

# Wireless Weekly

and the Wireless Constructor.

Vol. 4.  
No. 23

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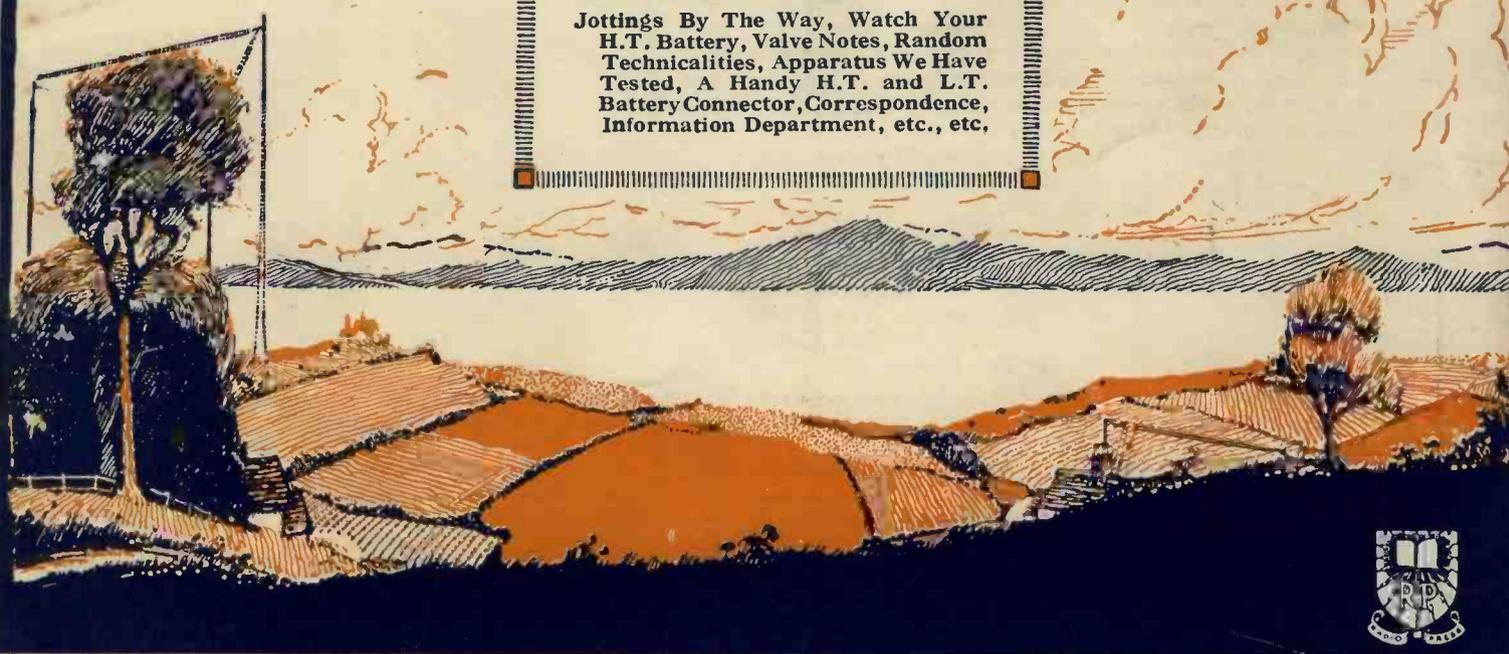
100 Metres and Below.

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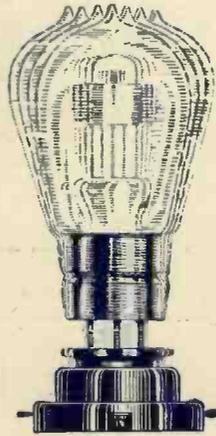
Post Office Hypocrisy

## New Burndept Wireless Apparatus with special features.

### THE ANTI-PHONIC VALVE HOLDER.

**T**HE Anti-Phonic Valve Holder eliminates the microphonic noises associated with dull-emitter valves, and prolongs the life of any type of valve by protecting the filament. It consists of an outer insulated shell, which screws rigidly to a panel, or base, and a valve holder which "floats" on springs inside the shell. There is no capacity between the sockets as there are no nuts on them. The risk of short circuits is eliminated owing to special construction. A special arrangement prevents the straining of the springs when a valve is inserted or withdrawn. The advantages of fitting Anti-Phonic Valve Holders to sets, especially portables, are very obvious.

No. 401. Anti-Phonic Valve Holder. Diameter  $2\frac{1}{2}$  ins. height just over 1 in. For panel or base mounting, 6s.



The illustration shows how a valve in the Anti-Phonic Holder vibrates when tapped. Normally, the springs in the base protect the filament from shocks.

### ETHOPHONE - DUPLEX— A Loud Speaker Receiver for Five Guineas.

**I**F you desire loud speaker reception of broadcast, but do not wish to go to great expense, the Ethophone-Duplex is the set for you. At five guineas this fully-guaranteed, simply-controlled instrument of real Burndept efficiency represents the finest value in wireless apparatus that has ever been put on the market. The Ethophone-Duplex will receive broadcast on a loud speaker within about 20 miles of a normal power broadcast station, and about 100 miles of the high-power station. The range on head telephones is four or five times as great. Bright or dull-emitter valves may be used without alteration to the set. Wavelength range: from 250 metres upwards. The coil-holder has a 5-1 geared vernier control.

### BURNDEPT STANDARD CONDENSERS.

**T**HESE new Burndept Condensers are so well designed that of the power applied to them only 0.05 per cent. is lost. They are guaranteed to have a capacity not less than their rated capacity and not exceeding their rated capacity by more than 12 per cent. Where great efficiency is essential—as in short wave reception—they will be found most satisfactory. To keep out dust and to obviate hand-capacity effects, steel snap-on dust covers are provided. An important feature is the construction of the spindle, which is entirely self-aligning. The upper phosphor bronze bearing rotates in a flexible steel housing, and the lower bearing consists of a steel ball running between hard brass cones. This patented method of construction ensures easy, even movement, while slight wear is automatically taken up, the capacity of the condenser remaining unchanged. The tension can be adjusted as desired. The illustration shows a Burndept Standard Condenser without the dust covers.



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No. 417. Capacity .001 mfd. ... £1 7s. 6d.



No. 1503.—Ethophone-Duplex, without valves, coils, batteries etc., with instructions. Price, £5 5s. 0d., to which must be added £1 5s. 0d. Marconi Licence.

Demonstrations of Burndept Wireless Apparatus can be arranged. Write for our 1924-25 Catalogue.

# BURNDEPT

## WIRELESS APPARATUS

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# Wireless Weekly

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## Post Office Hypocrisy

GENERAL indignation has been aroused by the growing tendency of the Post Office to impose restrictions on wireless transmission, and, although wireless transmitters are only a small section of the experimental movement, yet, nevertheless, they represent an extremely important section, and they will be backed to the full by all who have any interest in experimental progress.

It is with great satisfaction that we notice that the Radio Society is now tackling the problem of Post Office interference. The mutual admiration society, which has hitherto existed between the official amateur association and the Post Office has broken down, and although a prominent official of this Government department admitted to a Press representative that he "greatly admired Dr. Eccles," we are glad our President is getting down to solid facts.

Put bluntly, the British Post Office has consistently placed obstacles in the way of experimental progress, and the Radio Society's protests have been as water on a duck's back.

After the war, the Post Office maintained for an unnecessarily long period onerous restrictions as regards wireless reception. In August, 1922, they strongly opposed any broadcast transmission at all in this country, but after much trouble the Radio Society obtained from them a half-an-hour transmission from Chelmsford each week, by means of continuous waves. "It is regretted that it has not been found possible to agree to the inclusion of wireless telephony in the arrangement," reads a letter dated August 19, 1922. Here was an important radio society humbly requesting some co-operation from the British Post Office, who, however, regret that they cannot even permit a

few minutes telephony to be broadcast.

This is a typical example of a consistent Post Office attitude, and it seems positively ludicrous when one considers the extent of broadcasting to-day.

Then, of course, we had the deplorable situation about experimental licences. The writer of this editorial was a member of a small deputation to

The only result of this very important conference with the Post Office was that a memorandum was issued afterwards remarking upon the great courtesy of the Post Office officials and their sympathetic attitude. Be it noted, however, that this sympathetic attitude did not result in any extension of licences.

We then had the summer of 1923, which nearly wrecked the wireless industry, and which created more antipathy towards the Post Office than that department has ever experienced. Long delays and the appointment of a committee (whose work was futile, and whose final recommendations were totally ignored) were regarded with grinning complacency by permanent officials of the Post Office, whose callousness in this matter will live long in the memory of every experimenter who wanted a licence and every experimenter who had a licence, but had even the smallest amount of public spirit.

Fortunately for experimenters, powerful manufacturing interests, and a Post Office visit to the U.S.A., obtained for them what the Radio Society had vainly pleaded for.

This recent history shows what attitude the Post Office has taken in the past, and also it shows how absolutely unnecessary the restrictions at the time were. The same niggardly spirit of the Post Office is as manifest to-day as it was in 1922 and 1923.

