Supplied with 4, 6, 8, or 10 ohms resistance. Specially suitable for detector filament control and critical control of regeneration. Price, with fixing screws and drilling template for panel mounting 7/-.

Build a better set with



IGRANIC VARIOMETER
B. and B.L. TYPES

Here at last is the ideal Variometer for your radio set whether it be crystal or valve. The new form of winding eliminates all capacity due to insulating material—and you have an instrument capable of remarkably selective tuning and providing good signal strength at all frequencies covered by the two types. One hole fixing. B. type is for B.B.C. wavelengths and B.L. type for Chelmsford Radio-Paris, etc.

Prices
B. 280 to 650 metres 12/6
B.L. 700 to 2,400 metres 18/-



IGRANIC VERNOB

For fitting to any rotary tuning device in order to obtain fine vernier adjustment. It is designed to fit 1/2 in. spindles, but with a liner will fit 3/16 in. spindles. Price complete with liner and 180° scale. 6/-



No wireless enthusiast can hope to secure the best results from 1925 broadcasting with apparatus of 1922 design.

If you would enjoy, to the fullest possible extent, the undoubted advantages of Radio Broadcasting, you *must* use radio components embodying the most up-to-date principles in design and construction.

New IGRANIC Components are continually being introduced to meet this necessity, and to afford the amateur as well as the expert every facility for securing perfect results.

The name IGRANIC represents the last word in efficiency, quality and reliability.

The design, workmanship and materials used in IGRANIC Components are enabling thousands of wireless enthusiasts throughout the British Isles to build better radio receivers.

IGRANIC Radio Devices include:

Honeycomb Coils, Fixed Condensers, Variometers, Vario-Couplers, Bi-plug Coil Holders, Tri-plug Coil Holders, Filament Rheostats, Battery Potentiometers, Interval Transformers, Vernier Friction Pencils, etc.

Obtainable of all reputable dealers.

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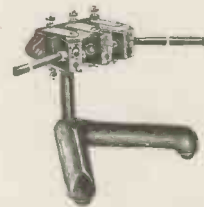
GLASGOW
NEWCASTLE



IGRANIC-FRESHMAN FIXED CONDENSER

Is designed upon an entirely new principle and so constructed as to render variations in capacity negligible. Will withstand high voltages and is eminently suitable for usual reception purposes and low power transmitting. Dielectric losses almost non-existent.

Prices:—
.001 mfd. .005 mfd. } 2/- each
.002 mfd. .01 mfd. }
.003 mfd. .02 mfd. }
.03 mfd. }
.05 mfd. } 2/6 each
.06 mfd. }



IGRANIC TRI-PLUG COIL HOLDER

For use with Igranic Plug type Honeycomb Coils, it is arranged to take one fixed and two movable coils. Finest nickelled fittings, instrument finish.

Price with stand and ebonite operating handles 21/-
For panel mounting 15/-

Notings on the Month's Progress

IN his recent address before the Royal Society of Arts, Signor Marconi gave a striking account of some of the latest advances in wireless science. The present system of high-powered transmission on long wavelengths he declared to be uneconomical and comparatively inefficient, adding that it was only a matter of time before such stations would be dismantled and replaced by smaller and less expensive installations utilising short-wave "beam" transmission capable of being focused in any required direction.

A series of investigations into the penetrative power, during the difficult daylight hours, of this type of radiation was commenced last August on board Signor Marconi's famous yacht the *Eletra*. At Madeira it was found that whilst a reflecting aerial at the transmitting station gave a considerable increase in the signals received, the results, using a wavelength of 92 metres, were not all that could be desired. It was then decided to try the effect of still shorter wavelengths. Experiments extending over a period of two months were accordingly carried out in the Atlantic and Mediterranean, using wavelengths of 60, 47, and 32 metres respectively. The results showed conclusively that the daylight range of reception increased very rapidly as the wavelength was reduced.

In October trials were made on a 32-metre transmission between Poldhu and specially installed receivers at Montreal, New York, Rio de Janeiro, Buenos Aires and Sydney (N.S.W.). Constant communication was secured with the North and South American stations, even when the whole of the intervening track was exposed to daylight. As regards Australia, reception from Poldhu was possible for 23½ hours out of the 24. More recently still a 48-hour test resulted in successful results being obtained during 47 hours of that period.

Signor Marconi anticipates the early arrival of the time when the practical range of broadcasting will embrace not only America but even the most distant parts of the British

Empire. This will be possible at all times of the day, and not only during the most favourable periods, e.g. late at night and early in the morning, as at present.

Frame Aerials for Transmission

Two Russian inventors have recently suggested an interesting plan for utilising loop or frame aerials for directive transmission. According to Professor Fleming the radiation from a closed circuit is inversely proportional to the fourth power of the wavelength, so that for long waves the ordinary frame aerial is an extremely poor radiator. Any attempt to reduce the wavelength whilst maintaining a reasonable area of loop involves cutting down the capacity to a very small value, which in turn prevents any considerable power from being stored in or radiated from the aerial.

It is proposed to overcome these difficulties by branching a number of large loop aerials across a common condenser of large capacity. This parallel arrangement ensures that the system as a whole possesses (1) a relatively small wavelength, and (2) a large capacity, together with (3) a small ohmic decrement. In particular ohmic losses due to earth currents (which vary in the case of the ordinary type of aerial with the nature of the ground, weather conditions, etc.) are entirely absent in the case of an unearthed loop. By arranging the parallel loop aerials at an angle, and suitably adjusting the phase of the currents flowing in each, the transmitted energy can be confined to a comparatively small angle in space, thus producing a directional "beam" similar to that obtained by the Marconi reflecting aerial system.

Distant Control

Extraordinary claims are made for a new method of wireless control invented by Signor Fiamma of Aquila in Italy. The principle of operation has not yet been made public, but the inventor has apparently discovered an extremely selective system of transmission and reception, whereby the response of distant mechanism to radiated ether waves

is immediate and decisive. The apparatus is said to be completely immune from deliberate jamming or other outside interference.

Signor Fiamma states that his apparatus would enable the Z R 3 to be navigated to America and back, or to and from any part of the world, without requiring a single human being on board the airship. Apart from the automatic steering of distant ships, vehicles, or aircraft, the new principle is also applicable to the wireless transmission of pictures, writing, etc. For instance, a business man sitting in his office in London could have his signature, as he writes it, reproduced instantaneously in New York.

In a series of official tests carried out at Spezia upon the 24-ton motor boat *Orlando*, the vessel was stopped, started, and reversed from the shore as required. In addition it was cruised around for a considerable time under the complete control of Signor Fiamma's apparatus, no one being on board at the time. The experiments were witnessed by a number of distinguished Italian scientists.

Problem of Selectivity

As the number of transmitting stations gradually increases the difficulty of getting full value from the ordinary multi-valve receiver becomes more and more pronounced. There is little advantage in possessing an expensive valve outfit unless it will at least provide variety. Apart from loud-speaker work, one naturally wishes from time to time to hear what is going on elsewhere, and particularly across the Channel. This problem of selectivity has for a long time been felt even more acutely in America, where it has to some extent been solved by the use of various "super" circuits, such as the neutrodyne and super-heterodyne.

Similar types of selective receivers are for the same reason rapidly growing in favour over here, particularly with those wireless enthusiasts to whom the mere question of expense is of secondary importance compared with the number of different stations they can "log" in a given time.

B. A. R.

Britain's Best BROADCASTING SETS

1925

GECOPHONE

REGISTERED TRADE MARK

MODELS

LET your choice of a Wireless Set be guided by the knowledge and experience of the many thousands of satisfied users of GECOPHONE Sets.

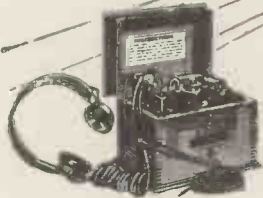
A new range of models has now been introduced, each set embodying all those superlative qualities which have made GECOPHONE famous throughout the World.

The range of GECOPHONE receiving sets now meets every requirement and offers selection to suit the pockets of all sections of the community. Prices from £2 10s. to £120.

Before you make your choice of a Wireless Set ask your dealer to demonstrate the new GECOPHONE models to you. He will gladly do this without obligation.

GECOPHONE Sets are sold by GECOPHONE SERVICE DEPOTS, Electrical & Wireless Dealers, Stores, etc. Ask for price list No. B.C. 3425.

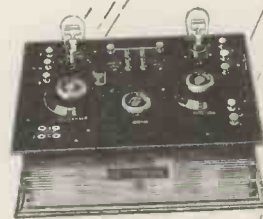
Advertisement of The General Electric Co., Ltd. (Manufacturers and Wholesale only), Magnet House, Kingsway, London, W.C.2.



**GECOPHONE
Crystal Set**



**GECOPHONE
Single Valve Set**



**GECOPHONE
Two Valve Set (Det. &
L.F.) Table Model**



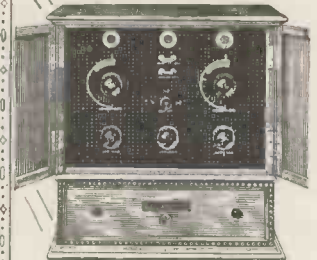
**GECOPHONE
Two Valve Cabinet
Set (H.F. & Det.)**



**GECOPHONE
Five Valve Cabinet Set**



**GECOPHONE
Two Valve Cabinet Set
(Det. & L.F.)**



**GECOPHONE
Three Valve Cabinet
Set (Det. & 2 L.F.)**



**GECOPHONE
Three Valve Table Set
(Det. & 2 L.F.)**



**GECOPHONE
Four Valve Cabinet Set de Luxe**

SHORT-WAVE PRACTICALITIES

(Continued from
page 27)

any change, absorbing nothing of the characteristics of the interfering ripples.

I suggest this experiment purely as an academic one and one which may amuse. Whether or not it has any bearing upon the fact that low wavelengths do not absorb as much static current as the higher I do not know.

But I think it will be found generally that the higher the frequency of vibration the greater the carrying power and power of penetration. Strike a chord on a piano which includes, say, a single high note among some lower ones. The higher note will stand out where the several lower notes merge into each other.

Three Great Points

However, be it as it may, we have the three great points in short-wave work; additional strength and volume; additional selectivity of reception; and decent freedom from static interference on the worst of nights.

These alone justify the present research that is going on in the hope of using these waves for general work.

High-frequency Amplification

Now let me say right away that high-frequency amplification on these wavelengths is not only practicable but advantageous. The B.B.C. use four or five stages in their American receiver, and I have a set myself in daily operation which comprises four stages of tuned high-frequency amplification with reaction on to the aerial. The bias put on the grids of the H.F. valves is certainly not more than a couple of volts, though I have not actually measured it.

But before attempting to outline some circuits which promise surprising results to those who have the time and interest to explore them, I am going to discuss some of the accepted methods of tuning down to one hundred metres.

Care Required

Before we commence it is necessary for the experimenter to realise that there are almost as many points requiring care on these wavelengths before one even commences to consider the actual receiving instrument

as there are in the receiver itself. These have been stressed almost sufficiently, I think, but perhaps a little reminder may not come amiss.

So let us consider the establishment of the receiving station before we hitch up the instrument itself.

Aerial tuning on short waves is almost unnecessary. It does not appear to matter what length, or what the natural wavelength of an aerial, but it does matter that it be sufficiently well insulated.

The loss on these high-frequency currents is so bad that special methods must be adopted to cope with it. As a matter of fact these precautions should be taken in any receiving station, no matter what wavelengths it is intended to receive, but seldom are.

First as regards insulation. Avoid the triangular use of insulators. If the aerial is a twin use two in series between each wire and the spreader and none between the halyard and the spreader, and leave a decent space between the two you do use.

If possible do not carry any stays higher on your mast than about half way and break these up with insulators at unequal distances. If a mast is sufficiently well embedded say with concrete, a minimum of stays can be used.

On no account use rope on the halyard and, finally, hoist your actual aerial in such a way that the distance from spreader to pole is considerable at each end and if possible raise it above any surrounding earthed objects, such as the house, even if only a couple of inches. If it is impossible to raise the aerial in this manner try using insulated wire.

Joining the Lead-in

A most important point is the proper joining of the lead-in to the main wire. This should always be soldered and in such a way that the two wires present extensive surfaces to each other. It is really remarkable how few lead-in wires are soldered to the aerial, yet actual measurement of the ohmic resistance of such aerials would probably surprise their owners.

The Lead-in Tube

The lead-in tube should be a good one and the portion of the lead-in which lies within the house should

be as short as possible and be carried carefully away from ceiling and walls as well as being well insulated with a covering of, say, rubber. An efficient earthing switch is essential and—a point often forgotten—should be cleaned regularly to avoid the deposit of dust which in all probability provides a resistance path between aerial terminal and earth terminal with a consequent loss of signal strength.

These few hints, with the addition of some common sense on the part of the experimenter, should ensure that there is no fault in the aerial system.

I will say right away that I have found no marked difference in the performance of any kind of aerial on sixty odd metres. So much is this so that I find a hundred feet of insulated wire attached to the aerial terminal of the set and thrown through the window to trail on the lawn to the end of the garden gives results as good as a single T type fifty feet high which I actually use.

Use what aerial you please but do be certain that the lead-in either connects at the exact centre or the exact end.

E. C. D.

(To be continued)

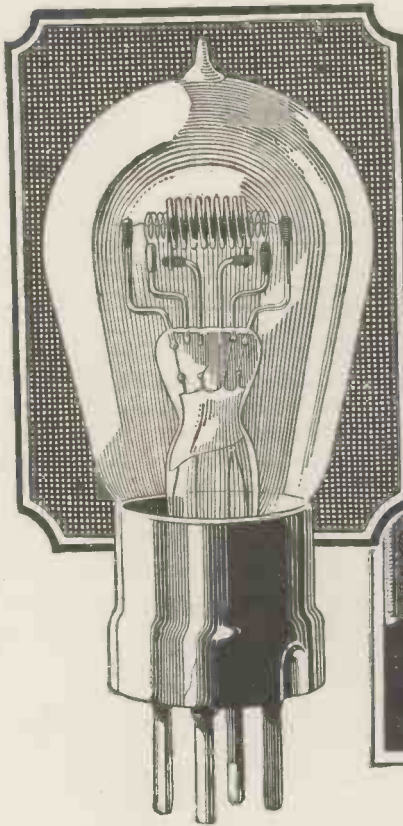
Noisy Dull-emitters

EVERY amateur who has used dull-emitters must at some time or other have experienced that unpleasant ringing noise that occurs when the valves are subjected to vibration, either accidental or intentional. These noises can be obviated by mounting the valves in special shock absorbing holders, but that is frequently not convenient.