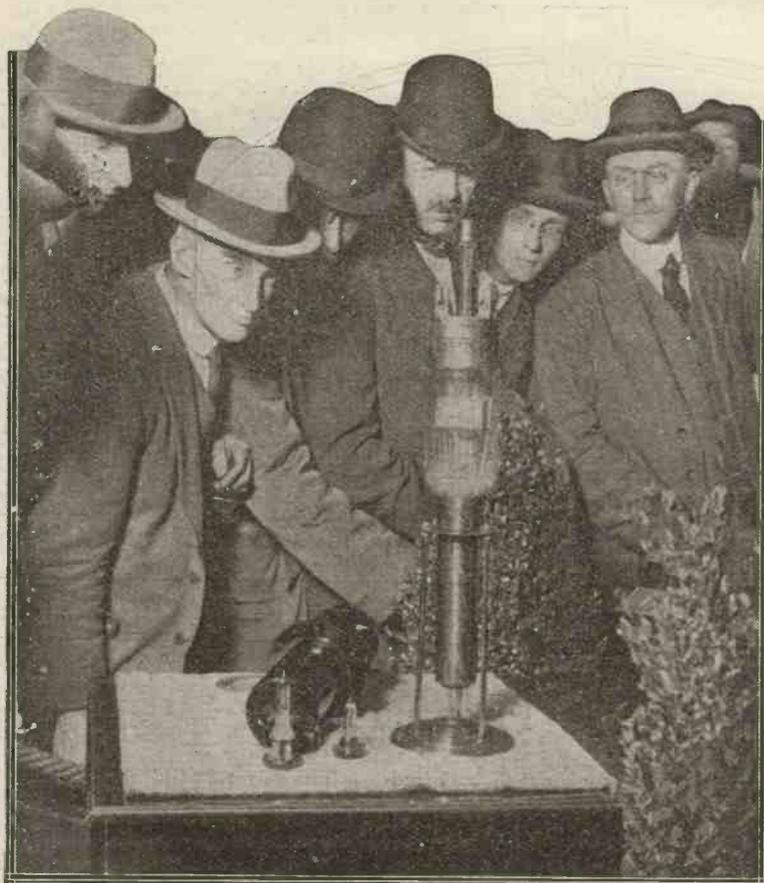
Let us look at some of the statements of Post-Office officials in the past, and we will see how charmingly reasonable they are before meetings of the Radio Society. At the second Annual Conference of Wireless Societies, in 1922, a Post Office official regarded with horror the idea of membership of a Radio Society being necessary before

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the Post Office to obtain an alleviation of the harshness with which the Post Office were refusing experimental licences, the only licences at that time which enabled experimental wireless work to be done. To-day, three quarters of a million people are making or using home-made apparatus. There is no logical reason why licences should not have been issued at that date.



*A contrast in valves which may be seen at the Exhibition, the large one being a ten kw. water-cooled transmitting valve.*

**T**HE first impression on entering this year's Wireless Exhibition at the Albert Hall is one of the sanity and commonsense of the whole affair. In previous shows the stands have often alternated between the sublime and the ridiculous—on the one hand we have had monuments of cabinet work of the one or two hundred guinea varieties, watched over by immaculately dressed young men who stand out gracefully against a background of velvet and luxury, while on the next stand one could see mountains of condensers, dials, knobs, and what not. This year there is none of this annoying disproportion. All the stands are of the same size, and the scheme of decoration chaste and effective; the whole industry seems to have "come down to earth," and now caters for the man who is really interested and who does not mind spending a few pounds so long as he gets good value.

The organisers of the Exhibition are certainly to be congratulated upon the artistic lay-

out, although the disposition of the stands in circles makes it difficult to tour the Exhibition as a whole and not miss sections of it.

#### The Exhibits

The exhibits themselves can, of course, be divided into two main headings of complete sets and components. In the general design of sets there seems to be considerable improvement in the last twelve months, and it is gratifying to see how some of the larger firms have realised that it is not beneath their dignity to make a good set at a reasonable price. Armstrong supersonic heterodyne receivers are beginning to make their appearance, and we particularly noticed those of the Western Electric Co. and General Electric Co. respectively. The Western Electric instrument is very compact, and contains seven valves (all "peanuts"), used successively as first detector, oscillator valve, three stages of intermediate frequency, second detector valve, and one

## Our Impression of the Exhibition

stage of transformer-coupled note-magnification. The set is exceedingly compact, and to obtain this compactness it has been necessary to shield every stage with a metallic casing.

The General Electric Co.'s supersonic heterodyne is rather more conventional in appearance, being made up in a large cabinet with all the valves projecting in front. The British Thomson-Houston Co. also have an instrument which we believe works on the super-heterodyne principle.

Among the "straight circuit" sets an interesting instrument is exhibited by Burndept. In this the aim of the designer is to give a set which is exceedingly simple to work for the man who is just taking up the art, but is so adjustable that later, when he learns more about it, the necessary flexibility is made available. There



*A compact 5-valve receiver by Metropolitan-Vickers, Ltd.*

\* \* \*

*A few notes on this  
year's Wireless Show*

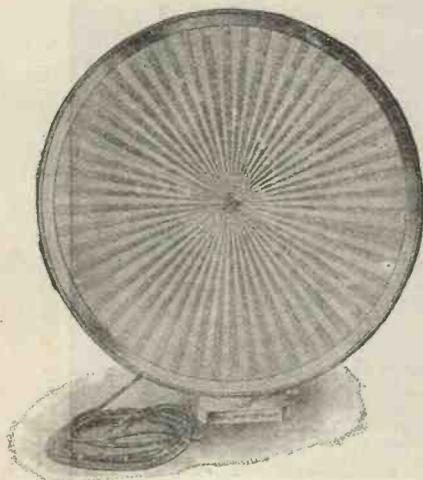
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are two stages of tuned high-frequency, stability being obtained by stabilisers working on a novel principle. Range blocks with fixed loose coupling between the aerial and the closed circuit are provided, and a switch enables both high-frequency stages to be cut out, so that all tuning can be conducted on one dial, when the set is near enough to a broadcasting station for good reception to be obtained without high-frequency stages. The more experienced listener can substitute for the range blocks a three-coil holder, thus getting the benefit of variable coupling and reaction as desired. Stages of low-frequency amplification are, of course, provided.

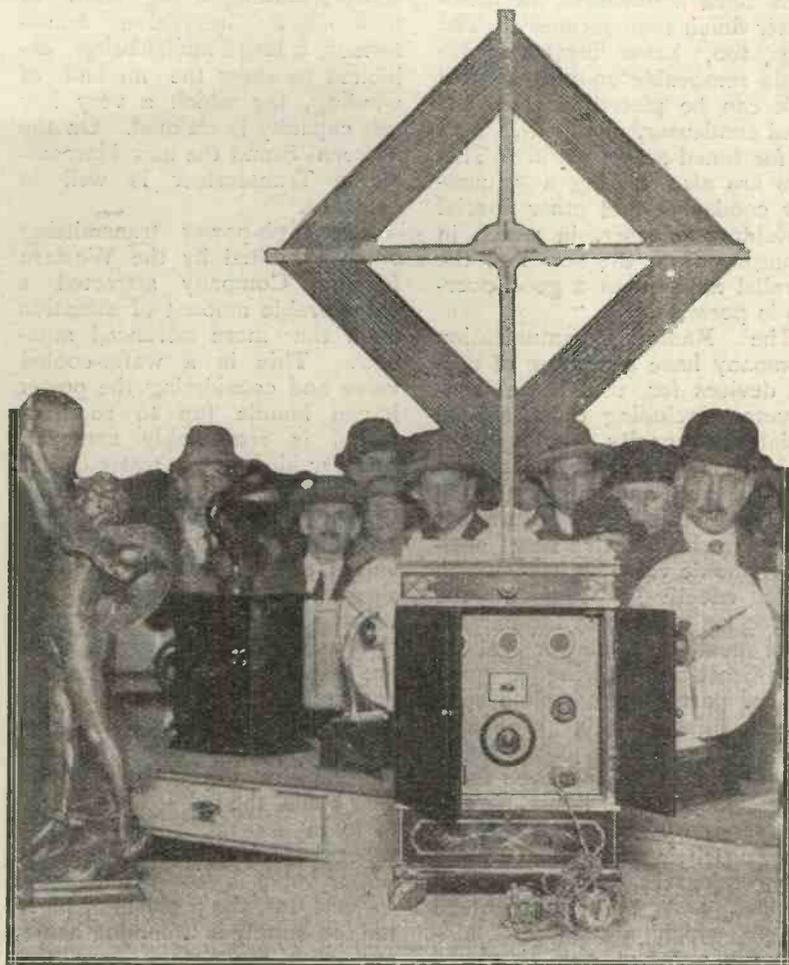
The Sterling people have a good range of receivers, including reflex sets using small frame aerials. Among other reflexes shown are the Marconiphones, the Ediswan TwoVee, certain sets by Metropolitan-Vickers.

**Loud Speakers**

Loud speakers of all kinds are an outstanding feature of the show. The large Marconi loud speakers, the invention of Capt.



*The Pri max Loud-Speaker.*



*A handsome frame aerial receiver, ornamented with Japanese lacquering, on the Sterling stand.*

Round (used to broadcast to the public in the Hall) are remarkably faithful in their reproduction, and should do much good in removing from the minds of the general public the impression that loud-speaker reproduction is a metallic-sounding and "trumpety" affair. So far as loud speakers for the home are concerned, these exist in great variety, but as they all have to be taken "on trust" (there being no demonstration of any one of them), the public is quite unable to make comparisons of anything but external appearances. So far as the horn varieties are concerned, practically all the manufacturers are adopting about the same shape, the horns being decorated in all kinds of colours, and some with the most bizarre patterns. Because it does not comply with the general uniformity of design, the Sterling Primax loud speaker stands out from the others in

great contrast. This loud speaker has a pleated diaphragm over a foot in diameter which distributes the sound without any horn. One of the most beautiful exhibits this year, and certainly the one which has attracted the most attention, is a graceful bronze figure holding aloft a Primax loud speaker, the diaphragm of which has been finished in a bronze colour to match the statue. It is illustrated in one of our pictures.

Great interest is being shown in the various unit systems, although there are no special novelties this year. The Polar Block method, the Cosmos Radiobrix, and one or two others attract most appreciative audiences whenever demonstrations are given. The leading valve manufacturers are, of course, showing their products. In the smaller components Dubilier have several interesting new lines, with new mouldings for

their fixed condensers, of much better finish than formerly. The clips, too, have improved; are made removable so that a grid leak can be placed across the fixed condenser, or in series with it, for tuned anode work. This firm are also making a square-law condenser and other special variable condenser, in which in changing from the series to the parallel adjustment a good overlap is possible.

The Radio Communication Company have a number of useful devices for the home constructor, including their special resistance-capacity coupling unit, which has been very carefully thought out, and a new dual filament resistance. Burndep are showing their new anti-microphonic valve sockets, which quite effectively remove the microphonic troubles inseparable from most dull emitter valves. Peto-Scott are showing a good line of parts and complete sets. Their Pilot panels are also attracting attention, these being cut, finished, and engraved for a very moderate figure. The Bowyer-Lowe Company are showing their well-known square law condensers, both single and double, and their guaranteed panels, which are also obtainable cut, polished and engraved for any Radio Press Set. Ready-cut and polished panels are also being exhibited by the British Ebonite Company.

Radio Instruments are, of

course, making a big show of their new intervalve transformer, a large model being exhibited to show the method of winding, for which a very low self capacity is claimed. On the Marconi Stand the new Marconi-phone Transformer is well in evidence.

The high-power transmitting valve exhibited by the Western Electric Company attracted a considerable amount of attention from the more advanced amateur. This is a water-cooled valve and considering the power it can handle (up to 10 kilowatts) is remarkably compact. Another high-power water-cooled valve is shown by the Marconi-Osram people, while Mullards are also showing high-powered valves of their well-known designs. The Cossor firm are making a big feature of the "Wuncell." Although there are few outstanding novelties in accumulators, the well-known makers of storage batteries are showing their regular lines, and judging by the crowds round their stalls, the public are anxious to learn as much as possible about these devices. Now that the power valve is coming into more general use, the problem of high-tension supply is becoming acute, and with multi-stage amplifiers the drain on an ordinary high-tension battery of the dry-cell type is very serious. High-tension accumulators are now obtainable at the quite reasonable

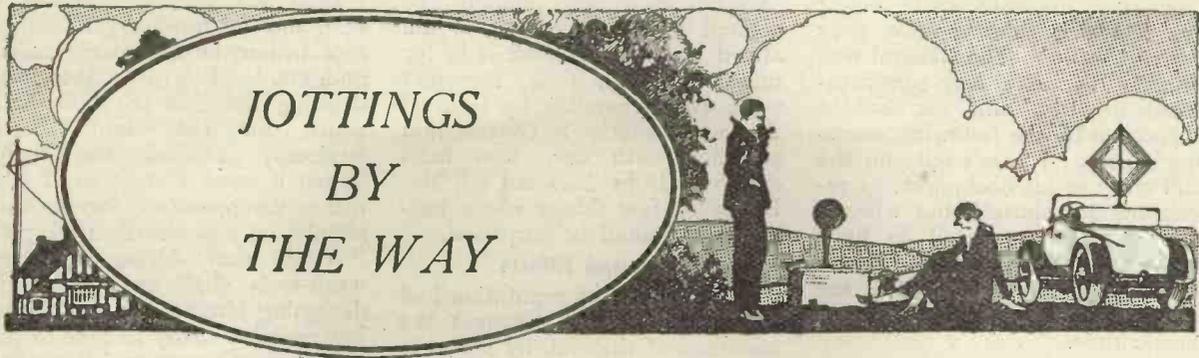
price of one shilling per volt, and whilst this, of course, seems a high first cost (much higher than dry cells), the maintenance cost is extremely low. The man who is now in a habit of purchasing a sixty-volt dry battery every few months should certainly consider whether it is worth his while to pay three or four pounds for one of the equivalent voltage accumulators. If you consider it on a two-years' basis, it will be found in many cases that the high-tension accumulator is cheaper.

Accumulators of low ampere-hour capacity are also being shown for dull emitters. We are glad to see this, as many people have been grossly overloading dry cells for filament lighting, and expecting to get from them far more than they can possibly give. A large number of very useful components, well made, are exhibited by Messrs. McMichael, while the multitudinous uses of "Clix" are being publicly demonstrated.

It is certainly gratifying to note that the industry has settled down on sound lines. Extravagant claims, freak sets, and useless components have disappeared. The public is no longer deluded into buying shoddy sets and components, and good material is now obtainable at quite reasonable prices. Certainly this year's show augurs well for the future of the great new industry.



A general view of the Exhibition. The Radio Press stand may be seen to the left of the centre, at the back.



### Snaggsby This Time

I was Snaggsby, I think, who was the first to suggest that the Little Puddleton wireless club really ought to obtain a transmitting licence, so that its activities might be broadcast to an eagerly-waiting world, not only in cold print, but also through the more romantic medium, the ether. He came to see me about it a day or two before he raised the question in the club-house. As he sat and smoked, he suddenly said, "I have been thinking?" "That is not an original remark, Snaggsby!" I replied, "Poddleby reported recently that exactly the same phenomenon had occurred to him, and certainly the results were little short of disastrous. If I remember aright it resulted in his spoiling two suits of clothes, a carpet, and his wife's temper. I therefore urge you to bear this terrible example in mind and, if necessary, to stifle at birth the results of your mental activity." Snaggsby waved his hand, blew a cloud of smoke, got up, sat down again, made some more smoke, cleared his throat, opened his mouth and shut it again. "Come on," I said, "it is quite obvious that you are oscillating under the impact of brain waves. Is there not an old song which tells of a lady upon whom some terrible disaster had fallen? Did not her old nurse say, 'she must weep or she will die?' I do not want you to weep if you can help it, for this is a new hearth rug; and I would rather that you did not die here, since the maids have strong objections to removing corpses in the morning. Speech, however, is obviously necessary or something untoward will happen. Out with it, my friend, and let me know the worst."

### The Great Idea

Thus encouraged, Snaggsby became more communicative. "We must have a transmitting licence," he said. "We," I roared, "*we?* You speak for yourself, my friend. You ought to have one, I know, for the howls that you produce frequently make my hair stand on end and are heard as far away as Bilgewater Magna. But I have a perfectly clean sheet. I can stand up before the world and say with my hand upon my heart that I oscillate not, neither do I howl." "I am not talking about you or me, you ass," said Snaggsby, with some heat, "I mean the club. Here we are, quite the most up-to-date and go-ahead club in the country, and all we do is to receive other people's transmissions instead of sending out things ourselves. Now I don't believe there is a member of the club who knows the first thing about transmitting."

### A Terrible State

"You must admit that this is a terrible state of affairs amongst really keen wireless people like ourselves." He went on to say that of course none of us wished to brag, but there was no doubt about it that the Little Puddleton Club was by now the best known in the world, and that on every hand people were asking, "Why don't those fellows do something to show us what they are made of?" Only the other day he had overheard a conversation between two residents in Bilgewater Magna, one of whom was telling the other (who cordially agreed) that he did not believe that those Little Puddleton fellows really knew anything about wireless. They just sat at home listening to broadcast programmes on ready-made sets, or went to the club and aired their ignorance for

each other's benefit. This kind of thing, Snaggsby insisted, was not to be borne, and I was rather inclined to agree with him, for there is no more patriotic a Little Puddletonian than myself.

### The Club Hears the Worst

At the next meeting Snaggsby stammered out his proposal to an electrified meeting, whilst I, who was seconder, made an eloquent little speech which put the whole case in a nutshell. Members were inclined to be a little doubtful at first, and there was a good deal of discussion, but in the end the resolution was carried that a transmitting licence should be applied for instanter. The authorities, I am sorry to say, showed a lamentable lack of appreciation of the services to the great science of wireless rendered in the past by the club.

### Red Tape

Instead of sending us by return of post, as we had expected, full permission to transmit as freely as we liked and their official blessing, they merely wrote a cold, formal letter, enclosing a horrible document in which all kinds of questions had to be answered. This was duly completed and despatched. Then we sat down waiting with as much patience as we could summon for our permit. The first one that came was far from satisfactory, for it merely gave us leave to use an artificial aerial. This, as General Blood Thunderby remarked, was nothing more or less than an insult. He volunteered to go at once to London as the club representative and get matters put right without delay. We despatched the General upon his mission with hearts full of hope. By three o'clock that afternoon we received an official telegram: "We

surrender unconditionally —; for heaven's sake remove your warrior —." The General was recalled by wire and congratulated heartily, and the licence turned up by the following morning's post. I won't tell you the full story of his onslaught, as recounted by himself, but when I say that he appeared to have opened his mouth and let himself go, you will understand that the officials must have had a pretty hectic time.

#### We Begin

Everything being now in order it remained only to erect our transmitter. It was decided to begin in quite a small way, for as Bumbleby Brown said, "It never does to rush things, and we don't want to be accused of swanking." Everybody contributed his mite to the club transmitting set. As I possess no gear of any kind suitable for the important parts of the apparatus, I could do no better than some terminals and a couple of rheostats, all of which were claimed in the most barefaced way by various members of the club as their own property. I did, however, offer, and the offer was accepted with alacrity, to proceed to Bush House to consult Mr. G. P. Bendall, of the Inquiry Department. I presented myself in his sanctum armed with an ample supply of half-crowns. These I placed upon the table in front of me, and he, with one eye upon a stop watch, removed one of them from my side of the table to his with a kind of croupier's rake at frequent intervals. He is really a very charming fellow, but as I had lots of questions to ask, the interview was an expensive one for the club, particularly as he suddenly went off into a discussion on tuning coils, plying his rake with great skill at the end of each ten minutes. At the end of our interesting conversation I was full of information about methods of winding, but remembered when I was outside the door that I had hardly been able to ask a single question on transmission, and that there was not a half-crown left. On my return to the club I was received rather coldly, even though I offered to give the finest lecture that they had ever heard on coil winding. It was seriously proposed by Poddleby that the half-

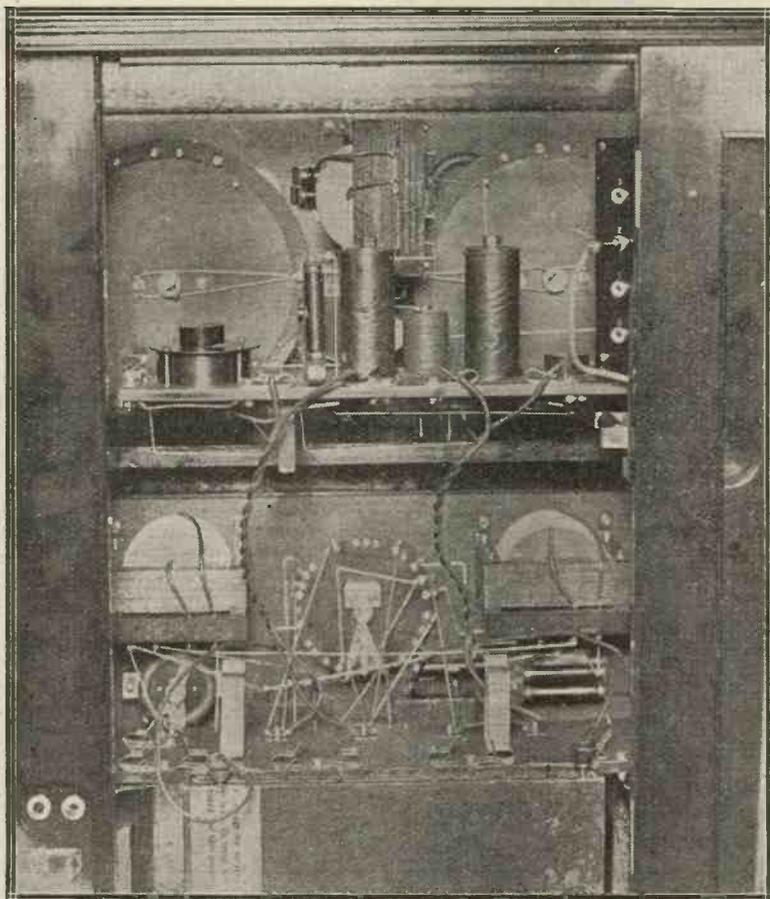
crowns expended should be debited to my account. I am afraid that Mr. Bendall is in for rather a rough time, for next week we are sending up General Blood Thunderby to consult him provided with only two half-crowns. If he does not tell Mr. Bendall a few things about tuning coils I shall be surprised.