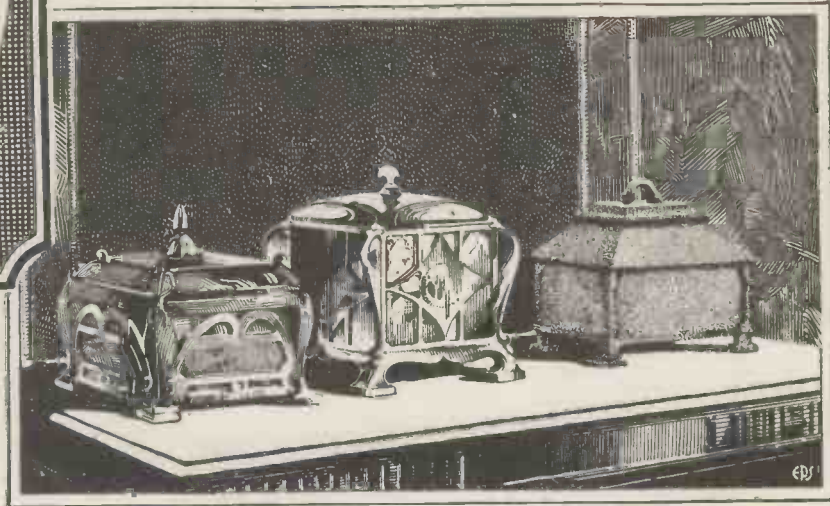
When the valves are used on an ordinary set, microphonic noises can be stopped almost completely by padding the valves round with wadding or cotton wool and placing valve boxes upside down over the covering.

If desired a hole can be cut in the side of the box so that the brightness of the filament can be seen. (Even with "silver"-coated dull-emitters it is possible to see the filament brilliancy by looking at the bulb just above the cap.)

G. W.



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.

**Louden
VALVES**



*The Plain Louden for
Detecting and Low Fre-
quency Amplifying.*

*The Blue Louden for H.F.
Amplification.*

Filament Volts ...	4.3-5
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

A Wireless Cross-word Puzzle

WE must be in the fashion, and so we present our readers with a cross-word puzzle—not so pretty as some, and not so difficult as most, but here it is, and you can try it for yourselves. We give the “definitions” below, and for the benefit of readers who have kept away from this terrible craze, we may just say that in this particular case every numeral marks the square in which a word begins.

Numbers 1 to 22 read horizontally and numbers 23 to 46 read vertically. Thus No. 1 represents a four-letter word: reading from left to right, whereas No. 35 is a six-letter word

reading from top to bottom. It will be noted that the numbers which start the vertical words are underlined. When a word comes to an end, the next square is occupied by a stop, this being true of both horizontal and vertical words, unless of course they end in outside squares.

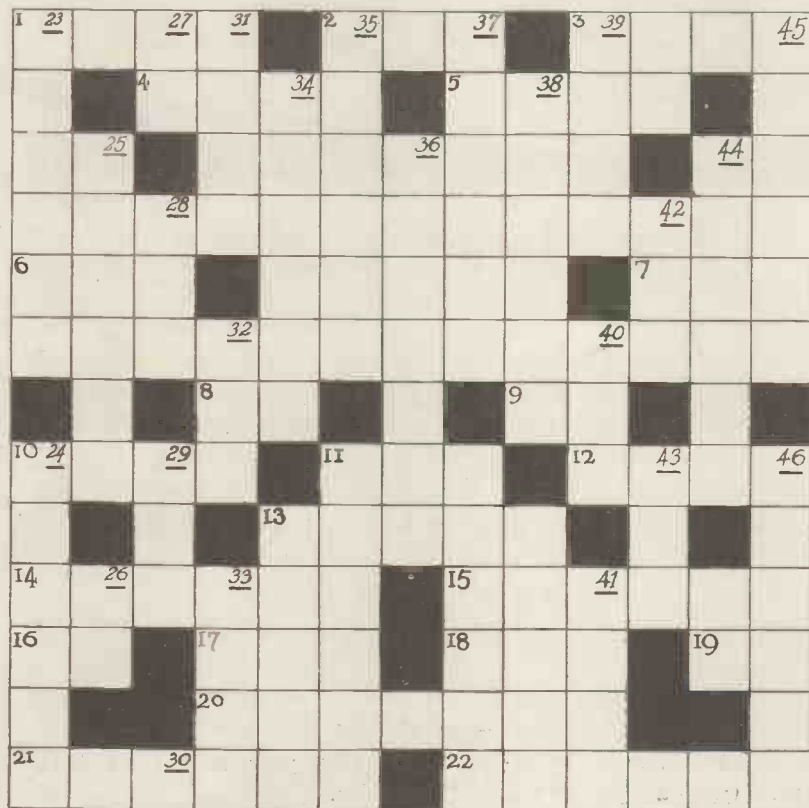
All but three or four minor words are wireless terms, and we are wondering whether this is the first wireless word-square yet attempted.

We offer a prize for a correct solution accompanied by the most original cross-word puzzle in which the majority of the terms are of a

wireless nature. Readers will understand that a solution of this somewhat easy puzzle will not alone entitle a competitor to the prize. Every competitor must send not only a solution but an attempt at an original cross-word puzzle of his own contriving.

Our prizes are wireless goods of any description, chosen from the lists of the advertisers in this magazine, to a total value of Five Guineas for the First Prize and Two Guineas for the Second Prize.

Entries close on Saturday, February 21, 1925.



“ DEFINITIONS ”

HORIZONTALS.—1, An electrode. 2, Where the whiskers come from. 3, A connection. 4, A circuit. 5, Inside the L.F. transformer. 6, Sometimes grid, sometimes earth. 7, Certain crystals. 8, For example. 9, Disturbances. 10, Secondary connections. 11, Where some wireless officers start. 12, What the set must not do. 13, A relay station. 14, Plenty of them in a valve set. 15, A continental station that transmits on week-days only. 16, Two well-known terminals. 17, Electrical unit abbreviated. 18, Irish call-sign. 19, A difference of potential. 20, To send forth. 21, Best when wet. 22, A soft valve.

VERTICALS.—23, A good crystal. 24, To hinder. 25, Electrical regions. 26, Exclamation when you break a D.E. 27, Certain primary connection. 28, A coil. 29, Good general-valve. 30, A well-known type of valve. 31, To stop vibration. 32, A positive. 33, Sharp. 34, Bringing into harmony. 35, Cored inductances. 36, An insulator. 37, An interrupter. 38, A popular type of circuit. 39, The quality of reception generally striven for. 40, An American station. 41, What THE WIRELESS MAGAZINE answers. 42, Not a negative abbreviation. 43, A garden-dweller who knew not 2 L.O. 44, A length of wire. 45, Certain waves. 46, Part of the aerial!

SHALL THE THEATRE BE BROADCAST? (Continued from page 39)

ably as to limitations in this, as well as other directions.

I can offer no further enlightenment on this point because when, on behalf of THE WIRELESS MAGAZINE, I asked Mr. Walter Payne, as a representative of the Managers' Association, if he would give me further particulars as to the meaning of his Association's statement, he replied that he had nothing to add to it.

Two Points

In considering this situation, two points may profitably be borne in mind. It appears that the B.B.C., having taken what it considers all possible steps to supply what the public wants, is now of opinion that the matter rests between the managers and the public, and it is for the latter, if they feel so disposed, to express their disapproval of the managers' action in whatever manner they deem fit.

On the other hand, we must remember that the managers have paid good money for their theatres and their plays and that they have undoubtedly a legal right to enforce, if they can, their ban against broadcasting. They have the right. The question is as to whether they will find it expedient to insist upon it.

T. B.

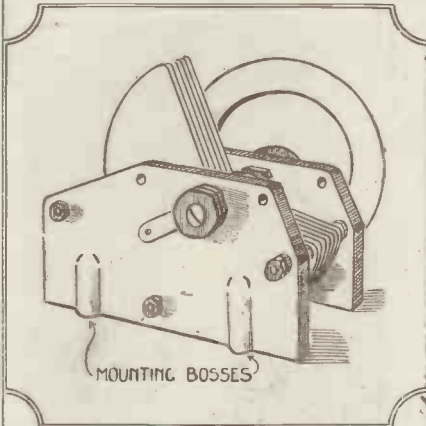
It is stated that 6 a.m. is the best time to hear Australian amateur stations. This means that those listeners who have a habit of going home with the milk will get the cream of the programmes.



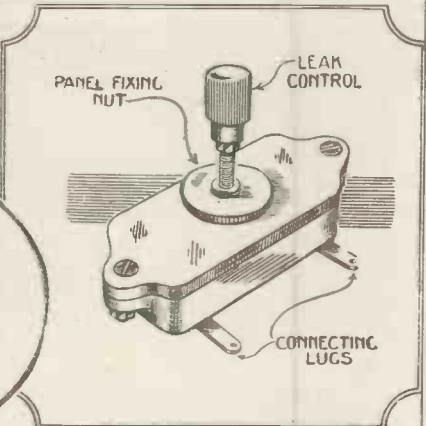
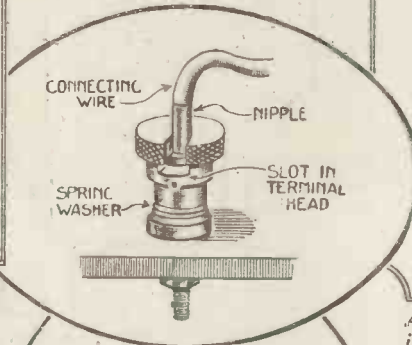
A New Year
Resolution
- use Cossor
Valves

NOVELTIES AND NEW APPARATUS

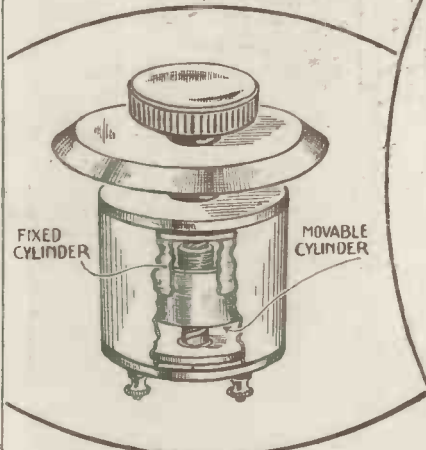
ILLUSTRATIONS AND BRIEF PARTICULARS OF SOME OF THE NEWEST WIRELESS COMPONENTS



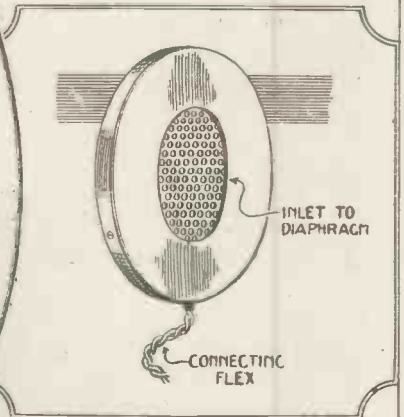
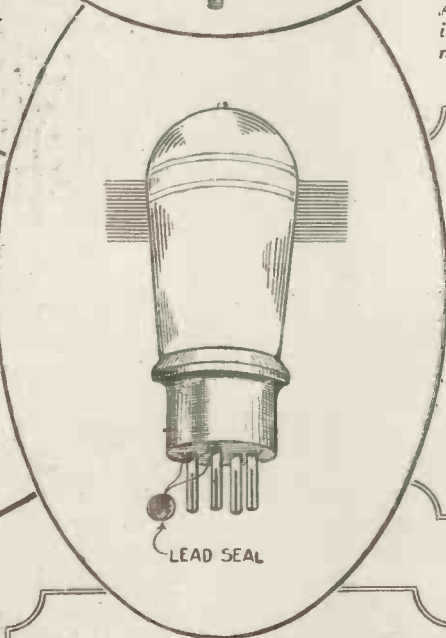
A neat Ediswan variable condenser of the square-law type. Note the special mounting bosses for fixing to baseboard.



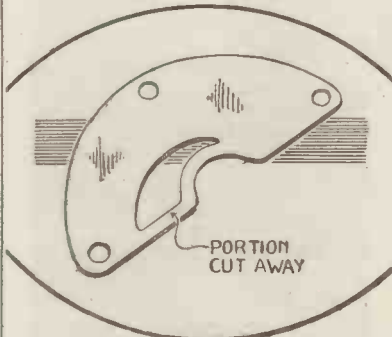
Above: An Atlas panel-mounting variable grid leak. Left: A new terminal made by Mousley of Birmingham.



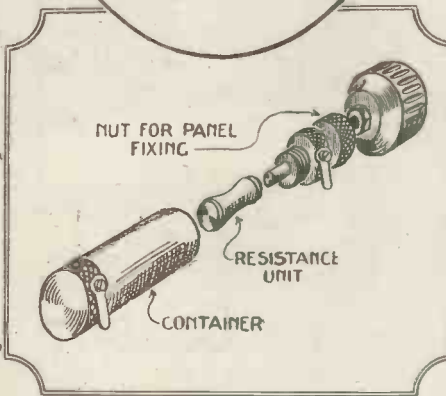
In this new Radiovox condenser the small cylinder, insulated by mica, slides into the larger one.



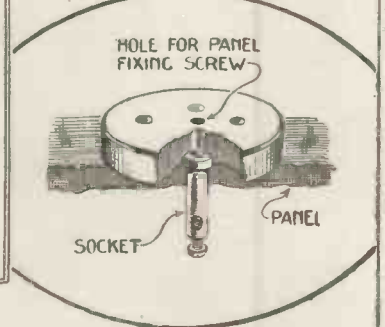
Above: An Economic Electric microphone. Left: Mullard valves cannot be used without removing the sealed wire shown.



To get the square-law effect Peto-Scotts use condenser vanes with a portion cut away as shown.