#### Renewed Efforts

Feeling that my reputation had somewhat suffered amongst the members of the club by my visit to Town, I then proposed a scheme, which was agreed to at once. "Mr. Hercy Parris," I said, airily, "is a friend of mine." This is quite true; in fact, I frequently call him Hercy when I think that he is far enough away not to be able to hear. "I will write to my friend, Mr. Hercy Parris, who has just started a transmitting station of his own at Wimbledon. I will propose myself for a week-end with him, and I am quite sure that he will be delighted to have me. During my stay with him

I shall pick up lots and lots of tips, and if I am lucky I shall be able to borrow some very useful gadgets." I wrote, therefore, debiting the club the three-half-pence for the stamp, and anxiously awaited the reply. When it came I must say I was rather disappointed, for he said simply, on a postcard, mark you, "Afraid that during next ten week-ends shall be engaged in designing circuits for the following months. May be able to put you up next summer if I can find a vacant week-end. Am insuring all my wireless stock against loss." This was a rebuff, as you will admit, but I am not yet defeated. There are *other* members of the Staff who know something of transmission and have suitable gadgets. Perhaps I shall have better luck with them. Meantime, the club is still getting ready to transmit, and you may expect something rather out of the ordinary when its preparations are completed.

WIRELESS WAYFARER.



A close up of the interior of a Marconiphone four valve receiver embodying the new Marconi transformer.

## Those Touching Plates

**E**VERYONE, I suppose, has had some experience of the troubles caused when the moving plates of a variable condenser touch the fixed at some point when they are rotated. This can be the most annoying of all faults when, as has just happened to me, it occurs in a condenser mounted in a very complicated set which cannot be removed for repairs without unsoldering a good many wires.

### Self Oscillation

Touching plates may give rise to a good deal of bother without the cause being suspected. I had an example of this the other day with a set containing two tuned-anode-coupled H.F. stages. It was not working well, and there was a tendency to fall into self-oscillation. Both the anode tuning condensers *appeared* to be up to the mark, for no clicks or other noises were heard when either was rotated. After a long and fruitless search for the trouble I happened to remove the second anode coil and to rotate its condenser whilst it was not there. Terrific noises indicated that at one point the plates were touching.

How a condenser of good quality, which works perfectly

before being mounted in the set, can suddenly develop this fault I do not know, but even the best of them are liable to do so at times. The job of setting matters right may be a perfectly easy one, or it may prove to be a long and exasperating business. The way *not* to set about it is to find the point at which touching is taking place and then to give one or more of the moving plates a bend upwards or downwards with the intention of correcting it. To do so merely means that if you cure them of touching at one point you will make them do so at another.

### The Moving Plates

See first of all whether the moving plates are firmly locked together on the spindle. One of the commonest causes of misbehaviour on their part is that the nuts securing them have worked loose, allowing them to wobble a little. These nuts can usually be tightened with a spanner without it being necessary to remove the spindle from the body of the condenser. If the moving plates are not loose, turn your attention to the fixed ones. These are usually secured by three long bolts, which also form the frame

of the condenser by supporting the top and bottom pieces.

Should it happen that these bolts have been tightened up unevenly, it will be found that the frame has been pulled askew. Owing to the strain the bushes at top and bottom are no longer properly aligned, and the spindle will not be quite at right angles to the fixed plates. Hence the moving plates which it carries will be cocked up a little at one end and will droop slightly at the other. The remedy in this case is to work the nuts upon the supporting bolts one against the other until the moving plates mesh truly with the fixed.

### The Fixed Plates

Should the moving plates be quite level, but either too high or too low, the fixed plates should be raised or dropped a little by means of the nuts on the long bolts. This hint applies to most standard condensers; some, however, have an adjustment for regulating the height of the moving plates, which makes matters much easier.

When it is found that "touching" is caused by some of the plates having become bent, it is not, as a rule, worth while to attempt to straighten them. Plates can be bought so cheaply that by far the best way is to purchase a new set.

N. O. P.



**I**HAVE just had a rather curious occurrence in a set fitted with a resistance-coupled note magnifier. This system of coupling is becoming more and more popular for note-magnifiers, owing to its freedom from the usual distortion due to interaction between circuits. As a good many readers probably use sets fitted with it, this type of coupling the occurrence in this particular set may be interesting to them. When first made up it functioned very well indeed, giving good signal strength with an entire absence of distortion.

### Reduction in Signal Strength

At the end of about a month the strength had fallen off considerably, the low frequency valves

showed occasional signs of oscillation and the original purity of reception was spoilt. At first sight the case was rather a baffling one, for everything appeared to be in order, both with the wiring and with the components. Tests with a milliammeter showed that of the two resistances, each of which was marked 60,000 ohms, one had a value of rather under 10,000, whilst the other was about 15,000. They were not of particularly good quality, and what had happened was that they were not able to stand up for long to the load of the plate circuits.

## Anode Resistances

### Warning

Both of them had given way, with the result that the whole equilibrium of the circuits was upset. When you buy anode resistances, either fixed or variable, it pays always to get those that are of well-known and reliable make. Poor ones may fall off considerably when they are in use, and in some cases their value may vary from day to day with changing atmospheric conditions. With these things the set can never be relied upon, for signal strength will not be constant.

M. A. Y.

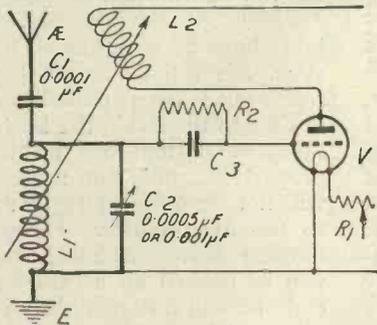


Fig. 1.—A simple aerial tuning circuit using constant aerial tuning.

A FURTHER development can be made of Mr. J. Scott-Taggart's "Constant Aerial Tuning" device, in which (Fig. 1) by the use of a small fixed series aerial condenser a great deal of that uncertainty is eliminated which usually attends the introduction of a new receiver on to an aerial of undetermined character. The effect of this small series condenser is to minimise the active aerial-to-earth capacity, which would otherwise load up the grid-tuning-circuit to an undetermined extent, and may play havoc with the tuning range as determined by the designer or constructor of the particular set on his own aerial.

**Series-Parallel Tuning**

This development, which has a useful application in certain cases, consists in making variable BOTH the small series condenser in the aerial and also a small parallel tuning condenser arranged as usual across the tuning inductance. With only a small portion of a low-minimum variable series condenser in use, the effective capacity of the aerial is reduced to such a low figure that quite a small parallel tuning condenser will cover a considerable wavelength range, if the tuning inductance has small distributed capacity; at the same time the total tuning capacity can be kept low. In crystal reception, as is shown by actual measurement of resulting signal-strength, the use of a small series condenser with a proportionately larger inductance (an arrangement which is historically derived from a compromise necessitated by the excessive size of ships'

**Combined Series-Parallel Aerial Tuning**

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

aerials when short-wave reception is in question) produces a loss of signal-strength which corresponds closely in magnitude to that produced by a series resistance deliberately introduced into the aerial, of a value equal to the "reactance" (effective H.F. resistance) of that same small condenser to an oscillating current of the same frequency, when inserted in an untuned circuit. But in valve reception it is an entirely different story: the small condenser acts as an efficient capacity coupling, and at the same time minimises both the effects of excessive capacity and of resistance-damping in the aerial. A bigger voltage build-up in the local oscillating circuit (with its comparatively less important damped aerial-branch) is

ing to the aerial and range of wavelengths in question), and tuning-condensers of really low minimum capacity, as indicated in Fig. 3, even a three-plate condenser will give enough range to bring in two adjacent B.B.C. stations at a signal-strength and with a delicacy of tuning which will be a revelation to those accustomed to the usual high-resistance tuning inductances with large parallel tuning condenser, and with the whole of the aerial-load in addition. The modest reaction-demands will also surprise many experimenters; a No. 50 coil will generally suffice over the usual broadcast range, and often the ordinary two-coil holder will not allow sufficiently loose coupling of the two coils to avoid oscilla-

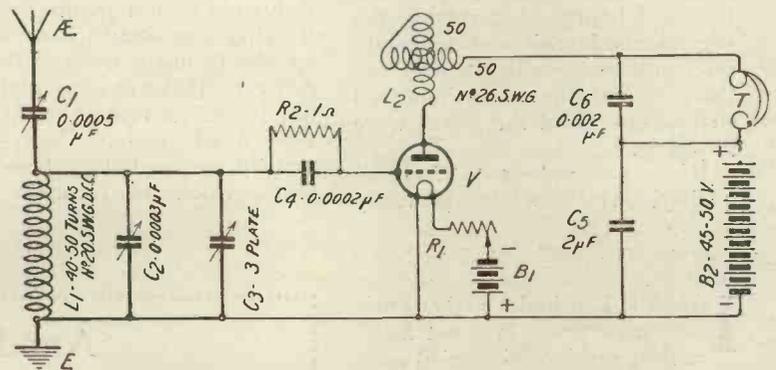


Fig. 2.—A circuit which will tune all short-wave B.B.C. stations on one inductance. The variometer may be loaded with a 0.0003 μF fixed condenser for higher ranges.

thus possible; and reaction can be applied in a much more refined manner. A marked increase in selectivity necessarily follows, though, of course, it does not become in this respect comparable with the semi-aperiodic types of coupling, or to proper loose-coupling in a two-circuit tuner.

**Tuning Inductance**

If a low-resistance tuning inductance is used in the form of, e.g., a basket-coil on a 1 in. former of No. 20 S.W.G. d.c.c. wire, say, 40 to 75 turns (accord-

tion with a valve of good filament emission and high amplification-factor. The loose coupling here also reduces that most annoying feature of the two-coil tuning device, the continual change of the aerial tuning with varying reaction-coupling.