Interchangeable resistance units are a feature of the rheostats made by the Enterprise Manufacturing Co., Ltd., of London.



A Murray panel-mounting valve-holder that takes up little room and is neat in appearance.

"Permanent Wiring Without Solder" (Continued from p. 40)

fixed without wrecking the connectors.

The thick wires are of the usual round tinned copper type, 16 gauge, and are therefore substantial enough to be straightened out and will keep straight whilst being fitted into the set. Another point: no spanners are needed, for there are no nuts to be tightened. All that is necessary is to screw the connectors on to the stem of the terminal, etc., it is desired to connect, and to fasten the thick wire into it by means of a rotary motion.

This new system of wiring possesses the greatest amount of utility on account of these latter advantages, with the added advantage that the work at all stages looks neat and requires only the means of cutting the thick wire into the desired lengths. It has already been pointed out that it can have no disadvantages from a standpoint of resistance, and there is certainly no chance of corrosion, as no acids of any description need be used on any part of the set.

Oxidisation

The chance that exposure to the air is likely to oxidise the various connections is extremely remote, as in most instances these connections will be under the panel in a case.

We can therefore reckon that this new system of wiring completely solves the soldering problem from a utility point of view.

Now for the springs. It so happens that 24 gauge bare phosphor-bronze wire wound upon any size of B.A. rod is suitable for screwing on to B.A. threads two sizes larger. It will therefore be an easy matter to wind one end of the connector springs. The other end—to take the 16 gauge wire—may be wound on a three sixty-fourths drill. Both ends should be wound in the same direction, the best plan being to wind several dozen of the small ends, leaving ample to wind the various sizes required at the other end as needed. The correct direction will be obtained winding to the right in a clockwise direction.

We understand that the system is being put on the market by Mr. J. W. Miller, of 68 Farringdon Street, E.C.4.

DE LUXE RADIO

—AT BARGAIN PRICES

The N. Mk. C.L. Special High-Low Wavelength SUPER CRYSTAL SET
Specially designed for receiving Chelmsford in addition to usual Broadcast.

The N. Mk. C.L. Super Crystal Set illustrated above has been specially designed by us for the reception of the new Chelmsford B.C. Station and also for Paris Telephony, in addition to the usual Broadcasting on lower wavelengths. The addition of Loading Coils to short wave Sets is unsatisfactory, especially if the latter are Variometer tuned. On this Set, when listening in to Broadcast on the 300 to 500 Metre wavelength, the extra winding used for 1600 metre wave length is automatically shorted, thus obviating "dead end" noises.

As regards range (distance from Broadcast Stations) this Set will do all that the famous little "Gnat" does, and in addition will, on a good Aerial, receive Chelmsford Broadcast up to a distance of over 200 miles.

The finish is unequalled in quality, all brass parts being Nickel-plated and the Ebonite Panel highly hand polished. At the same time the price is ridiculously low. Several pairs of phones may be used if desired.

Price of Instrument only — 32/6

Price complete with 1 pair Brown "P" Type Headphones (4000 ohms) (25/-), 100 ft. Aerial Wire, 4 Insulators, Lead in Tube and Earth Wire.£3 0 0
Registered Post, 2/-.

WRITE FOR CATALOGUE, post free 3d.

ONE VALVE SET, Type N. Mk. 1*

TUNING. The tuning arrangements, a vario-coupler, with variable Reaction, are simple and extraordinarily good, giving long range, high selectivity, and eliminating to a great extent local interference.

RANGE. The Wavelength Range of this Instrument is 300 to 1800 Metres, and it is capable of receiving, in addition to ALL British Broadcasting Stations (including new Chelmsford Station), PARIS Telephony Broadcasting without any additions in the shape of Loading Coils or Amplifiers. We have recently received Testimonials from satisfied users, to the effect that they have also received direct transmissions from AMERICA.

FINISH. The Panel consists of best quality, hand polished, 1/4 in. Ebonite and all fittings are heavily Nickel-plated. The Cabinet is of Oak or Mahogany, size 10 x 8 ins. with 2 in. Lid. Price of Instrument only, excluding Valve and Accessories, but including Marconi Royalty £5 5 0
Price of Complete Set, including all Accessories, £15 0

N.B.—We can supply in place a Dull Emitter Valve and Dry Battery for working same at no extra charge. This eliminates the trouble of having accumulator recharged and the results obtained on set are just as good.



TWO VALVE SET, Type N. Mk. 2*

The N. Mk. 2*, which is illustrated here is practically identical to our N. Mk. 1* (see above) except that it has one stage of L.F. Amplification added. The Tuning arrangements are precisely the same and the wavelengths 300 to 1800 Metres, covering all British and most Continental Broadcast.

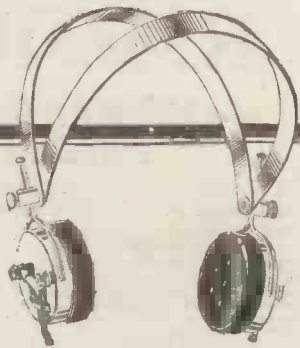
This Instrument is capable of working a Loud Speaker up to a distance of 50 miles for usual British Broadcasting and up to a distance of over 200 miles for Chelmsford and Paris Stations. In addition to the above it will of course receive on Headphones all British Stations, Paris and America. In fact there is practically nothing it will not receive.

Price of Instrument only, excluding Valves and Accessories, but including Marconi Royalty£3 10 0
Price of Complete Set including Accessories £13 10 0

Dull Emitter Valves, which only require dry battery, can be supplied in lieu of ordinary type quoted above and a dry battery in place of Accumulator. Total extra charge, 12/6

NATIONAL WIRELESS & ELECTRIC COMPANY

42, GRAY'S INN ROAD, LONDON, W.C.1



They weigh but six ounces!

OBVIOUSLY tele-phones for Broadcast use should be light in weight, sensitive and low in cost.

The Brown Featherweight Headphone is probably the lightest in the world (including cords it weighs but 6 ounces) yet its sensitiveness compares favourably with others considerably heavier.

And Broadcast enthusiasts fully appreciate that at twenty-five shillings the pair these Featherweights have no competitor.

Thoroughly well made, under typical Brown supervision, they are indeed remarkable value for money.

From all Dealers:

4000 ohms 25/-

also 120 ohms 22/6

Handphones (4000 ohms) 33/-

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

Showrooms:

19 MARTIMER STREET, W.1
15 MOORFIELDS, LIVERPOOL
67 HIGH ST., SOUTHAMPTON

Brown
Wireless Apparatus

Gilbert Art. 2004

Wavelets

BRADFORD CORPORATION is charging a half-crown licence on all aerials that cross the street. This acumen proves what we were taught in our schooldays—that Bradford is in Yorkshire.

WITH wireless waves travelling at 186,000 miles per second, some of our giddy young motorists will have to look to their laurels.

THE B.B.C. have asked listeners to cork their aerials. Has any Kilmarnock reader a few dozen surplus corks: he can send us for the purpose?

AN inventor claims that his new discovery will make wireless conversation as secret as that on the ordinary telephone service. If that is the best he can say about it, it is doomed from the outset.

It is said that an American has constructed a receiving set in the bowl of a pipe. This sounds like another of those rumours that end in smoke.

Two amateurs have been using Ford car parts in building their receiver. It must have been a "rattling" good set.

MOST of the West End clubs now have receiving sets. With specially large-sized headphones, we presume, to cater for the "morning after the night before" feelings of their members.

WIRELESS has been installed in several cinemas. So that's the end of the "Silent Drama."

THE Food Commission are considering a proposal that the prices of foodstuffs should be broadcast. In view of the fact that women listeners have been asking for more humour, the suggestion is not very timely.

SIGNALS are sometimes like old soldiers: they seem to fade away.

BROADCASTING is likely to begin in Finland shortly. So Finnish enthusiasts ought now to finish grumbling.

A WOMAN complains that the wearing of headphones causes wrinkles to appear round her forehead and mouth. But she is different from most women if she does not know how to camouflage those.

WE are not yet able to verify the report that the call sign XXX is being reserved for Burton-on-Trent.

SCOTLAND YARD is now transmitting finger-prints by wireless. Chimney.

"WHAT THE READER THINKS"

is the title of a section of THE WIRELESS MAGAZINE in which we shall publish month by month interesting correspondence from our readers.

If you have anything timely and interesting to write about wireless, let us hear from you. Remember that the success of this section depends partly on you.

To encourage readers to let us have their opinions on all wireless matters, we shall give a prize—a Marconi-Osram valve—for every letter published in the March and April issues.

Keep your letter brief, and let it be topical, interesting and to the point. When you have written it send it to:

The Editor,

THE WIRELESS MAGAZINE,
La Belle Sauvage, E.C.A.

sweeps, nevertheless, are likely to stick to their old-fashioned method of impressing their finger-prints on the cook's apron.

A MILITARY writer says that in the next war wireless television will make it possible to direct operations from an armchair in London. But that was not altogether unknown in the last war.

CERTAIN people in America are talking about censoring the wireless. What they want is sense, not a censor.

TALKS we all want to hear:—"How I Reduced the Income Tax," by Uncle Winston.

"Music of the Month"

(Continued from page 67)

One might call January 1 the common denominator of the year, for it is a day of special significance to all, especially the Scottish people.

However, at Edinburgh the proceedings were opened appropriately enough by Miss Rosaline Masson, the well-known authoress. She has written widely on her country's history, and especially Edinburgh. I think, too, that the songs of Mr. Grant, the Pipers of the 4 15th Royal Scots, and Miss Marion Richardson's Vocal Octet with the singing of "Auld Lang Syne" after the chiming of the tubular bells, made the affair more impressive.

Glasgow

5 S C made a very special "nicht o' it," for they had the play *Hogmanay* by Fred W. Sidney, the music of *The Jolly Beggars* of Burns arranged as a Cantata by Sir Henry R. Bishop, while the Scottish atmosphere was still further maintained by the playing of the Glasgow Tramways Pipe Band.

Aberdeen chose a still more ancient date, namely, January 3, "Aul Eel" as it was called, and a fine programme it was.

Belfast

Of all the stations, however, I think Belfast has the knack of good programme making. There is always a touch of novelty about them. Ancient custom played its part here, too, in the reconstruction of an "Ulster Ceidlioth" (pronounced Caley).

A "Caley" is not a piece of chocolate, but an informal "sing-song" at a neighbour's farm, and judging from *Charley's Christmas Party*, especially written for the Belfast Radio Players by Mr. Charles K. Ayre, a very jovial affair, too.

I liked, too, the idea of the programme devoted to women composers. STUDIUS.

AN experimenter says that he has been using a frame aerial which was entirely enclosed in a soldered metal envelope of tinned iron. Sounds more like a Ford car than an aerial!

AN expert has been lecturing to a wireless society on his experiences with a portable receiver in Central Europe. What would be more appropriate in that region is an official receiver.



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"Personalities of the Programmes" (Continued from p. 47)

A Rival to Mrs. Camp

Everyone will admit that to make a pantomime "dame" famous over the ether without the help of make-up or props is a triumph in itself. But I think Fred Spencer has literally "done the trick" with his Mrs. 'Arris. He must be fast approaching the famous number of "57" varieties, I mean episodes, and these he writes entirely himself. He told me recently that he had taken the good lady in various pantos for twenty-five years, and, like the perennial "Charley's Aunt," is "still running."

Certainly "Mrs. 'Arris at the Bargain Sales, or when she quarrels with her boon friend Mrs. 'Opkins," is bound to be an attractive item on most programmes.

Amongst the Instrumentalists

The violoncello really "radios" the best of all the stringed instruments, and the B.B.C. have been particularly fortunate in securing two of the best known of the English artists in Miss Beatrice Harrison and Mr. Cedric Sharpe. Both are great classical players. The name also of Miss Harrison will always be intimately associated with broadcasting, for it was at her suggestion and with her assistance that the successful experiments of broadcasting the nightingale's song was carried out last year.

Mr. Sharpe, in addition to being a noted soloist and composer, is also a member of several famous trios and quartet parties, including the English String and the Virtuoso String Quartets. Both these are led by Miss Marjorie Hayward.

Miss Hayward is known for her classical attainments; her recitals at the London concert halls, as well as her leadership of these quartet parties, have made her name one of the best known of violinists in the country. She is heard frequently at all stations and confesses to liking broadcasting. She is also a professor at the Royal Academy of Music.

"The Harp that Once——"

Amongst the other stringed instruments the harp "radios" well, especially under good hands. Miss Sidonie Goossens, who is now permanently attached to the B.B.C. at 2 L O in

the string quintet, is a Queen's Hall orchestra artist. She is a sister of the famous conductor Eugene Goossens, who has also conducted a wireless concert.

The piano has been termed England's national instrument, and it is certainly the most popular. Again the B.B.C. have scored with their artists, for they have had Miss Irene Scharrer, the noted artist of the Queen's Hall Symphony Concerts and other famous concerts. She has broadcast from all stations, including Manchester, where she has also played at the Richter-Hallé concerts.

The S.B. Programmes

For these programmes the best artists are chosen, and amongst the many singers who have become almost a stock company for the operas and musical plays is Miss Gladys Palmer. Her singing (as well as her acting) make her work before the microphone an assured success.

I really don't know what the programmes would do without the works of Albert Ketelby. I can imagine most musical directors, after going through their mail, saying, "What! A dull night last night; well, give 'em Ketelby to-night," and then we get some of those tone pictures—"In a Persian Market," or "A Monastery Garden," and other of his prize-winning compositions, and all is peace. A noted organist, there is little music that this versatile composer has not done, and done well—songs, waltzes, symphonies, string quintets, as well as musical switches.

ZIRCON.

A WIRELESS UPSET

WE made a wireless set to-day
 With Nurse's work-box on the floor
 (Well, yes, she chanced to be away!).
 We stretched her wool from door to door

To make the aerial. But, oh!
 It tangled up and broke instead.
 When Nurse came back this vexed her so
 She said "You'll listen-in—in bed!"