**Range Covered**

In order to cover a very large range efficiently with a single home-made coil of low H.F. resistance, such as indicated here, one can adopt the highly-developed tuning arrangement

Those readers who are familiar with the advantages of constant aerial tuning will find in the following article much to interest and instruct them.

shown in Fig. 2. By using a rather larger (but low minimum) variable series condenser in the aerial, and a rather larger parallel tuning condenser across the inductance, with a three-plate (or so-called "vernier") condenser in parallel with this, we have the possibility of reducing the total effective tuning capacities to a low figure for the shortest waves (e.g., for Brussels and Sheffield), whilst using a fairly large inductance and thereby obtaining good signal-strength; and for the higher stations, such as Aberdeen and one or two of the German stations, we can use a larger proportion of our aerial capacity (by putting the series condenser at its maximum), together with a reasonable parallel capacity, under conditions where these are less harmful to effective signal-strength. At the same time, with the small three-plate condenser, equipped with a long handle, we have fine tuning available at all times. Exceedingly smooth reaction is obtained over a wide range of wavelengths by means of the electrostatic reaction-coupling produced by a plate-variometer, not deliberately magnetically coupled with the A.T.I. in most cases, of about 50 turns each on stator and rotor, and preferably of the internally-wound spherical type.

**Actual Results**

Actual trial with a similar tuning device on a country aerial of an unassuming type showed that, after dark on a fairly favourable night, it was an easy matter to go the rounds of most, if not every, main B.B.C. stations on the single valve, followed up by Brussels, Petit Parisien, Ecole, Berlin, Breslau, Frankfort, Hamburg (with a ghost of Madrid at the edge of his wave), etc., with a few of the British relay stations thrown in for good measure.

The improvement of signal-

strength with these tuning arrangements over that attainable with the customary types of low efficiency is considerably more than that given by existing methods of high-frequency amplification.

**The P. O. and Amateur Transmitters**

We reproduce below correspondence which has passed between Mr. Percy W. Harris and the Post Office. Our comments upon the attitude of the Post Office are given in our Editorial.

**Experimental Transmitting Licence 2MQ.**

SIR,—With reference to the above, I should esteem it a favour if you would kindly grant me a permit to communicate with experimental wireless stations outside this country and on wavelengths shorter than 150 metres, together with an increase of power when required to not more than 25 watts.

The reason for this application is that I am at present engaged on some highly important work for greatly improving the range of transmission with very low powers, and which will, incidentally, have a considerable bearing on the secrecy of communication.

As the experiments will probably form the subject of Letters Patent in the near future, I do not care to indicate in detail what these are, but trust that my standing as an experimenter will prove my *bona fides*.—I remain, your obedient servant,

PERCY W. HARRIS.

**Wireless Telegraphy.**

SIR,—With reference to your letter of September 12, I am

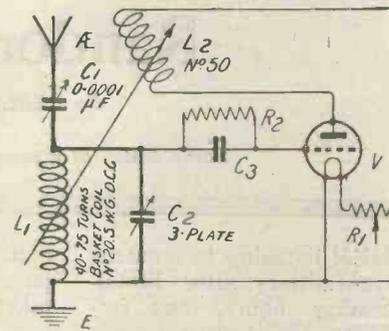


Fig. 3.—A combined series-parallel aerial tuning condenser circuit.

directed by the Postmaster-General to say that the use of power over 10 watts and of wavelengths below 150 metres can only be allowed in cases where special justification is shown, and with the consent of the Government Departments other than the Post Office which are interested in wireless communication.

If, therefore, you will furnish full details of your proposed experiments, stating what wavelengths below 150 metres you require, and indicating clearly why you consider the use of such waves and higher power essential, the matter shall receive attention. Any information which you may furnish on the subject will be treated as confidential.

As regards your application for authority to communicate with foreign stations, I am to say that permits granted for the use of wireless sending apparatus are for experiments in wireless telegraphy between stations in Great Britain and/or Northern Ireland, although this was not expressly stated in the earlier permits issued. Communication with another country is not considered to be necessary under normal conditions, but the Postmaster-General is willing to consider any application for further facilities on receipt of detailed particulars of any experiments with stations abroad and evidence of an arrangement for co-operation by a foreign or colonial experimental station or stations.—I am, sir, your obedient servant,

J. W. WISSENDEN,  
for the Secretary.

# Random Technicalities.

By PERCY W. HARRIS, Assistant Editor.

Some Notes of interest to the Home Constructor and Experimenter.

WHEN listening to amateur transmitters after broadcasting hours, one frequently hears the statement made that the speaker is getting  $\frac{1}{2}$  or  $\frac{3}{4}$  or whatever the fraction may be, of an ampere in the aerial, as if this was an indication of power. Furthermore, it is quite evident that many transmitters are under the impression that amperes in the aerial are all that matters, and that any increase in aerial current is bound to mean an increase in radiation. This fallacy is fostered to a certain extent by the often incorrect reference to a hot-wire ammeter in the aerial circuit, as a "radiation meter."

\* \* \*

In a transmitting aerial our great object is to "get the juice away," not merely to obtain a high current in the aerial wire. It is quite possible to have two aerials, in both of which an ampere of high-frequency current is registered, one radiating excellently to long distances and the other barely getting a mile or two. We should therefore always aim at maximum radiation rather than maximum aerial amperes.

\* \* \*

In a transmitting aerial we have two important factors to be considered—ohmic resistance and what is termed the radiation resistance. Radiation resistance is the convenient, if somewhat loose, term to indicate, in figures to which we are accustomed, the power we can get away. If we state the radiation resistance in so many ohms, this means that the same amount of power is radiated as will be absorbed by a plain resistance of that number of ohms.

\* \* \*

Now, we want ohmic resistance, which is of no value to us, to be as low as possible and our radiation resistance to be as high as possible. If the total high-frequency resistance is, say, 10

ohms, we want the largest possible percentage of this to be taken up by the radiation resistance. It is thus easy to see that two aerials both, say, having a high-frequency resistance of the same figure, one may radiate much better than the other.

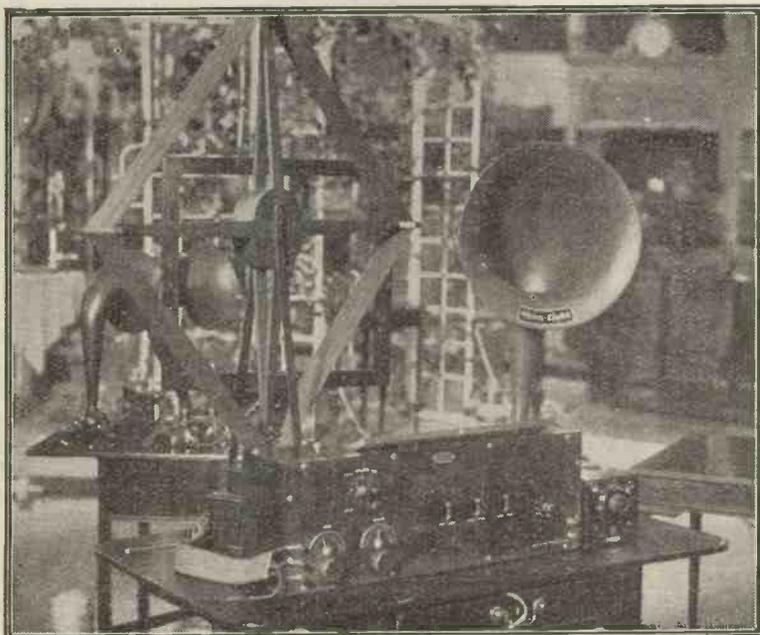
\* \* \*

It will now be seen how misleading it is to give the aerial amperes only. Let us suppose that by some alteration of shape or general arrangement we are able to increase our radiation considerably. We will assume for the moment that our previous total high-frequency resistance was 20 ohms, and that the change we have made has increased the radiation resistance by 10 ohms. Our total resistance will now be 30 ohms and aerial current will actually drop; this will be seen from a few simple figures. If we have, say, 10 watts of power dissipating some way or other in the aerial system, and the total resistance is 20

ohms, then, according to the formulæ  $I^2R$ , the current will be approximately .7 ampere. Let us now add 10 ohms to the radiation resistance, making a total resistance of 30 ohms, the current necessary to dissipate 10 watts will be approximately .57 ampere.

\* \* \*

And then there is a matter of counterpoising; I am not concerned at the moment with whether a counterpoise is a better arrangement than a direct earth. I merely take this opportunity to point out that erecting a counterpoise, say, 10 feet above the earth reduces the effective height of the aerial by that much, and from an increase in capacity can easily increase the aerial amperes without any improvement in radiation. Alternately, a man may be disappointed after erecting a counterpoise to find that his aerial amperes do not go up, whereas he actually may be radiating far more than previously.



A Western Electric Super Heterodyne Receiver employing seven Weco valves.



Many examples of what can be done with Clix plugs may be seen at the Exhibition.

Turning to receiving affairs, I recently came across a case which is well worth mentioning in these columns, as there may be others suffering in the same way. A friend of mine moved from one locality to another, and was greatly disappointed at the very poor signals he then obtained on his crystal set, compared with those he had previously received in the other district. Incidentally, the distance from the broadcasting station was not appreciably greater, and the new aerial was somewhat higher and generally looked better than the old one. I went down to the house to find out

what was the matter, and could find nothing wrong with the aerial, the earth, or the receiving set. By the process of elimination I came down to the head-phones, which, on being taken back to my own house to be repaired, proved to be very insensitive, although when purchased a year or more ago, they were practically as good as any on the market. Of course, substitution of new 'phones put everything right.

Now, when using a crystal set, telephones do not lose their sensitivity in the way which is

possible with a valve set, for in the case of the latter, if the telephones are connected in the circuit the wrong way round, the steady anode current may tend to de-magnetise the 'phones and to reduce their sensitivity that way. In a crystal set, of course, there is no steady current flowing, and it does not matter which way round they are connected. What had actually happened in this case was that the telephones had been dropped on the floor a number of times, and each of the jars had knocked a little of the magnetism out of the magnet. A sharp bang or jar is very bad indeed for telephones, and it is always wise to have a hook handy on which the 'phones can be hung immediately after use. If they are left lying on the table it is as like as not that a member of the family will occasionally catch his or her foot in the cords, and drag them to the ground.

\* \* \*

Congratulations to the Dubilier Company for at last bringing out a condenser with clips so that the grid leak can be placed across the condenser or in a position necessary for a tuned anode circuit. This little arrangement is long overdue, and I hope will be adopted by all other manufacturers as soon as possible.

Can a growing tree be used as Aerial?

Some experiments have been carried out in which a tree was used as an aerial. The method consisted in driving a nail into the tree some 8 or 10 feet above the ground and connecting the nail to the aerial terminal of the receiving set in the usual way. An earth connection was obtained either by driving a steel peg into the moist soil or by the use of earth mats. Valve receiving sets were used, and the results obtained varied considerably, it being suggested that the connecting wire between the aerial terminal and the nail in the tree probably acted as a fairly effective aerial. There is no doubt scope for some interesting summer-time experiments in this connection.

Some Simple Questions Answered

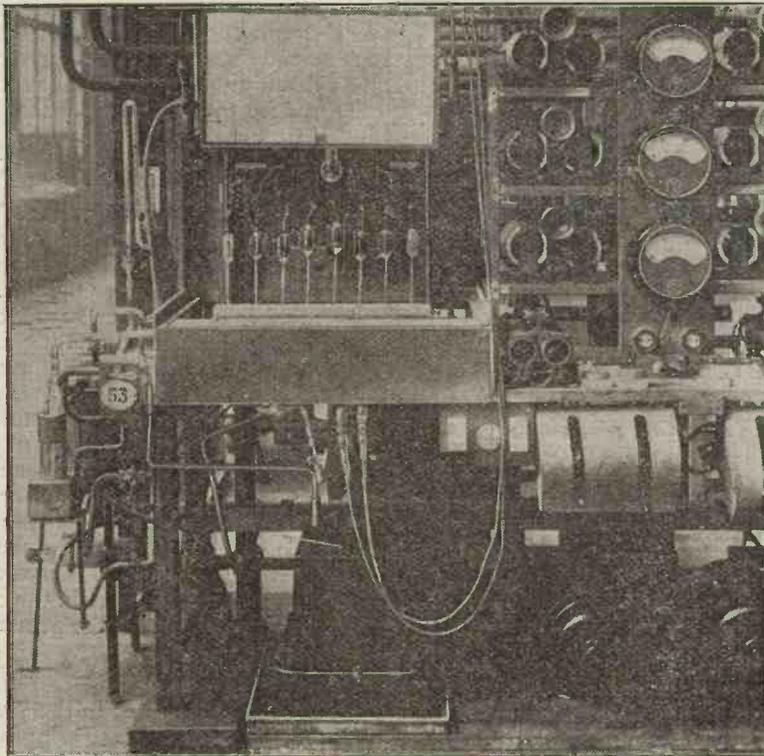
What methods of winding are adopted to reduce the internal capacity of multi-layer Coils?

When winding a multi-layer coil the points to be borne in mind are these:—Firstly, the turns must be separated from one another electrically by only a small difference of potential. The first object is achieved by adopting that method of winding which produces a cellular formation such as the honeycomb coil, or by spacing the layers from one another by either artificial separators, or a special spacing turn of wire. An example of this latter type of coil is the lattice. Electrical differences of potential

between adjacent turns will be reduced by so winding the coil that turns which lie fairly close to each other are only separated in the electrical sense by a small number of convolutions. Thus, turn 1 may lie close to turn 3, but turn 1 and turn 20 must be well separated.

Can accumulators be used to supply the H.T. current for valves?

Yes, batteries containing a large number of small accumulator cells are used to a limited extent. They are somewhat expensive, however, and require a good deal of attention to keep them in good order.



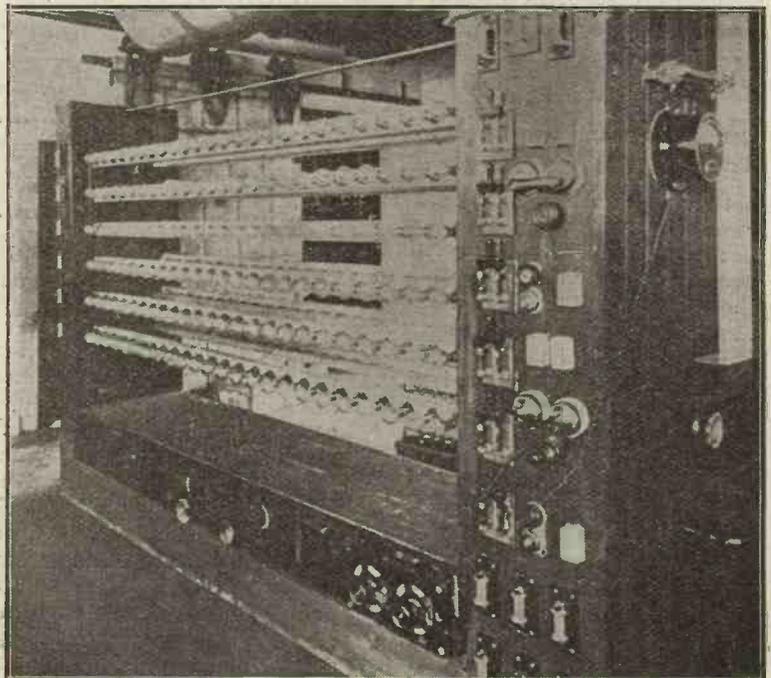
*Pump tables with eddy current heating equipment for fine filament valves.*

IT is an unusual thing in this specialised century to find a factory turning out so highly-developed a product as the modern valve, which yet begins its series of processes with the extraction of one of its raw materials from the crude ore. That, however, is what is done at the M.O. Valve Company's works at Brook Green, Hammer-smith, and the first thing which the visitor is shown is the plant for the preparation of pure tungsten. The ore employed is an Australian one, which consists in the main of a compound of tungsten and calcium, and a simple process of extraction with hydrochloric acid and ammonia, and finally re-precipitation with acid yields pure tungstic oxide. The requisite percentage of thoria is then added, after drying and grinding to a fine powder, and the mixed oxides are reduced to the metallic state by heating in an atmosphere of hydrogen.

**Powder Filaments**

The result is a grey powder which presents something of a

problem, since it must be reduced to a coherent metallic mass before wire-drawing can begin, and the



*Ageing rack for receiving valves.*

How a . . .  
 Modern Valve  
 is made . . .

obvious process of fusion is undesirable.

The procedure adopted at the Brook Green works is therefore of necessity somewhat elaborate, although to the spectator it seems wonderful how soon the apparently uncontrollable grey powder becomes a stiff rod capable of undergoing quite severe mechanical treatment. The first step is compression in a hydraulic press, which produces a square bar something like a foot in length and a quarter of an inch square, possessing a fair degree of cohesion. This bar is next gripped by its ends, and a very heavy current is passed through

\* \* \*

*A brief sketch based upon a visit to the M.O. Valve Co.'s Works.*

\* \* \*

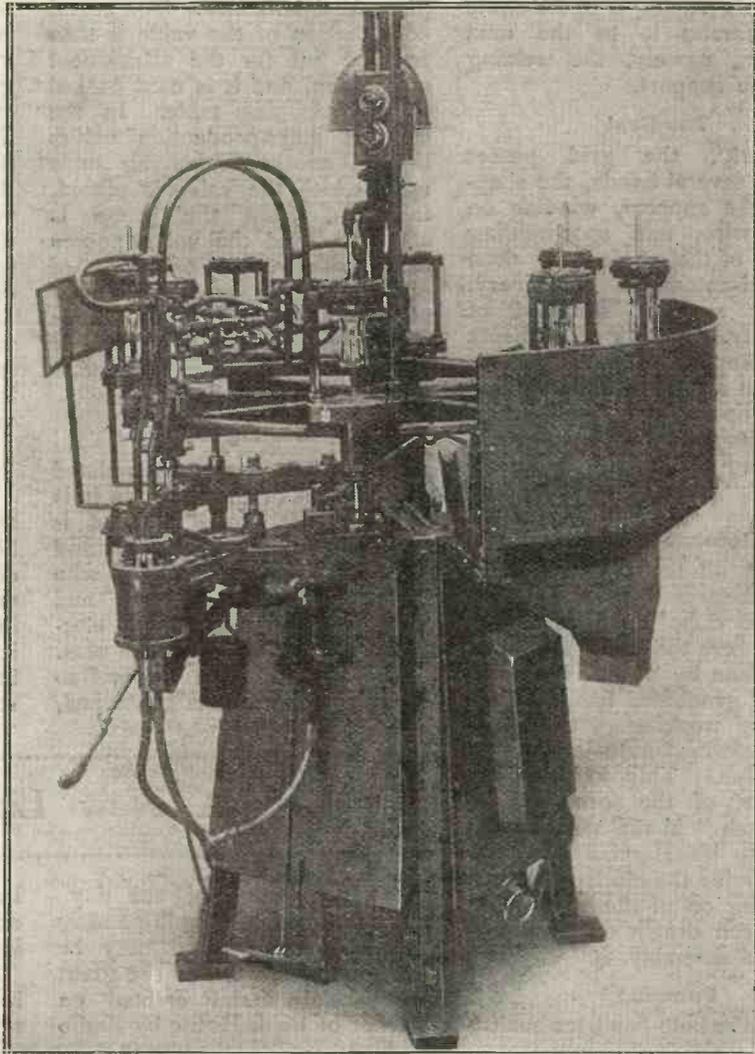
it, thereby welding its particles together.

**Drawing the Filament**

The solidified bar is then transferred to a series of small furnaces in which it is strongly heated, and at the same time subjected to the action of high-speed automatic hammers. Its successive passages through these furnaces produce a gradual elongation, until finally the rod is sufficiently reduced to be passed to the ordinary wire-drawing machinery, where repeated journeys through diamond dies bring it down at last to the thinness of a hair.