L. M. O.

"Broadcasting Sound and Sight" (Continued from p. 43)

If you think of each white dot or space as an extremely minute electric lamp *lit up*, and of each black dot as an equally minute lamp *not lit up*, you will realise that, granted a mass of such lamps, each lamp being lit, as necessary, by an appropriate wirelessly transmitted impulse, it is not beyond the bounds of possibility to think of the kinema of the future as fitted with two screens instead of one. There would be the present-day screen upon which the usual photographically made pictures of past events would be shown, including dramatic and comedy films. The other screen would really be no more nor less than an electric flash sign whereon would appear, in glowing dots of light, broadcast wireless pictures of actual happenings of the moment. These broadcast contemporary pictures would largely supplant the screen topicals of the present day.

Making Moving Pictures Talk

Meanwhile, though we may have to wait several years longer before that possibility becomes an actuality, there is already in existence in this country a company formed to introduce into the kinema films bearing upon their edges a continuous sound record translated into light and shade by means of a photo-electric cell (Fig. 2). As these films, called "phonofilms," pass through the projector at the kinema where they are being shown the sound record on their edges is to be made to pass once again through a second small photo-electric cell whence the minute differences of current are taken through the grids of a train of power amplifying valves, till sufficient potential variation has been built up to operate a large loud-speaker.

Sight, Speech and Music

The film will thus be made to serve as picture record, speech record and music record all in one. The audience at a kinema where phonofilms are shown will be an audience in fact—not mere spectators—for the characters in picture plays will do their own talking and singing as well. The film will even be capable of providing its own orchestral interludes where necessary.

COLIN BENNETT.

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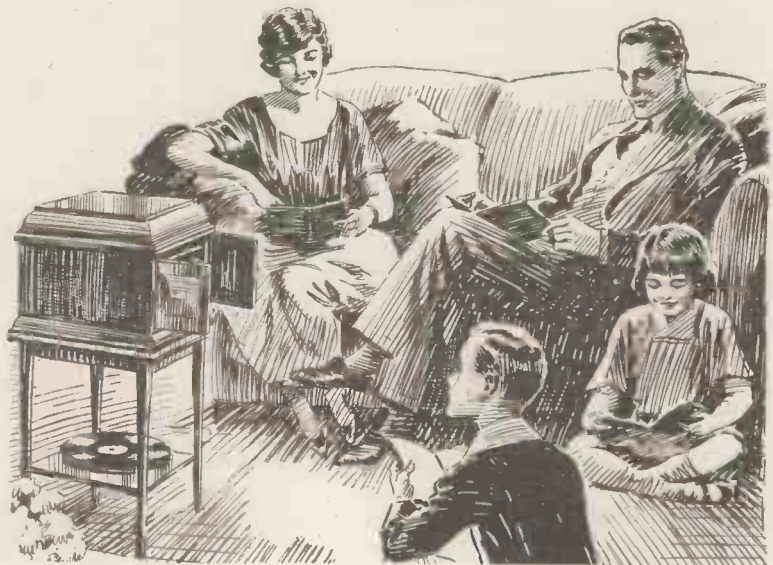
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Continental Notes

LATELY, I have been devoting a goodly portion of my leisure time to the reception of Madrid. Radio-Iberica is a powerful station which, as a rule, keeps its programmes going until past midnight. It comes in very strongly as soon as our home stations have closed down and considerably adds to my daily menu. To those who have listened to this station it must have appeared curious that Madrid should have chosen as an announcer a gentleman with a pronounced lisp. This, however, is not the case. In the Spanish language the letter "c" in front of at least two of the five vowels is pronounced "th"; hence the result.

For all that, the charming little thing who, when asked how she would like to spend her evening blushing replies: "Leth go to a thinema" is not necessarily of Spanish origin!

The Madrid paper *La Libertad* provides a programme once a week, in the same way as *Le Matin* supplies one to Radio-Paris every fortnight. Some of the vocal and orchestral items are particularly good, and from what I can hear I should say that most of the singers are members of the State Opera House. It seems a pity that Radio-Iberica's announcer should see fit to broadcast, in the course of the evening, what are obvious advertisements for articles of daily use. We should be thankful that the B.B.C. have set their face against this policy, which to some of the South American stations has become the main source of income. It is quite true that, in certain instances, the adverts. or "puffs" are camouflaged by interesting talks, but you know how wild one feels when after having read a thrilling story in a newspaper the discovery is made that it is merely a "gilded pill." As a child I always hated taking my powders in jam!

What London Does To-day . . .

Radio-Paris is now devoting two or three late evenings to dance music or, as they still call it over there,

"jazzban." It is a remarkable fact that certain tunes which catch on in London immediately make their way across the Straits to the Continent. The fox-trots and one-steps you hear at the Savoy can be picked up a few evenings later from Paris and within very few days after that from Berlin and Vienna.

When I left London we were being overwhelmed with "Bananas." I gathered a hefty crop in Paris, another one in Brussels and a perfect harvest when I reached the Central Empires. Fox-trots, blues and one-steps may perhaps bring the nations in closer touch with one another (I'm not referring to the dancers' contortions), but as Abraham Lincoln might have said (had he lived in this enlightened age), "For those who like that sort of music, it's the sort of music they'll like."

In a recent programme I received from Madrid, I noticed that "Yes, &c." was being given "by request" (a petición). Now, would you believe it?

Hamburg

I felt quite pleased with myself the other evening and—metaphorically, of course—patted myself on the back. I tuned in Hamburg and managed to hold this station for quite a good time, notwithstanding the fact that at least two other neighbouring waves were coming through the ether very lustily. Hamburg has made wonderful strides of late, and I must say that of the many varied programmes now offered by the Fatherland the station on the Alster literally takes the bun.

Curiously enough, although it is not so easy to tune in as Hamburg, I have no difficulty in getting excellent reception of Bremen, its relay station. The wavelength is much more favourable, as it is well away from our B.B.C. transmissions. On several occasions I have listened, with interest, to a Mrs. Theo. Drill's English talk on "British Life of To-day." Her descriptions of our Christmas festivities, our mistletoe custom and our national plum pudding were particularly amusing.

She speaks very deliberately, but has a fairly strong Teutonic accent. In my opinion she must be either a German lady who has lived many years in England or an English-woman married on the Continent who has spent the greater part of her life in Germany.

What is a Schwarzhoerer ?

Do you know what a "schwarzhoerer" is? Well, it's the German synonym of a blackleg listener or that unpleasant individual who fails to take out a broadcast licence for his set. In Germany, wireless being under State Control, the authorities are making short shrift of such "criminals" by imposing fines ranging from £5 to £20, and, what is much worse, they confiscate the set. Very little sympathy can be extended to the victims, as for the sake of two marks per month they run a very big risk.

More Opera

Now that Brussels has so successfully relayed opera from the Theatre de la Monnaie, which, by the way, was given us via Chelmsford some short time ago, I am informed that this treat will be frequently repeated. Unlike London, most of the Continental cities run an opera house ten months out of the year. The German stations relay opera from their local houses at least twice weekly. There is no reason to believe that the broadcasting in any way affects the receipts of the box office.

Broadcasting tends to advertise plays by bringing the best part of the performances to the notice of listeners. There need be little discussion on this point over here as it can easily be proved that in most cases where the B.B.C. has relayed one act from a play, the theatre has derived direct benefit therefrom.

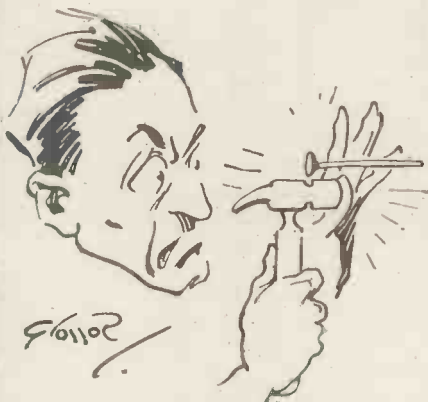
Lessons in English

It is a curious fact that most of the German stations are now giving English lessons and talks regularly every week. They all appear anxious that their hearers should learn our melodious language. Berlin is also giving instruction in French, a matter which caused me some surprise. Vienna is now advertising English talks on literary subjects by the President of the "English Progress Club" in that city, Professor Dr. McCaul Smythe. P.T.T., Paris, has, as you must know, included English lessons in its programmes for many months.

I wonder whether ours will become the international wireless language after all, notwithstanding the great efforts made to introduce Ilo and Esperanto for this purpose.

JAY COOTE.

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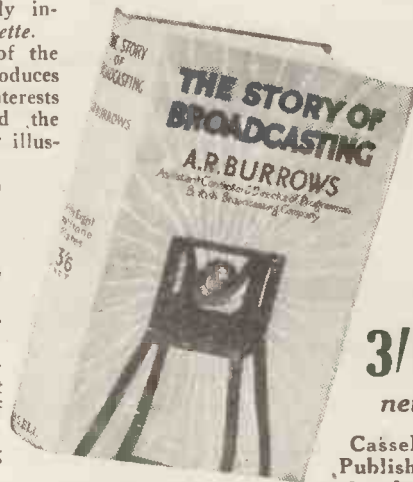
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"A LOUD-SPEAKER—AND A FIDDLE, TOO!" (Continued from page 33)

My brace came into my line of vision and it had rather a long bit in it (quite a thin one), about $\frac{1}{4}$ in., and with a little care I managed to gauge the centre line, and thrusting the bit through the hole in the belly of the violin (the hole which I had just made), I speedily bored a small hole through the back. It all sounds very callous and I dare say many violin lovers will shed a tear at this cruel handling of one of their pets, but it had to be done in the interests of experiment.

Back and Front

Having now established some idea as to where I was in the back portion of the anatomy of the violin, I treated this in the same ruthless manner as the front. The back proved to be a tougher proposition, (at least the wood was), but it did not entail quite such careful handling.

A Brown reed earcap was next screwed to the back with the magnets, etc., removed, and things were beginning to look ship-shape. The Brown reed had a long piece of

No. 10 B.A. threaded rod inserted in the hole which formerly held the aluminium diaphragm in place and troubles began to increase, for I wanted the end of this threaded rod to bear against, or pass through, a cross-piece which was to lie under the hole (see sketches). After having twice lost in the depths of the violin a small oak cross-piece which I had made, I at last hit upon a solution to this trouble.

The small oak cross-piece (it must be of a hard wood) had a hole countersunk on the underside by means of an ordinary Morse bit, and having cut off the No. 10 B.A. rod so that it was just long enough to reach the underside of the "belly" with the magnets screwed nearly right into the earcap, the cross-piece was carefully held in position with the countersunk hole so positioned that the B.A. rod rested in it. Having once got the magnets screwed into the cap and the rod engaged in the countersunk hole (and it is not easy because you cannot get your fingers inside to

guide it), a little Croid glue was smeared on the ends of the cross-piece before screwing the magnets right home. After screwing the magnets carefully into the earcap so that the rod—which, it must be remembered, was screwed into the reed—was lightly pressing the cross-piece with the "Croided" tips against the front board, the strings and bridge were replaced and a light tension placed on them so that a firm contact was made between the cross-piece and the board.

Good Volume and Quality

The Croid eventually set, and when this novel loud-speaker was put on test it repaid all the work expended on it, the volume being good and the quality extremely beautiful. The strings may be left on the instrument without interfering with the reproduction in any way, and in fact they might possibly be used to correct any resonance errors which might arise by the simple expedient of increasing or decreasing the tension on them.

MY NEW VALVE: A Wireless Reverie

I HAVE bought a new valve. It is my first. Wonderingly I look at it on my way from the City. What vast possibilities it conjures up! With it I may hear signals from across the tumbling seas of the Atlantic, signals from large ocean-going liners thrusting their rusted iron hulks through gigantic waves. On the decks may be many people, lovers hastening to meet their beloved, men of adventure going to far-off lands to hunt and kill beasts of prey, men of commerce going to deal in fine silks and precious stones of the East, men of war going to conquer the enemy, to kill or to be killed.

Again, mayhap the signals will come from the East across desert sands on which travel camels ridden by Arab sheiks; over graceful minarets and lofty domes; through Eastern bazaars, with the natives bargaining for rich-coloured goods; through the walls of mud-built houses—passing over deeds of good or deeds of evil, deeds of passion and deeds of love. They may come from America or

Canada across wind-swept prairies, over herds of horned cattle, across vast open spaces and ranches. They may travel through boundless forests, the trees sighing in the wind, across mighty lakes and waterfalls, over mountain and mountain pass.

All the signals have to cross my own country before they arrive at my home. They must pass over green hills and valleys, across villages basking in the pure sunshine, churches whose bells are tolling in the towers, calling the people to worship, fields a mass of gold-brown ripened corn, orchards laden with fruit, sun-baked dusty lanes on which farmers' waggons wend their creaking way, sweet-smelling gardens surrounding quaint cottages, across towns with smoke-belching chimneys, and so they will come to you, little valve, and I will read them.