**The Ore**

Of the more important materials used in a valve the tungsten wire for the filament alone is prepared from the ore

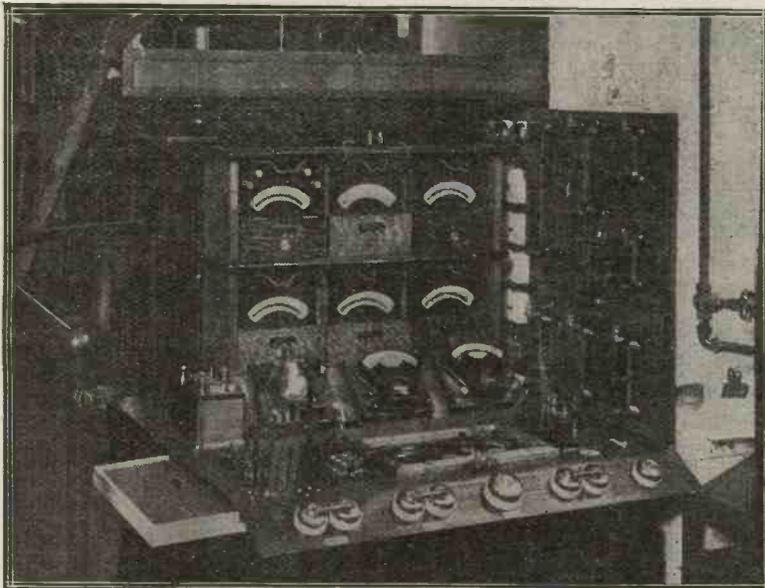


A "sealing-in" machine for small valves.

at the M.O. works, and in the factories carrying on the mass production of the various broadcasting valves the complete life-history of a valve can be followed from the punching out of the electrodes from sheet metal to the exit of the finished valve to the packing department.

**Speciality Workers**

Every stage is carried out by a worker who specialises in that one operation, and the result is, naturally, very high speed and great uniformity in the final product. Thus, one operator may work the machine which stamps out the anode from sheet metal. The anode is then passed down a little chute to the next



Test table at the Marconi Osram works.

worker, who shapes it and electrically welds its edges together, afterwards placing it in the shute which carries it to the next operation, namely, the welding on of the support.

**The Grid**

Similarly, the grid passes through several hands, the shaping of the support, winding on of the wire, and spot-welding together of the whole being done by semi-automatic machinery, ensuring a high standard of uniformity. The three elements being complete, they are assembled upon a form of template and the next operation is the insertion of the filament (again welded into place) and sealing of the whole into the "pinch" of the glass stem.

**Revolving Tables**

Almost all the operations involving the treatment of the glass parts are done upon revolving tables, where the necessary heating is done by a series of gas flames of graduated temperature, the actual working of the glass being performed automatically in most cases. This is true, in particular, of the formation of the "pinch" in the stem of the valve (the inner glass structure which carries the electrodes) and the sealing on of the bulb when it has been drawn on over the completed assembly.

**Pumping**

When the bulb has been sealed

on it is pierced at the top and the glass tube by which it is to be pumped is attached. The actual construction of the valve is then finished but for the attachment of the cap, and it is next passed to the pumping table. In the case of mass-production valves this is another revolving table upon which the valve is placed, the lead from the pump is attached, and the valve passes round slowly, the operation of pumping being accompanied by heating by means of gas flames to ensure the removal of "occluded" gases in the metal parts of the valve itself.

**Sealing Off**

When the valve has completed a revolution of the machine it is automatically sealed off and is then removed from the table and passed to the next workers, who cement the cap in place and solder the wires from the electrodes on to the appropriate pins.

The valve is then finished so far as construction is concerned,

and it is placed upon the ageing table, which is again of the revolving type. Here the filament is lighted and a high-plate voltage is applied, and the valve gradually heats up. When a certain temperature is reached a little piece of magnesium which had been attached to the anode during an earlier process is volatilised and the bulb suddenly fills with a brilliant blue glow, which persists for perhaps twenty or thirty seconds. Almost as suddenly as it appeared it vanishes again, leaving the familiar mirror on the glass, and having finally "cleaned up" the vacuum.

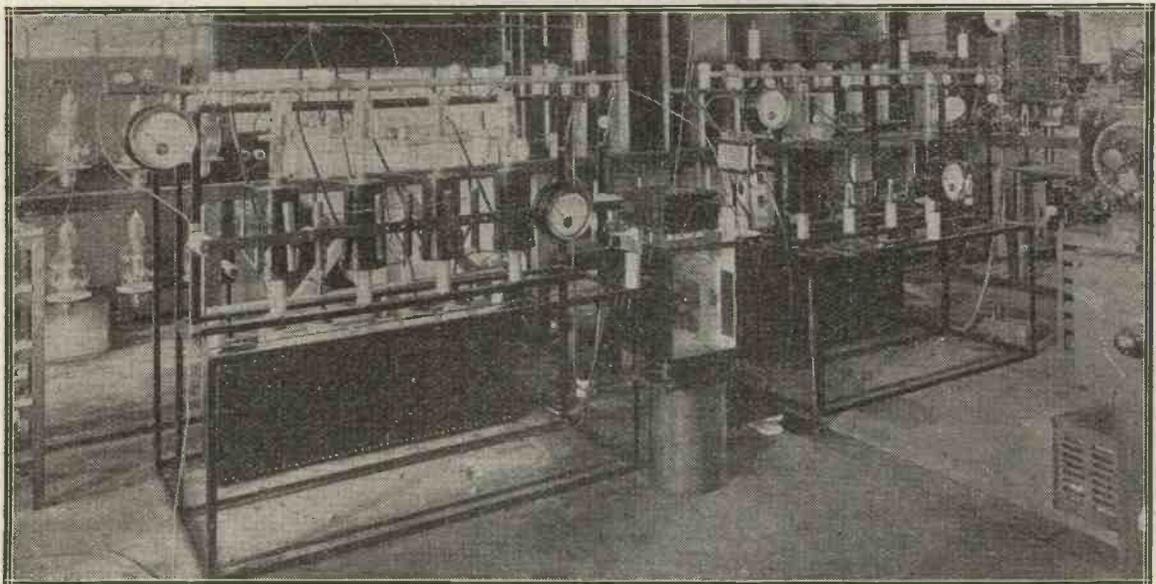
**Testing**

Upon leaving the ageing table the valve passes to the test bench, where it must conform to definite standards of hardness, emission, etc., and then, assuming that it has passed the tests, it goes off to be labelled and boxed and finally is placed into stock.

**A New Landmark**

EVERY hour of the day hundreds of people passing along the Strand may be seen gazing upward at the great new wireless aerial erected on the roof of Bush House by Radio

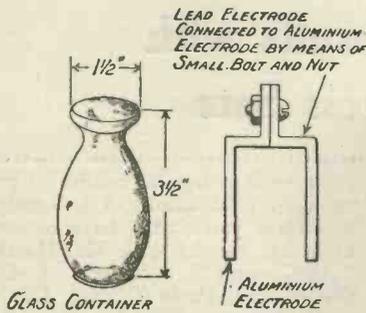
Press, Ltd., for their head office experimental work. The aerial is of the cage type, high above every other building in London, completely free from screening effects.



Water-cooled valves in use at the high-power broadcasting station at Chelmsford (5XX).

## High-Tension Supply from A.C. Mains for Small-Power Transmitters and Radio Receiving Sets

By E. A. POLLARD (5HQ).



Figs. 1 and 2.—Illustrating the jar and method of connecting the electrodes.

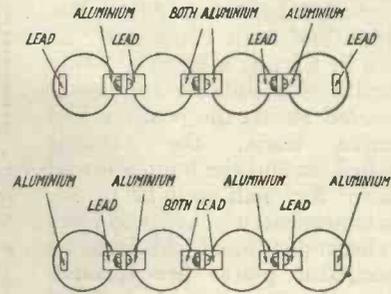


Fig. 3.—The complete rectifier with electrodes in position.

HAVING been troubled with the constant unreliability of the ordinary dry cell H.T. battery, the writer decided to try and obtain suitable current from the 220-volt 50-cycle A.C. mains. Many methods of chemical rectification were tried with various salts in solution as the electrolyte, but it was not until after considerable experimenting that success was obtainable by using chemical rectifiers. The rectifier about to be described has been in use some considerable time as a means of supplying the anode current to a small power transmitter, but it was not until several weeks ago that experiments were commenced with a view to supplying the receiving set from the same source. First attempts were unsuccessful, as the hum arising from the A.C. 50 period supply spoilt all chances of good reception. Several modifications were then introduced, and now reception is as good, if not better, than using the ordinary dry cell H.T. battery. The experiments were carried out on a three-valve receiver, comprising one high frequency, one detector, and one low-frequency valve.

### Constructional Details

The construction of the rectifier is as follows, and it can be made by any amateur without workshop facilities. The total cost of the apparatus need not exceed fifteen to twenty shillings.

The parts required are:—

One 4 $\mu$ F condenser, two 2 $\mu$ F condensers, and four 500-ohm chokes.

These parts may be obtained at a trifling cost from the many firms who specialise in ex-Government wireless apparatus. The remaining parts may be got

from any reliable chemist, and will be dealt with in detail as required.

If the amateur has access to 220-volt mains, eight rectifier cells will be necessary, and in the case of 100 to 150 volts A.C. four cells will be required. The containers for the cells may be small boiling tubes, obtainable from any chemist, or the small glass jars in which a well-known food commodity is sold. These jars are some 3 1/2 in. high by 1 1/2 in. diameter, and serve the purpose admirably. The type of jar is shown in Fig. 1. Next procure some No. 16-gauge aluminium wire or sheet, care being taken to

as shown. The strips are next placed in the glass containers in the order shown in Fig. 3. These strips should not reach to the bottom of the jar, but should terminate some 1/2 in. from the bottom. This is to allow any sediment which may form to drop clear of the electrodes, so as not to interfere with the rectification.

The glass jars are then filled to within 3/8 of the top with the electrolyte. This electrolyte is composed of a saturated solution of ammonium molybdate (pure) chemical formula (NH<sub>4</sub>)<sub>2</sub>MO<sub>4</sub>. The writer, as mentioned before, has tried various salts in solution, such as borax,

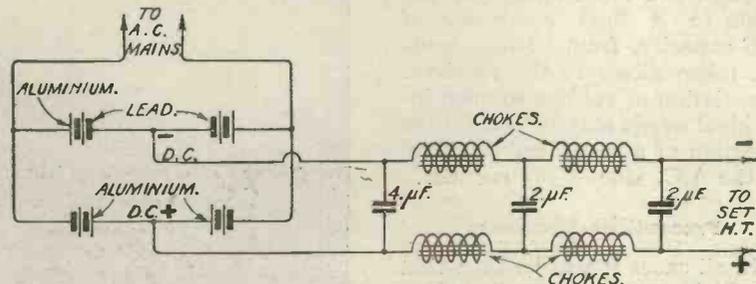


Fig. 4.—The complete arrangement of rectifier and smoothing circuit is shown here.

have only the best quality (pure), and either some 16-gauge lead wire or lead sheet, as the case may be.