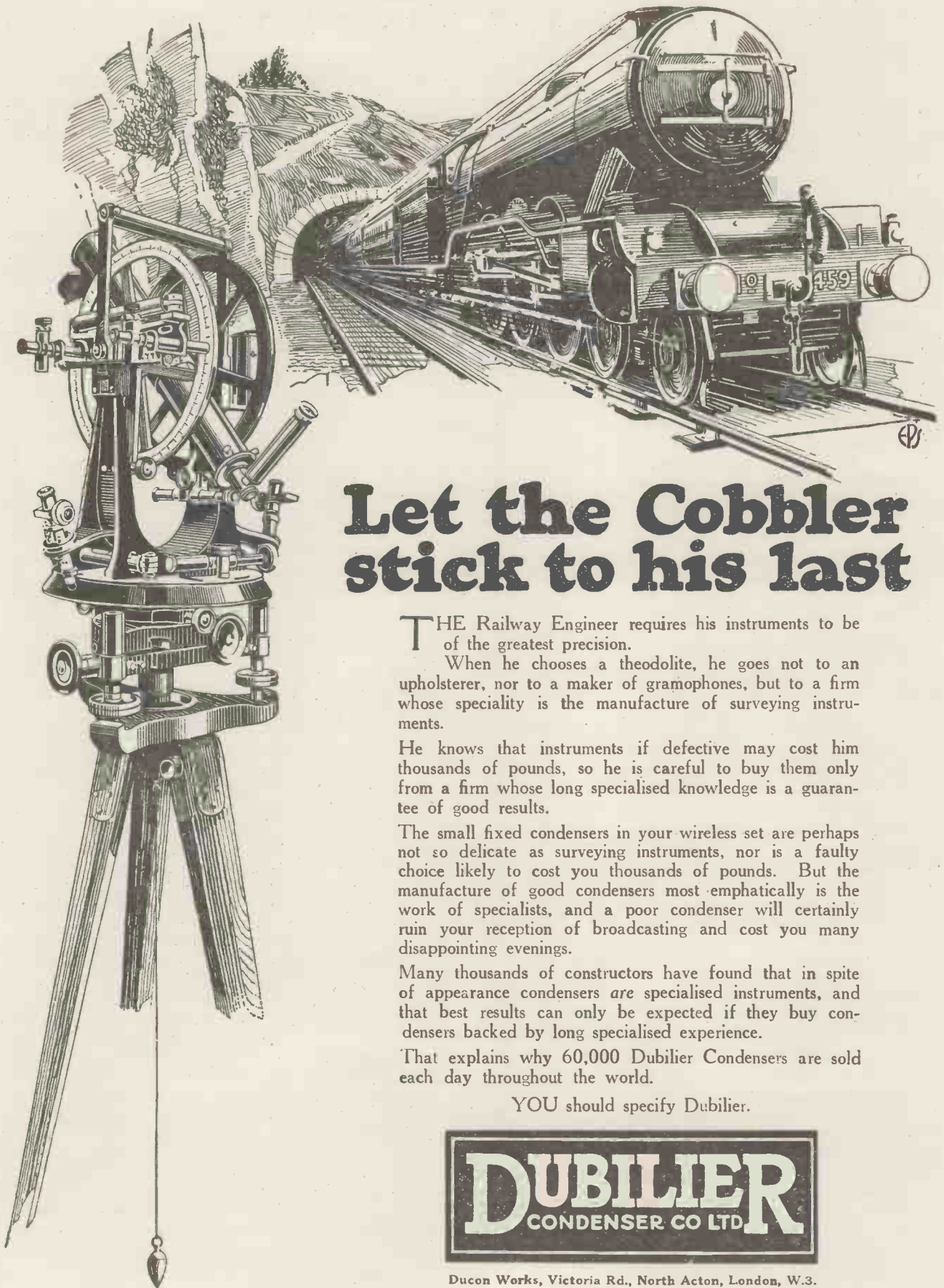
Little valve, you promise wondrous things. When I read the prosaic dots and dashes of the Morse code and decipher a message my thoughts will at times follow the path travelled

by the signals, and I will travel with my thoughts a tour of the world through space.

I hold you to the light to examine you. An ordinary enough object, and one not looking romantic; yet, little valve, if I had not bought you, who would? Would that person have prized your delicate form as I shall, and would you and he have enjoyed together the same trips as you and I? I think that perhaps not.

Together we shall search the ether, you fulfilling your function of making audible the signals, I transcribing them into words. We will hear many strange languages, you and I. Some of them will tell of the great doings of the humans, others will tell of their frailties and failings. Perhaps it may be that we shall hear a ship in distress, the S.O.S. of a great monster stricken by the relentless seas.

You and I will hear of many things happening in this world of ours—some beautiful and some hideous; but, little valve, you will tell me faithfully of what you hear. J. A. J.



Let the Cobbler stick to his last

THE Railway Engineer requires his instruments to be of the greatest precision.

When he chooses a theodolite, he goes not to an upholsterer, nor to a maker of gramophones, but to a firm whose speciality is the manufacture of surveying instruments.

He knows that instruments if defective may cost him thousands of pounds, so he is careful to buy them only from a firm whose long specialised knowledge is a guarantee of good results.

The small fixed condensers in your wireless set are perhaps not so delicate as surveying instruments, nor is a faulty choice likely to cost you thousands of pounds. But the manufacture of good condensers most emphatically is the work of specialists, and a poor condenser will certainly ruin your reception of broadcasting and cost you many disappointing evenings.

Many thousands of constructors have found that in spite of appearance condensers *are* specialised instruments, and that best results can only be expected if they buy condensers backed by long specialised experience.

That explains why 60,000 Dubilier Condensers are sold each day throughout the world.

YOU should specify Dubilier.

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CONDENSER CO LTD

Ducon Works, Victoria Rd., North Acton, London, W.3.

"CRYSTAL SET WITH AIR-SPACED COILS" (Continued from p. 38)

of the circuit in turn, leaving the tune position of the No. 2 switch until last. The secondary coil is wired up to the respective points by means of short lengths of flexible wire.

The components used are a .0005 variable condenser with ebonite or "bakelite" end plates (in the primary circuit), a Baty .0002 mica dielectric (secondary circuit), and a good crystal detector.

Wavelength Range

The coils are designed to cover a band of wavelengths of which the minimum is 150 metres and the maximum 475 metres with a standard Post Office aerial and when using the loose-coupled secondary. This covers the entire band of wavelengths used by the British Broadcasting Company, excepting Chelmsford and so far as the secondary circuit is concerned; the amount of additional capacity required to tune in the lower half of this band of wavelengths where the losses are higher is very small. The "tappings" are so arranged that a maximum amount of inductance is obtainable for both halves of the band of wavelengths specified, and the .0002 condenser serves more or less as a fine tuner in this circuit. The aerial circuit is tuned with the condenser in the series position; that is, the capacity of the aerial and the condenser are in series, thus lowering the maximum amount of aerial capacity across the coil.

Switches

Switches have therefore been introduced into the set so that series or parallel condenser tuning are alternatively available in the aerial circuit, and the tune-stand-by switch provides that reception may be carried out on the aerial circuit only if interference is not present.

The aerial circuit tunes from 330 metres to 1,000 metres with the condenser in parallel, but the secondary circuit will not tune up so high as this without a loading coil, which may, of course, be easily added if desired. There is plenty of room on the outside of the panel for the addition of such a coil, which should be of approximately the same size and number of turns as the existing secondary coil.

The design and construction of the

coils as specified provides an exceedingly elastic tuner, as is shown by the following short list. It must be remembered that the aerial condenser has a value of .0005 microfarad, and that generally with most coils of an ordinary type a condenser of twice this value would be necessary to tune them to the wavelengths mentioned. Tune position, aerial condenser in series; plug in position No. 2, 475 metres maximum, 250 metres minimum; plug in position No. 1, 237 metres maximum, 150 metres minimum. Aerial condenser in parallel, switch-in "stand-by" position. Plug in position No.

2, 1,000 metres maximum, 633 metres minimum; plug in position No. 1, 330 metres minimum, 477 metres maximum.

Results Obtained

The set has been tested on aerials between ten and twelve miles from 2 L O, and the results obtained were such that they compare very favourably with the skeleton bare wire type of tuner.

For the amateur who is only interested in receiving good strong broadcast signals in England, the set is superior to many that are at present in common use. A. J. C.

"B. B. C. P."

I LAID down the invitation and reached out for a second triangle of hot buttered toast. Aunt Jane's invitation was for next Thursday. Now Aunt Jane has five thousand a year, rheumatism, a wonderful cook, no husband, and a healthy admiration for her nephew. So a subtle excuse for a refusal or a postponement had to be carefully thought out. Eventually I sought paper, pen, and ink, and wrote: "My dear Aunt,— Very many thanks for your kind invitation to dinner. May I let you know later? An old pal of mine— you've heard me speak of Tommy Campbell—is coming up to town next week, and I shall not know definitely which day until Friday morning.

"I hope your aches are better and that all the 'pets' are well at home. Your dutiful and affte. nephew, REG."

Next Week's Programmes!

I re-read the note with a certain amount of satisfaction, if not pride. There was still a modicum of brains in the old bean, what? You see, I could not get a glimpse of next week's broadcasting programmes before Friday. How could an invitation be accepted until I knew what was in them?

In future, when replying to my wealthy relatives or friends, I shall only accept invitations with the

proviso: "B.B.C. permitting." In fact I intend to go one better and, similar to the R.S.V.P., P.P.C., and other polite formulas, will simply put at the foot of my note "B.B.C.P."

J. G. A.

TO A NEW CRYSTAL

O, CRYSTAL, how you scintillate!
But, Crystal, why so blatant?
Is it that you've heard of late
You're quite the foremost patent?

My whisker's worn down to a stub.
Upon your form polyg'nal
I've scratched and pressed, but
(here's the rub)

I have not got one signal.

Befits you ill, your blatancy.
You're dumb as any waiter.
You're useless here, your proper
sphere—

A first-class insulator. C. T.

WE read that wireless has made improvements possible in weather prediction. We wish it would make improvements possible in the weather.

LISTENERS, who pick up time signals from Rome should remember that when it is night-time in Italy it's Wednesday over here.

Take Advantage of the Experience of Others

WHAM WGY KDKA WOR WBZ
PROOF MORE PROOF

TAUNTON.

"With your Crystal and a One-Valve home-made Amplifier I got these American stations direct. They were quite loud on Phones."



LYME REGIS.

"I must write to say your claims are quite justified. 'The Mighty Atom' is all-sensitive."

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Kaynite Patent Radio Coil Winding Machine.



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The coils produced by the Kaynite method are of a criss-cross close formation, and, being self-supporting, can be made for the cost of wire only. In this small space it is not possible to prove that the coils equal, and in many cases are even superior to so-called low capacity ones, and we therefore invite you to forward a post card for a detailed pamphlet, which answers the questions in your mind.

No. 1 Machine, without Automatic Indicator, costs only 21/-

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TENSION ATTACHMENT for either machine. Extra price, 2/6

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WINDS HIGHLY EFFICIENT COILS.

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 167, RYE LANE, LONDON, S.E.15.



AS regards telephony on the lower wavelengths the chief feature of the past month—I am writing late in December—has been the wonderful way in which K D K A has been coming through on his 65-metre transmissions. I have not heard him lately on his old 100-metre wave, and am led to suppose that he has now ceased work there. I understand that he is contemplating going lower still, to the neighbourhood of 50 metres. If he does he will cause a lot of frenzied work amongst the growing number of short-wave enthusiasts, for reception begins to be really tricky when we are dealing with frequencies of six million cycles to the second.

To return to K D K A. I have been doing a little experimental work with regard to reception of his low-wave transmissions. I find that on a Reinartz circuit he comes in very well on an ordinary P.M.G. aerial, the natural wavelength of which is about 140 metres.

Of course this sort of thing is impossible on an ordinary "straight" circuit where ordinary aerial tuning is resorted to. The Reinartz arrangement is certainly very useful for short-wave work. I then tried him on a low aerial with a natural wavelength of about 40 metres. He was not any stronger but far more easily tuned. He came in with the set nicely off the point of self-oscillation.

Next I switched on to a short indoor aerial about ten feet long. He was not quite so strong but just as easily tuned. Then I removed the aerial connection from the set and found that he was still there but faint and rather difficult to tune. Disconnecting the earth stopped reception altogether on any aerial. I have repeated this experiment many times during the month and always with the same results.

How Do They Reach Us?

This brings up the interesting question as to how these short-wave

signals reach us. I am not going to advance any theory of my own, though I have my ideas.

The Radio Society of Great Britain is taking up the subject, and experimenters far more competent than I am will be getting to work on it. It also gives visions of the days to come when we shall be free of the aerial at any rate.

To sit in a room in a Surrey village and listen to a programme of music sent out from an hotel in East Pittsburg without any aerial at all certainly renews one's feeling of wonder at the mysteries of wireless.

R.A.F. Experiments

By the way, I wonder how many of my readers have heard anything of the excellent short-wave telephony now being done by the R.A.F. It gives one a thrill to hear a pilot say, "You were coming through O.K. but I'm not getting you now. Waggle your wing-tips if you are getting me!" Government work is supposed to be secret so I will not give any information. But if you do pick up this work you will be surprised at its excellence and you will also, probably, hear the wavelength they are on. The R.A.F. wavemeters are to be relied upon and so these transmissions are excellent for checking one's own calibrations.

Long-distance Reception

The "D.X." brigade have been remarkably busy recently. Amateur two-way working with Australia and New Zealand is becoming almost a commonplace with such stalwarts as 2 O D (Mr. E. J. Simmonds), 2 K F (Mr. J. A. Partridge), and 2 N M (Mr. Gerald Marcuse, the enthusiastic secretary of the Transmitter and Relay section of the R.S.G.B.). 2 Z S (Mr. Goyder of Mill Hill School), another of our D.X. stalwarts, has been successful in picking up both Argentine and Mexican amateurs though, to date, he has not established communication.

The famous 8 A B (M. Leon Deloy of Nice) has been heard in the Transvaal. This is over five thousand miles. Of course M. Deloy uses more power than is usually allowed to British amateurs; but it is great work, anyhow.

In the middle of the month the Swedish amateurs put out some useful calibration signals starting at 50 metres and working up, on succeeding days, to 200 metres. These signals came in very well over here and must have been very useful to those who were not sure of their wavemeters and who had sufficient energy to be up at 6 a.m. It seems to be a general experience that the shorter waves came through better than the longer ones. The Swedish amateurs concerned in this excellent transmission were S M Z S, S M Z Q and S M Z Y, with whose ordinary transmissions many of us are very familiar.

And now a word to those who are interested in short-wave work but who have not, as yet, been very successful in getting down low enough. It is generally found that the ordinary receiver is not suited to this work, and the beginner should certainly not attempt anything in the nature of H.F. amplification. In my opinion the best circuit to use is a Reinartz.

B.B.C. Transmissions

We have no further news of the contemplated B.B.C. short-wave transmissions. When it does come it will be welcome, for it is not fitting that we should lag behind in these matters. I have a kind of feeling that for delivering a great deal of power to receiving sets within a radius of five hundred miles or so stations such as 5 X X are the thing; but for covering enormous distances there is nothing to beat the very short waves.

They should be very useful for simultaneous broadcasting and relay

(Continued on page 104)

"BELLING-LEE" VARIOMETERS

Wound with green covered wire.

Cotton finish, 4/- each.

Silk finish 4/6 each.

Packed in cartons.



The "Belling-Lee" variometer is the only variometer on the market with a **SOLID** hard wood rotor. This makes possible the same system of spindling and connections used in the highly priced moulded types. Loose connections are impossible. Stators are of specially prepared vulcanised fibre with slots for windings, and owing to this fibre being infinitely stronger than ebonite, only a very thin wall is necessary. This allows of very close coupling, resulting in extraordinary efficiency. This variometer is used in the

"BELLING-LEE" CRYSTAL RECEIVERS

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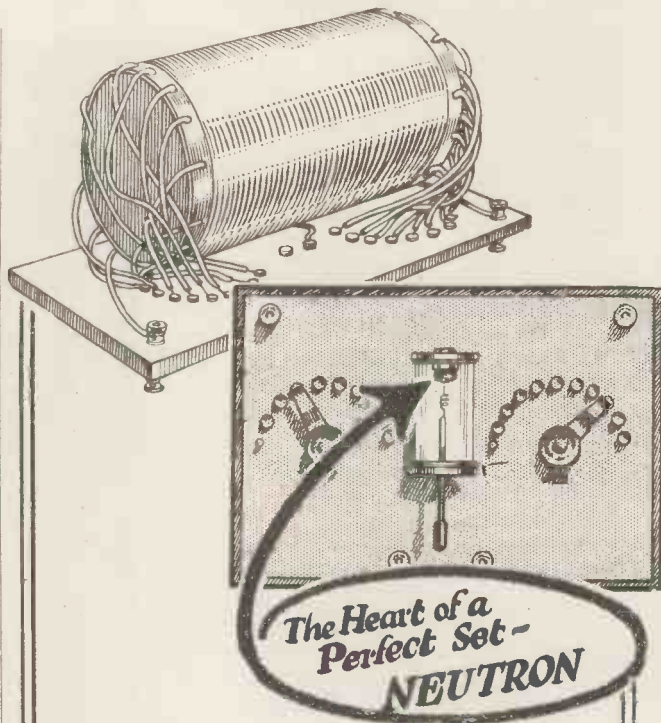
Phones and loading coil extra.



These receivers also embody: (1) Our own **ROTATING DETECTOR**, which enables the cat-whisker to engage practically every point of the crystal. (2) Our own patented **SELF-SHORTING PLUGS AND SOCKETS**, which take the various standard loading coils for reception from 5 X X. The switch closed gives reception from local stations without the inconvenience of removing loading coil. (3) Our own multiphone terminals, accommodating 6 pairs of phones. (4) Our own **INDICATING TERMINALS**. (5) Our own **INDICATING KNOBS**. (6) Our own highly polished and artistically finished mahogany cabinets.

Ask your usual dealer to let you listen-in on one of our Receivers, or if you wish to build your own set, ask for our components. In case of difficulty write to

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Ask your Dealer for Free Diagram (given on request to every purchaser of a Neutron) of the Circuit used by 5 BT in receiving Brussels from Chiswick on a Neutron. We send one direct with sample Neutron if you enclose stamped envelope and 1/6 with Dealer's name. Stocked by the Best Radio

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'Phone—Museum 2677.

E.W.B.

"BELOW THE BROADCASTING BELT" (Continued from page 102)

work, which is not always a success when the land-line is depended upon. But a wavelength below the reach of the great majority will have to be chosen.

Rome

I hear that Rome is now giving occasional programmes on 120 metres or thereabouts; but so far I have not picked him up. The Telefunken stations at Berlin and Nauen were doing some excellent work round about the beginning of the month, but now seem to have stopped work for the time being. These transmissions were not regular programmes but tests.

They were mostly during the daytime, so I do not suppose they were much heard over here. Nauen went down to 85 metres, but the other station was between 100 and 150 metres. I understand that between 80 and 100 watts was used.

What to Hear

The beginner who is not very good at morse need not hesitate on that

account to take up this most interesting short-wave reception. An ability to read no more quickly than five or six words a minute will enable one to pick up any number of stations, particularly French, Dutch and Swedish amateurs, who usually start their work by sending CQ many times followed by their call sign, also sent very many times and quite slowly.

These good people do a lot of work between nine and eleven in the evening and afford a deal of enjoyment to those who do not like sitting up till after midnight to follow the work of our own amateurs. Occasionally excellent French telephony can be heard at these early hours.

K D K A comes on at 11.30 every night. On Saturday nights he usually starts at 11 o'clock G.M.T. As a guide to wavelength he is not absolutely reliable as he seems to wander a bit. In my experience he does not shift at all during his transmissions, but some nights he is lower and some higher.

I think his limits are between 63 and 67 metres, but I would not like to say for sure. A very reliable guide to wavelength, which is often a difficulty with the short-wave beginner, can be had a little higher up. FL transmits regularly on 115 metres in morse at 9.40 a.m., 2.30 p.m., 5 p.m., and 11 p.m. His wavelength does not vary. This is a C.W. transmission and should be heard all over this country.

D. X. Reports

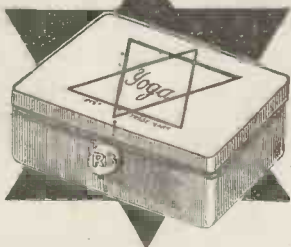
To keep this feature interesting and up to date I shall be glad to have reports of long-distance working either on telephony or telegraphy, also reports of new short-wave telephony stations heard working, with details of times and wavelengths. All reports should be sent to 5 Y M, c/o THE WIRELESS MAGAZINE, La Belle Sauvage, E.C.4, 5 Y.M.

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Engraved Dial and Knob ... 1/- extra.

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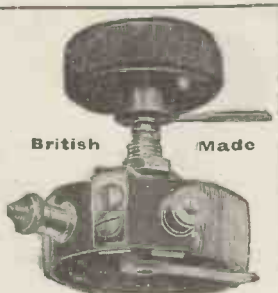
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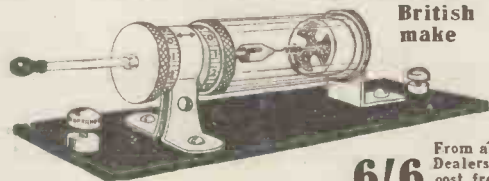
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"WIRELESS FEMININITIES" (Continued from page 41)

wouldn't be grateful for a seat. Once in front of the microphone, set in an immense expanse of floor, you feel cut off from everyone and the quiet is unnerving.

The announcer has told you to try to imagine you're talking to a friend and that the microphone just happens to overhear you. But it's difficult to get any such idea into one's head while staring straight at that ugly, queer machine. If it would only laugh at one's poor little jokes, rustle interestedly at thrilling points, and clap even once after the last sentence! But, no. The wireless talker, like the film actress, has to entertain people she can neither hear nor see.

And yet that vast and distant crowd is not nearly so trying, really, as the consciousness of the few other folk in the room—chiefly other people waiting their turn at the microphone—who are listening. For a crowd, I suppose, seems to be in the singular number—just one; whereas four people are four separate people with

four separate ideas of what is interesting to hear.

Speakers, by the way, are always placed within a foot or two of the microphone; whereas singers and musicians, owing to the much more vibrating sounds they produce, take up a position several yards away.

Is Listening-in Unsociable?

When I was talking to a very well-known woman novelist the other day, the conversation veered round to wireless.

"When I'm alone I like listening-in," was her comment. "But I do not care for it, either with phones or loud-speaker, when I'm in company. It interferes with talk and companionship; it's 'Hush—hush!' all the time. No, listening-in is essentially unsociable—a pastime for the solitary."

Do you agree? I'm inclined to think I do. It certainly seems to me I enjoy my set best on the evenings when I'm quite alone and can put on the headphones knowing that

no one will enter the room before closing-down time. Whereas when other people are present the demand of wireless for unbroken quiet sometimes makes it a little of a domestic tyrant.

Why is it one always has something vital to say as soon as silence is enjoined? This may be just the feeling of an admitted chatterbox, but I don't think so. Surely all concerts and the first act of every play go to prove that people are frantic to talk the minute they mustn't!

It isn't only talking either. I know of a household where mother mustn't clear the supper table while father is listening-in to the news bulletin. He complains, with justice, that the voice from 2 L O is drowned in the rattle of china and tinkle of spoons.

A. M. M.

A LECTURE was recently broadcast from Los Angeles on "Art." We should have thought that "heart" came before "art" over there.

HULLO! C.Q., WILL DAY CALLING FOR Where there's a WILL there's a DAY

Would you secure immunity from Leakage in your set? Then have your panels cut to your own size from our famous AJAX Ebonite. At 4/6 per lb., all edges square.

The new DAYZITE Variable Condensers fitted with Aluminium End Plates, and both sets of Vanes adjustable.
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MAKE NO MISTAKE IN YOUR SELECTION. Do not keep wasting money on crystals of unknown repute. GET A CRYSTAL THAT HAS STOOD THE TEST OF TIME.

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Sold only boxed with Silver Cat's-whisker, 2/6 each, postage 3d. each extra. Makes excellent contact with Zincite for a Perikon Detector.

Copy of letter recently received:—*Shepherd's Bush.*
Dear Sirs,—Will you please send me another "Dayzite" crystal. My last one must be getting on for nine months' wear and still going strong. My pal asked me to lend him my "Dayzite," which I did, and now I cannot get it back from him, so I must have one for my own set. I could not do without it. Send along early, and oblige,
JAMES SMITH.

Write at once for our New Free Catalogue.

WILL DAY, LTD.,
19, Lisle St., Leicester Sq., London, W.C.2.
Phone: Regent 4577. Telegrams: Titles, Westrand London.

Makes every Loud Speaker a pleasure to listen to



Price
5/-

That is not merely our opinion, but an expression taken from the letter of an actual user, who writes:

"I am more than pleased with the Listoleon Modulator. . . . It makes the loud speaker a real pleasure to listen to: it is well made and cheap at the price."

The LISTOLEON MODULATOR

modulates the volume of sound from a whisper to full strength, cuts out unwanted noises and vastly improves reception. It is very easy to fit and perfectly simple to manipulate: full instructions are given.

RADIOPHONES LTD
4a Savoy St, Strand, London, W.C.2

HEADPHONES

"BRIGHTONIA" (Adjustable Type)

(4,000 OHMS.)

YOURS



THE FAMOUS "BRIGHTONIA" for

Adjustable 4,000 OHMS Resistance Headphones now for the first time offered to "Wireless Magazine" Readers on our unheard-of bargain terms.

READ OUR BRIEF DESCRIPTION.

Genuine 4,000 OHMS resistance "Brightonia" double headphones, heavily nickel-plated, fitted with adjustable head band of the very latest and most comfortable type. Absolutely pure musical reception is assured by the laminated adjustable magnets and highly sensitive diaphragms of exceptional thickness and accurate adjustments, altogether the finest head set ever offered, no matter at what price.

Fully guaranteed 5 years.

FREE to Purchasers. Crystal detector, enclosed type, patent ac cw crystal cup, complete with catswhisker ready to fit to set, beautifully finished, given FREE with every headphone.

OUR UNHEARD-OF TERMS

We send a pair of these high quality headphones upon receipt of 1/- deposit. If satisfied you send 2/6 more on receipt and the balance by instalments of 2/6 until only 22/6 is paid. Price full cash with order (or within seven days of receipt) 21/-. Send P.O. now to:-

SIMPSON'S (BRIGHTON), LTD.
(Dept. 917), 94, Queen's Road, Brighton, SUSSEX.

ZINCON CRYSTAL AMPLIFIER

No alterations to wiring of set. When connected in the aerial lead, magnification of signals up to 40 times is attained—the weaker the signal, the better the amplification.

DETECTOR-OSCILLATOR

only.
(L. Miller's Prov. Pat.)

5/6

If your signals are not now strong enough to drown all outside noises when using six pairs of headphones, you want a

ZINCON

AMPLIFIER UNIT

21/-

15-volt H.T.
3/9 extra.

A. HINDERLICH

1 LECHMERE ROAD, LONDON, N.W.2.

BUILD SILENCE into your RECEIVERS

Considerable and lengthy experiment has demonstrated that even variable grid leaks can be responsible for much bad reception. Mysterious valve noises do emanate from the grid leak. We have discovered that bad or chance contact between the plunger and the collar is the origin of noise. Hence the WATMEL is now fitted with a refinement—a small, but very effective spring which, anchored to the collar, presses firmly upon the plunger. Electrical contact is therefore always good—and noise due to a faulty connection is eradicated permanently in the WATMEL—a consideration which definitely inclines your choice for grid leak to the



5 to 5 Megohms . . . 2/6
50,000 to 100,000 Ohms 3/6
Other Resistances to suit any circuit.
Send P.C. for descriptive Folder.

SEE THE TRADE MARK

WatMel

ON EVERY GRID LEAK BEWARE OF IMITATIONS

WatMel

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

THE WATMEL WIRELESS CO.

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

Telephone

CLERKENWELL 7990.

Barclay's 513.

ST ALLOY DIAPHRAGMS and CAR CAPS
from 1½ in. to 4 in. by 16ths. For Phones and Loud Speakers from 6d. to 2/- each. Ear Caps, all sizes, from 1/- to 1/9; Choke Coils, 500-1,000 ohms, 2/3; G.P.O. Transformers, 2/3; G.P.O. Transmitters, 4/-; Mark III Buzzers, 5/6 each; Spark Gaps, 3/-; 5- and 7-way Ebonite Terminal Boards, 1/- and 1/3; Hot Wire Amp. Meters from .0 to 2 amps, 7/6 each; Milliamper. Meters, .0 to 50 milliamps, and .0 to 500, from 15/- to 30/- each; Single Ear Phones, 2,000 ohms, W.D., 6/6 each; Phone Units for making up Loud Speakers, 4/3.
J JAKVIS, 29 New Kent Road, London, S.E.1.
All Goods Post Free. Phone: Hop 4382 and Streatham 2431.

WONDERFUL WIRELESS INVENTION MAKES 'LESS' WIRELESS

Catswhiskerless, Batteryless, Worryless, Fuss-and-Botherless Wireless

No batteries; no fiddling with catswhiskers; no disappointment. Simple turn of milled screw and "Hovimo" Crystal Valve gives instant reception—uninterruptedly pure and bell-like tone. Can be easily adjusted to suit the individual set; once right always right. Is equally excellent for Crystal Sets and



3/6
BRITISH MADE
EVERY ONE GUARANTEED.

"HOVIMO" CRYSTAL VALVE.

Replaces the old-fashioned detector. for circuits employing Crystal Rectification, as well as for Crystal Loud-Speaker systems. A new invention, and must not be confused with ordinary "permanent" detectors nor Silicon-bornite or similar combinations. Ask your dealer for it, or write to W. Molback, 27, High Holborn, London, W.C.1. Phone: Chancery 8391.

Crossword Puzzles

Cassell's Concise English Dictionary gives the words you'd never guess.

Cloth 512 pages, 2/- net.

"THE CHILDREN'S HOUR" (Continued from page 49)

all of which are overheard because 5 IT's microphone is present at every one of them.

Important Achievement

Now it may be thought that to single out specially the Children's Corner of this important provincial broadcast station is to overestimate its relative importance in regard to the other constituents of the list of our activities. That, however, is not so, for in a sense it has been in these planned productions in the Children's Corners that we have been developing a side of broadcasting which has led to what I regard as the most important achievement and possibly the most promising activity in our existence.

Stage Effects

In most of these "playlets" the necessary stage effects have been carefully worked out and the general setting or mounting in the matter of music and manner of playing closely watched. The results obtained no doubt led to our "Wireless Fan-

tasies"—of which there have been two—perhaps best described as experiments in a new wireless art form.

They comprise three or four characters and are accompanied by music which has been selected because of its harmony with the spirit of the piece. We have endeavoured, in the first wireless fantasy, to express the mood of the year's autumn time, and in the second the mood of winter time and Christmas, by a blending of the influences of poetry, prose and music, the whole produced with the appropriate noises.

Immense Possibilities

Those two particular broadcasts have been first steps in a wireless-art form, which, to my mind, has not only an immense field of operation but also immense possibilities. It is worthy of mention to say that the first one brought to the station no less than three thousand letters of praise. For the second, the letters at the time of writing are still mounting up.

There have been many memorable broadcasts during the year by the Birmingham Station. There was the first wireless pantomime, and there are two carillon recitals to our credit, one relayed from Bournville and the other from Loughborough. During the summer we relayed and broadcast a series of park concerts, and during the concert season we have relayed quite a number of outside concerts, including one from Walsall, some seven miles from the station, and one from Wolverhampton, farther still.

Another Year

Now at the end of another year I can look back over a successful twelve months, successful because of the loyal co-operation of an enthusiastic staff; successful because of the unfailing support and sympathy from a legion of listeners who by their appreciation have made our work both a pleasure and a privilege to do.

With such co-operation the new year holds great promise.



"Broadcasting" Comfort

BERKELEY Comfort is broadcast throughout the entire country and has, indeed, added to the greater enjoyment of wireless by providing ideal conditions for "listening-in." What can be more delightful than to rest in the luxurious deep-seated comfort of a Berkeley and "listen-in" to the broadcasting concerts and the wireless news?

The universal popularity of the Berkeley increases day by day. Every chair purchased is an eloquent advocate of Berkeley Comfort and Quality. It makes a circle of new friends wherever it goes. Built for ease and comfort, handsome, roomy, and of the greatest durability, Berkeleys are the finest chair value ever offered.

The
Berkeley
(Regd.)

is the Easy Chair
with the largest
Sale in the World

The frame of the Berkeley is exceptionally strong. It is fitted with long steel-coppered springs in the back, seat, and front edge. The Berkeley has bold, broad, heavily upholstered arms, with an extra deep seat and double-bordered front. The seat also has an independent front edge which adds greatly to the comfort and life of the chair.

CASH PRICE

85/-

or 15/- with order
and 5 payments of
15/- monthly.

SOLD ON THE MONEY-BACK PRINCIPLE. Soon after receipt of first payment with your order we send the Berkeley, carriage paid, in England and Wales (Scotland 5/- extra). If upon examination it is not completely satisfactory, you may return it within 7 days at our expense and we will refund your money in full.

WRITE NOW FOR PATTERNS—SENT POST FREE.

H. J. SEARLE & SON, LTD., Manufacturing Upholsterers,
(Dept. W.S.), 70-78, OLD KENT ROAD, LONDON, S.E.1.

Showrooms: 133, Victoria St., Westminster, S.W.1, and The Arcade, High St., Croydon.



Berkeleys cannot be
obtained elsewhere.

GARAGE

No More of this!

ACCUMULATORS RE-CHARGED FREE in your own home

Why spend good money every week to have your accumulators re-charged when you can do them yourself at home. **FREE OF ALL COST?**

Why suffer the annoyance of being left with accumulators run down and the trouble of carrying them to a charging station, when you can keep them always fully charged and in perfect condition in your own home.

If you have a Direct Current supply of electricity of any voltage in your house, either for lighting or heating purposes, all you need to charge your own accumulators at home is this

Price
42/-

Curr. Free. Complete with instructions

ULINKIN

PAT. No. 212391

The D.C. Home Battery Charger

which charges your batteries automatically whenever you have lights, radiators, electric irons or vacuum cleaner in use in any part of your house, without consuming any extra current, and therefore free of cost



Price
42/-

Curr. Free. The Original and the Best.

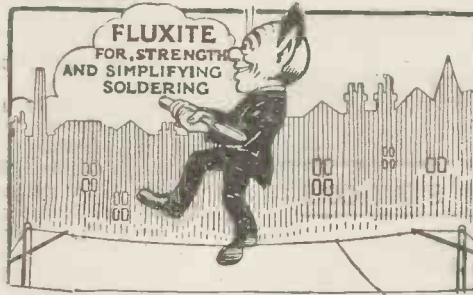
Illustrated Pamphlet and full particulars post free on request.
Trade Inquiries Invited.

GRAN-GOLDMAN SERVICE

(Dept. F.2),
71, Fleet Street, London, E.C.4.

YOU CAN DO THIS!



When you pause for a moment before a wireless dealer's window to admire the array of wonders—don't you often wish your own little home-made set at home had such neat and efficient wiring as those super-sets in the window? If you examine the wiring of these super-sets, you will see each joint neatly soldered.

And, apart from the resultant neatness, the receptive qualities of your set are considerably improved.

Soldering is delightfully easy when Fluxite is at hand to help you.

Ask your Ironmonger or Hardware Dealer to show you the neat little

FLUXITE SOLDERING SET

It is perfectly simple to use, and will last for years in constant use. It contains a special "small-space" Soldering Iron with non-heating metal handle, a Pocket Blow-lamp, FLUXITE, solder, etc., and full instructions. Price 7/6. Write to us should you be unable to obtain it.



Price 7/6

ANOTHER USE FOR FLUXITE.
Hardening Tools & Case Hardening

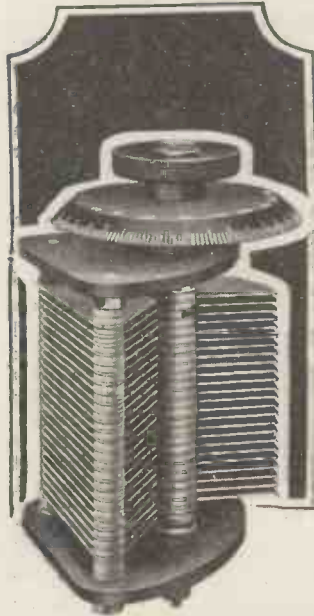
FLUXITE SIMPLIFIES SOLDERING

All Hardware and Ironmongery Stores sell FLUXITE in tins, price 8d., 1/4, and 2/8.

Buy a Tin To-day.

FLUXITE, LTD., 332 Bevington Street, London, S.E.16.

TUNING MADE EASY



The quickest way to do anything employs the most efficient means. Inefficient condensers—for instance—complicate tuning; they may be unmechanical, thereby causing operation to be a frantic pastime; or their electrical characteristics, a long tale of loss, leakage, absorption, under capacity—hopeless inefficiency.

Simplify tuning by fitting only efficient condensers. See their name J.B.—the mark of very high efficiency. Constructional Authorities use them.

SQUARE LAW.			
.001	- 9/6	.00025	- 6/9
.00075	- 9/-	.0002	- 5/6
.0005	- 8/-	.0001	- 5/3
.0003	- 6/9	Vernier	- 4/6
STANDARD.			
.001	- 8/6	.00025	- 5/9
.00075	- 8/-	.0002	- 5/-
.0005	- 7/-	.0001	- 4/9
.0003	- 5/9	Vernier	- 4/-

Go to your dealer first. If he cannot supply, send direct—your set deserves it. Post: One, 6d.; two, 9d.; three, 1/-.

JACKSON BROS.

8, POLAND ST.-OXFORD ST. LONDON - W.1
(First Floor)

Telephone: GERRARD 7414

H.T. EFFICIENCY AS IT "WASN'T ON WEDNESDAY."

Asked the meaning of the word revolution, a small boy said that it was "something on Saturday as it wasn't on Wednesday." **HOVIMO** Connectors are a revolution in H.T. Efficiency. Their use avoids soldering and cheapens cost of complete battery by from 25 per cent. to 50 per cent. The **HOVIMO** also ensures perfect "silent" working, is everlasting, allows easy replacement of units, will take ordinary wander-plug, and makes it possible to keep your H.T. at an equal voltage. British Made. **P. MOLBACK, 27, HIGH HOLBORN, LONDON, W.C.1.**



Phone: Chancery 8391.

PLUG HOLE

Ask your dealer for them

1/6

Per Doz.

From dealers or direct.

GRIP

VALVES REPAIRED

Standard Valves - - 6/6 post free
Dull Emitters - - 10/6 "

All repaired valves are guaranteed to work equal to new.
THE VALVE RENEWAL COMPANY, 4/5, Mason's Avenue, Coleman Street, London, E.C.2. Phone: London Wall 5184.

TELEPHONES RE-WOUND

Remagnetised, repaired and overhauled from 3/- to 10/-.
All makes and loud speakers. Guaranteed.

READY SAME DAY if order received by 8 a.m.
SEND FOR REWINDING PROSPECTUS "M."

JOHN W. MILLER, 68 Farringdon Street, E.C.4.
Telephone Centra: 1950.

THE WORLD'S BROADCASTING

EUROPEAN STATIONS

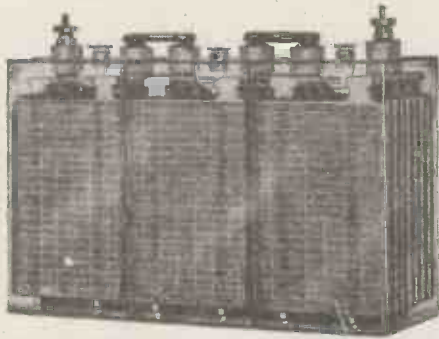
Wave-length	Name of Station	Call Sign
265	Brussels	SBR
301	Sheffield	6FL
306	Stoke-on-Trent	6ST
310	Bradford	2LS
315	Liverpool	6LV
318	Swansea	5SX
322	Nottingham	5NG
325	Barcelona	—
328	Edinburgh	2EH
331	Dundee	2DE
335	Hull	6KH
335	Plymouth	5PY
345	"Le Petit Parisien"	—
346	Leeds	2LS
351	Cardiff	5WA
365	London	2LO
375	Manchester	2ZY
385	Bournemouth	6BM
392	Madrid (Radio-Iberica)	—
395	Hamburg	—
400	Newcastle	5NO
410	Münster	—
418	Breslau	—

Wave-length	Name of Station	Call Sign
420	Glasgow	5SC
425	Rome	1RO
430	Berlin (Vox Haus)	—
435	Belfast	2BE
440	Stockholm	TV
443	Stuttgart	—
454	Leipzig	—
450-458	L'Ecole Supérieure	PTT
460	Gothenburg	—
463	Königsberg	—
470	Copenhagen	—
470	Frankfurt-on-Main	—
475	Birmingham	5IT
485	Munich	—
495	Aberdeen	2BD
515	Zurich (Höngg)	—
530	Vienna (Ravag)	—
550	Lyons-la-Dcuca	—
680	Kbely	OKP
750	Berlin (Telefunken Co.)	—
780	Lausanne	HB2
950	Buda-Pesth	MT
1,025	Ryvang	—
1,050	Amsterdam	PA5
1,050	Ymuiden	PCMM
1,060	Hilversum	NSF
1,100	Geneva	HB
1,100	Haeren	BAV
1,525	Toulouse Aerodrome	MRD
1,600	Chelmsford	5XX
1,780	Radio-Paris	SFR
1,800	Komarov	OKB
2,125	Amsterdam	PCFF
2,400	Lyngby	OXE
2,500	Boden	—
2,650	Eiffel Tower	FL

AMERICAN STATIONS

Wave-length	Name of Station	Call Sign
66	East Pittsburgh	KDKA
100	Rochester, N.Y.	WHAM
283	Hastings, Nebraska	KFKX
285	Cincinnati	WLW
309	Oakland, Cal.	KGO
312	East Pittsburgh	KDKA
326	Springfield, Mass.	WBZ
337	Chicago	WEBH
370	Schenectady	WGN
380	Troy	WGY
380	Newark	WHAZ
405	New York City	WOR
411	Kansas City	WJY
417	Minneapolis	WDAF
423	San Francisco	WLAG
425	Montreal	KPO
430	Calgary	CKAC
448	Chicago	CFAC
455	New York City	WMAQ
462	Pittsburgh	WJZ
469	Washington D.C.	WCAE
469	Washington D.C.	WRC
469	Los Angeles	WCAP
479	Fortworth	KFI
492	New York City	WBAP
509	Portland, Oregon	WEAF
517	Philadelphia	WBAY
517	Detroit	KGW
526	Omaha	WIP
536	New York	WWJ
536	Chicago	WOAW
536	Chicago	WNYC
536	Chicago	KYW

WIRELESS DEMANDS THE BEST



and you get Best Results from

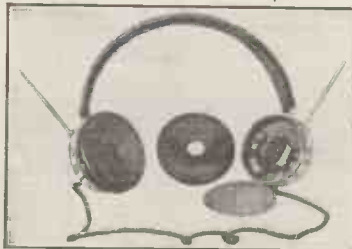
I.M.I.
(All British)

POPULAR ACCUMULATORS

DO NOT LET THE PRICE DETER YOU, AS EFFICIENCY IS GUARANTEED.

20A	40A	60A	80A	100A	IGNITION CAPACITY
7/6	9/10	12/3	15/6	17/6	2 Volts
14/2	18/8	23/6	29/6	33/-	4 Volts
20/6	27-	35/3	41/9	46/9	6 Volts

I.M.I. "Astoria" Headphones.



I.M.I. Popular Accumulators have been used in conjunction with the Motor Industry since 1907.

Over 70,000 sold for Wireless during 1922-24.

WHY PAY MORE?

These Phones are light in construction, very sensitive and sweet in tone, and Guaranteed 4,000 ohms. The Earpieces are easily adjustable, and the leather-covered Headbands afford the maximum comfort to wearer. The Magnets are of the finest steel and we confidently recommend them as the equal of many makes being sold at 25/- pair.

Retail Price - 11/6

THE IMPERIAL MOTOR INDUSTRIES, LTD.,
Denmark Street, Charing Cross Road, W.C.2.
Telephone: Gerrard 3347. Telegrams: Giftedness West Cent.

BONZO, tickled by John Henry. You will wear an equally happy expression if you also wear "BONTONE" PH. N's, Britain's best. Backed by a generous guarantee. Sensitive, Durable, Comfortable, and beautifully finished.



Manufactured entirely by British labour.

Up to a high efficiency and down to a low and popular price.

"BONTONE" Lightweights 15/6

"BONTONE" Originals 14/6

4,000 Ohms per pair.

An assurance for all time:—We agree to replace any Phones not giving complete satisfaction, if returned to us within 7 days of purchase, undamaged.

We further agree to repair, adjust and retest any "BONTONE" Phones irre-

spective of the date of purchase, for the sum of 3/-, plus 6d. postage, if returned to us intact with remittance.

This is our Bond; compare same with the risk entailed when purchasing foreign-made Phones, which may be dear at any price. Insist upon purchasing "BONTONE" Phones, avoid substitutes, and you will increase your Wireless pleasures, and reduce your Wireless worries.

May be purchased from all Electricians, Wireless Dealers, and Stores; or direct from:—

B. D. & Co. (Edward A. Boynton)

Works:—Goswell Road and City Road, LONDON, E.C.1.

Offices:—167-173, Goswell Road, LONDON, E.C.1.

Admiralty, War Office and India Office Contractors.



NEW MODELS FOR EVERY OCCASION

"Dri-ped" Soled Footwear, in all styles and sizes for men, women and children, is obtainable from all leading footwear stores, including all branches of:

Dolcis Shoe Co.
 Opsons Ltd.
 High Life Shoe Co.
 W. Abbott and Sons Ltd.
 Lilley and Skinner Ltd.
 Lennards Ltd.
 Jacksons Ltd.
 Civil Service Association.
 London Boot Co.
 Crick and Co., Etc.

"Dri-ped" repairs. Your footwear repairer can re-sole the shoes you are now wearing with "Dri-ped" leather.

FOR many years "Dri-ped" super leather has been used in the making of the highest class footwear for golf, shooting, fishing and similar occasions. Craftsmen shoemakers have produced their finest bespoke work from bends of "Dri-ped." The leather has gained an exclusive reputation for quality.

Now "Dri-ped" Soled Footwear is available for all occasions. Leading manufacturers have adopted "Dri-ped" for their special lines, for every type of footwear where waterproofness and unusual durability is desired. Most dealers sell this better footwear—at moderate prices. There are appropriate styles in all sizes for men, women and children.

DRI-PED LTD., BOLTON, LANCs.

You can identify "Dri-ped" Soled Footwear by the "Dri-ped" purple diamond stamped every few inches on each sole. There are many imitators of the "Dri-ped" method of stamping sole leather, but there is only one "Dri-ped" leather produced from specially selected hides of finest quality. "Dri-ped" is more than a name—it is a guarantee of unrivalled quality.



©310

DRI-PED SOLED FOOTWEAR

"Which Set Shall I Buy?" (Continued from p. 26)

few of the most reputable manufacturers (space will permit us to make only a small selection), and get to know what kinds of sets they make.

We may be surprised at the comparatively small number of single-valve sets listed, but these are not always satisfying, and most people "make a splash" by starting straight off with a two- or three-valve set.

A Valve for a Letter!

Referring to the article on p. 18, if you believe you know what is wrong with the Wireless Societies, send us your views in a brief letter. To the writers of any letters published we will present a Mullard valve.

Address letters:

"WIRELESS SOCIETIES"

"THE
WIRELESS MAGAZINE,"

La Belle Sauvage, E.C.4.

Entries close February 21.

There are a number of one-valve sets (as distinct from one-valve amplifiers) sold, however—such as the Marconiphone VI, the Gecophone, Siemens' CV receiver, the G.R.C. 501 and the B.T.H. Radiola 1 (a one-valve and crystal "reflex" set).

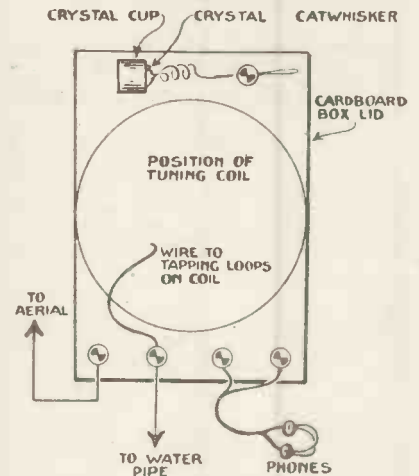
There are a large number of two-valve sets on the market, and among those with high-frequency amplifiers we shall find the Fellophone Super 2, the Radio Instruments portable cabinet set, the Sterling two-valve long-range model, and a number of Cosmos and Ediswan two-valve "reflex" sets. Sets with a detector valve and a low-frequency amplifier are usually made by adding a separate amplifier to an existing one-valve set. All the big firms make reliable one- and two-valve amplifiers.

As you and I are not deeply technical people we shall be influenced in our choice to some extent by the shape and appearance of the sets we come across. Perhaps the best thing to do is to collect valve-set catalogues from a number of reputable manufacturers—we shall find their addresses in the advertisement pages of this magazine—and see what the different sets look like from the photographs. BROADCASTER.

"A Crystal Set for the Boys and Girls"

(Continued from p. 71)

contact with the surface of the crystal and listen carefully; at the same time try the wire from the earth terminal on different loops of the coil.



If a broadcast programme is being transmitted and you have made the set correctly, you should hear quite plainly.

TRADE **Grelco** MARK

WIRELESS EXHIBITION

It is with these two words that many of our friends have described our new and enlarged showrooms. PAY US A VISIT and see all the latest components laid out before you. We say with every confidence that they are the **FINEST IN LONDON.**



ACCUMULATORS

There are many makes—some bad, some indifferent, some good. A make without a reputation to uphold may cause you endless trouble and annoyance.

Our accumulators are made from the **FINEST MATERIALS** procurable and are **GUARANTEED.** Strong cases—ample clearance at bottom. In fact, are made as they should be. Remember we have been accumulator manufacturers for years.

MAKE SPECIAL NOTE OF PRICES.

		Prices of 2-Volt on Application. Ignition Capacities.		
	4-Volt	6-Volt	Post	
20 Amps.	14/-	19/-	1/-	<i>NOTE—Any Accumulator can be sent Fully Charged with Acid at following price extra. Box 6d., Carriage forward. Any voltage, 20 amp 2/-, 40 amp 2'3, 60 amp 2'6, 80 amp 3-, 100 amp 3'6. Be sure then that first (and most important) charge has been carried out correctly.</i>
40 "	16/6	23/-	Carr. Fwd.	
60 "	21/-	32/-	"	
80 "	27/6	38/-	"	
100 "	34/-	47/6	"	

Nearest Stations: Warren Street and Euston Square.

Telephone: MUSEUM 241. F. 2400: SLOUGH.

ELECTRIC GRAFTON COMPANY

GRAFTON STREET, TOTTENHAM COURT ROAD

LONDON, W. C. 112

YOURS FOR 20/-

Send 20/- to-day, together with your order for the "Tonyphone," and this wonderful set, which receives all B.B.C. stations, will be delivered complete, including all accessories. You pay a further £1 each month afterwards. The total cost is only £15 9s., or, if you prefer, £14 5s. cash.

"Tonyphone" Super Two-Valves

Complete with Accumulator, H. T. Battery, Aerial, 1 pair 4,000 ohms Headphones, and two Valves—one High Frequency and one Detector. All Royalties paid.



Send To-day and enjoy Broadcasting NOW.

BRITISH ENGINEERING PRODUCTS CO.
(Receiving Dept.),
Windsor House, Victoria Street, London, S.W.1.

THE ACCUMULATOR BUGBEAR REMOVED

That bane in the existence of the Valve set enthusiast is removed once and for all time by

"CHASEWAY" CHARGER

Where you have DIRECT CURRENT (100 to 250 volts) you can

RE-CHARGE YOUR ACCUMULATORS FREE IN YOUR OWN HOME

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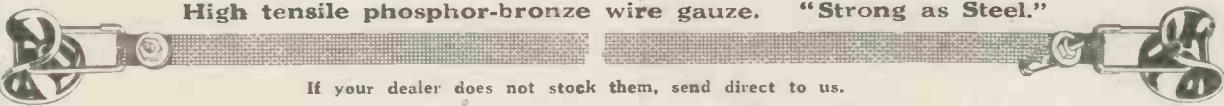
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"I obtained excellent results from the Bournemouth Station (80 miles) with a Crystal set of my own construction. Your 50 feet replaced a double 40 feet which I had previously used with uncertain results."

HELIXO LTD., 'Phone: Museum 6039
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London, W.1.

"EARTH OR COUNTERPOISE?" (Continued from page 55)

by a second set of wires. The essential difference between the two systems is therefore that in the first we make use of the ground, whilst in the second we insulate the bottom plate of our condenser most carefully from it.

The insulation of a counterpoise is a very important point if it is to be efficient. It must be just as carefully protected as the aerial itself, not less than two shell insulators in series being used at each end. Speaking of insulators I would like to mention one point which is frequently overlooked. One often sees the arrangement shown in Fig. 5, which is thoroughly inefficient. The right method is that seen in Fig. 6. Here is the reason why:—There is no such thing in this world as a perfect insulator; the best that we can do is to use something which has so high a resistance that even when the voltage is big only a minute amount of current will pass over or through it. Now, leakage in aerial

insulators takes place in two ways. In the first place there is "creeping" over the surface, in which case the insulator must be regarded as a resistance. Secondly there is a passage of current *through* the insulator by capacity; the insulator is thus a condenser. What we want therefore to achieve in our insulation is the highest possible resistance coupled with the smallest capacity. Let us take first of all the resistance aspect. In Fig. 5 we may regard the two pairs of insulators as providing a resistance between the points A and B. The two resistances are thus in parallel. Now if you place two resistances of equal value in parallel the total resistance in circuit is one half that of either. Hence if we suppose that each insulator has a value of 10 megohms, we have 20 megohms on each arm of the aerial, but the total resistance between the points A and B is only 10 megohms. Now look at Fig. 6. Here the two resistances are in series, and if they

each have the same value as before the total resistance between the points A and B will be 20 megohms. The rules for capacities in series and in parallel are precisely the opposite of those for resistances. Thus in Fig. 5 there is twice as much capacity between the points A and B as there is in Fig. 6. Thus we see that by adopting the method shown in the second of the two drawings we obtain a large resistance and a small capacity in insulators, which is precisely what we want.

The counterpoise should be suspended directly under the main aerial and not less than 6 or 8 ft. from the ground. The lead-in from it must be brought through a good insulating tube made on the same lines as that used for the aerial connection.

J. H. R.

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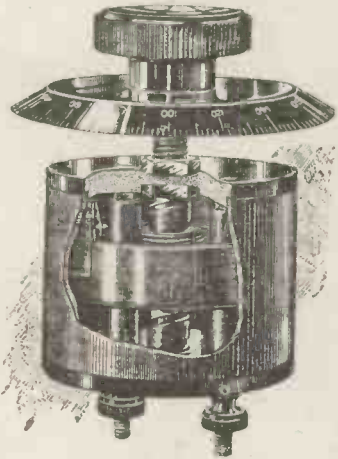
uation throughout the whole of its range, and owing to the small size of its electrodes losses are reduced to a minimum.

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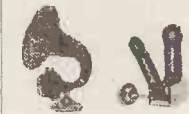
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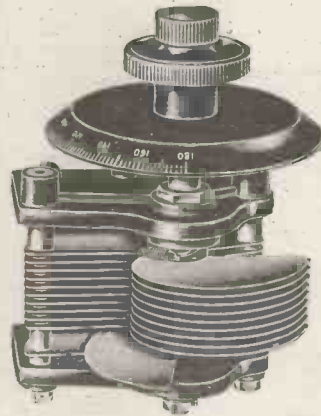
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THE REAL PURE TONE VALVE

Leaflet V.R.20 gives full technical information.



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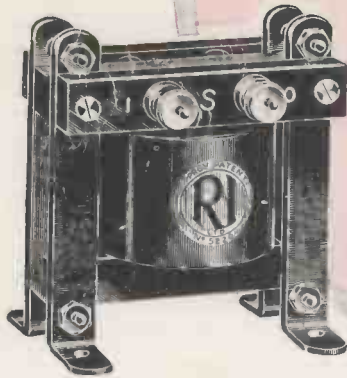
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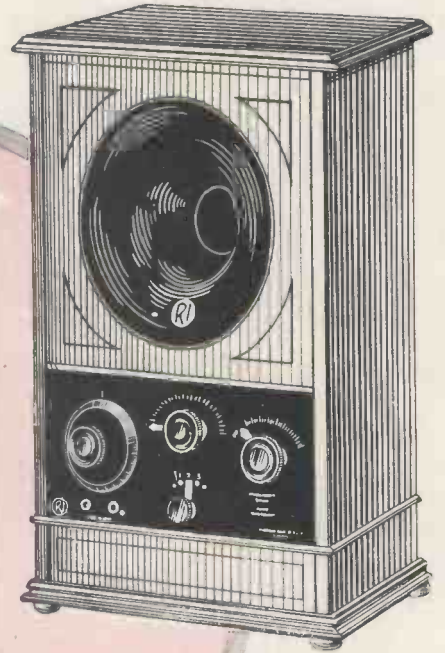
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