### Chemical Purity

Care should be exercised in the purchase of the articles to see that both the lead and aluminium are of the chemically pure variety.

In the case of wire not being obtainable, the aluminium sheet and lead sheet is cut into strips 1/4 in. wide by 4 in. long. These are bent to the shape shown in Fig. 2, and one strip of lead is joined to one strip of aluminium,

ammonium phosphate, both pure and commercial, but in no case were the results as good as when ammonium molybdate was used. The saturated solution is got by dissolving 3 oz. of ammonium molybdate in 1 3/4 pints of water. Care should be exercised in using only distilled water in the preparation of this, as ordinary tap water contains impurities which may possibly affect the efficiency of the rectifier. The saturated solution is then poured into the glass containers to within 1/2 in. of the top. A good plan is to fill the remainder of the glass con-

tainer with some high-grade insulating oil, or ordinary paraffin is a good substitute. After the rectifier has been completed, as shown in Fig. 3, a lamp of some 50 watts of a suitable voltage is connected across the positive and negative leads, the current switched on and the lamp allowed to burn for half-an-hour or so. This is necessary in order to form the electrodes, much the same as accumulator plates are formed. When the rectifier has been formed the lamp is taken out of circuit and the rectifier is ready for use. The direct current, which can now be drawn from the rectifier, is of a pulsating nature, and is as yet unsuitable for use with the receiver circuit.

#### The Filter Circuit

The pulsations, which are of the frequency of the A.C. supply, are now passed through a filter or smoothing circuit, whence leads are taken to the receiving set. This filter or smoothing circuit is shown in Fig. 4. The positive and negative leads from the rectifier are led to a condenser of  $4\mu\text{F}$ , thence from the condenser through two chokes of 500 ohms each to another condenser of  $2\mu\text{F}$ , then from this condenser through two more chokes of 500 ohms to a final condenser of  $2\mu\text{F}$  capacity, from whence leads are taken direct to the receiver. A variation of voltage to meet individual needs may be got by the insertion of a resistance or choke in the A.C. side of the rectifier.

#### Precautions Necessary

In all cases it will be seen that it will be necessary to include a large condenser of  $0.002\ \mu\text{F}$  in the earth lead of the set, otherwise a direct short will take place.

In conclusion, the author places the ultimate success of this method of obtaining H.T. from A.C. mains on the using of nothing but pure raw materials, and too much stress cannot be given to this point. The diagrams are self-explanatory, and the amateur should have no difficulty whatever in constructing a high-efficiency rectifier.

Further, this rectifier will deal with a current of some 30 milliamps without excessive heating; thus making it quite suitable for low power transmission.

## Readers' Results with Radio Press Sets

SIR,—I have much pleasure in informing you of the success I have obtained with the "Simplicity" set. Signal strength is most astounding, and am compelled to say it is all you (or rather more) claim it to be. When Cardiff is broadcasting, which is 20 miles distant, signals are heard at great strength through the whole of the house when half-a-dozen pairs of headphones are attached to the set. When Cardiff closes down all other stations are easily got at enormous strength on an outside double aerial 38 ft. high. Its construction is very easy, having had no difficulty whatever.—Yours faithfully,

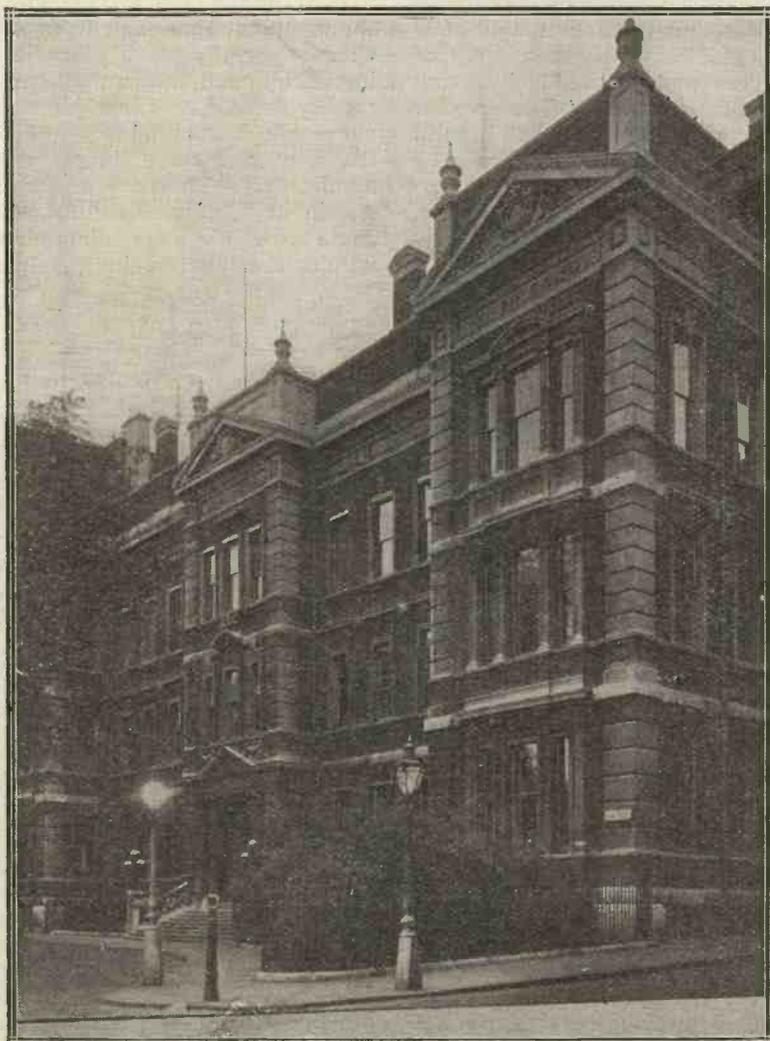
EMLYN JAMES.  
Glamorganshire.

SIR,—As a regular reader of your excellent publications, I feel obliged to inform you that I have obtained first-class results with Mr. Harris's "All-Concert" receiver. I hear Chelmsford, Paris (Clichy), Königswusterhausen, Zürich, etc., clear and without distortion on two or three headphones.

I followed entirely the instructions in Mr. Harris's book, "Twelve Tested Wireless Sets," and used Weco valves, all other parts are from the Vereinigte Telefon and Telegrafenfabriks A.G., Czeija-Visel & Co. My aerial is 30 metres long.—Yours faithfully,

FRITZ MENNY.

Vienna.



*The Institute of Electrical Engineers, Victoria Embankment, S.W., where the meetings of the Radio Society of Great Britain are usually held.*

## Watch Your H.T. Battery

**M**UCH of the noisiness in their sets of which so many amateurs complain is caused by overloading the high-tension battery. The average high-tension battery is made up of very small cells similar to those used in pocket flash-lamp refills. It is doubtful whether any battery whose cells are this size is capable of an output for any length of time of more than three or four milliamperes without becoming partially polarised and therefore uneven in its output. Five milliamperes should certainly be the outside limit of the current taken from it. Those who do not possess milliammeters do not always realise what a great strain they may be putting upon their high-tension batteries. With ordinary bright emitter valves the plate current, if the filament voltage is not excessive, will average about 1.5 milliamperes per valve. This means that a three-valve set is the biggest that can be worked satisfactorily from a high-tension battery of ordinary size. A five-valve set using ordinary valves may make a steady drain of as much as 7.5 milliamperes, and if a power valve is substituted for an ordinary one, as a note magnifier, the current may rise to 12 or 15 milliamperes, which is quite sufficient to make a small battery noisy in a very short time.

reason. Its long, straight curve, low grid current, and small plate filament impedance enable it to give much purer amplification than the ordinary valve, and greater volume of sound in the

other day an American UV 199, which was the first of the ".06" valves to be designed. With the filament working at 3 volts the steady plate current with the grid at zero was one milliampere. Raising the filament voltage to 3.5 increased the plate current to nearly 2 milliamperes, and there was a much bigger jump when the filament was put up to 4 volts.

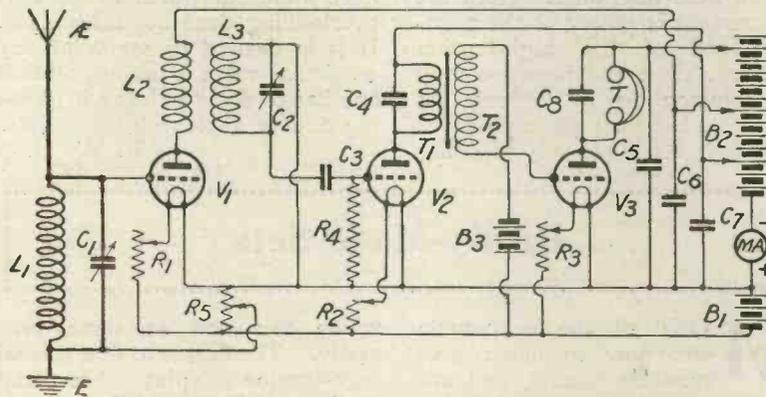


Fig. 2.—Showing position in which milliammeter should be used when employing three separate H.T. tapplings.

loud-speaker. But these valves are specially designed to pass a large plate current, and if one is fitted to a set which is worked from a small H.T. battery, the gain in purity will be more than offset by the very great increase in parasitic noises.

Another cause of overloading the high-tension battery is to be found in using dull emitter valves with their filaments working too brightly. Some of these valves are a little on the soft side, and if the filament voltage is at all

During these tests the plate voltage used was 40. Any increase in this voltage resulted in an increase of plate current. With 4 volts on the filament and 80 on the plate the current in the anode circuit approached 7 milliamperes. With British-made dull emitters of the same type the anode current was not quite so heavy as this, but at the same time it increased to high values when either the plate or filament voltage were made excessive. The very greatest care should therefore be taken not to overload the filaments of dull emitters, for quite apart from its effect upon the life of the valve, to do so, may easily ruin the high-tension battery in a comparatively short time.

The milliammeter is by far the most useful instrument that any wireless man may possess. It is unfortunately rather expensive, for it is a delicate instrument and must be very accurately made. Still, they can be obtained sometimes second-hand or from shops which deal in Army surplus goods. Fig. 1 shows the best way of using the milliammeter when the same high-tension voltage is employed for all valves. It is wired permanently into the high-tension plus lead. It may be mounted in the cabinet of the

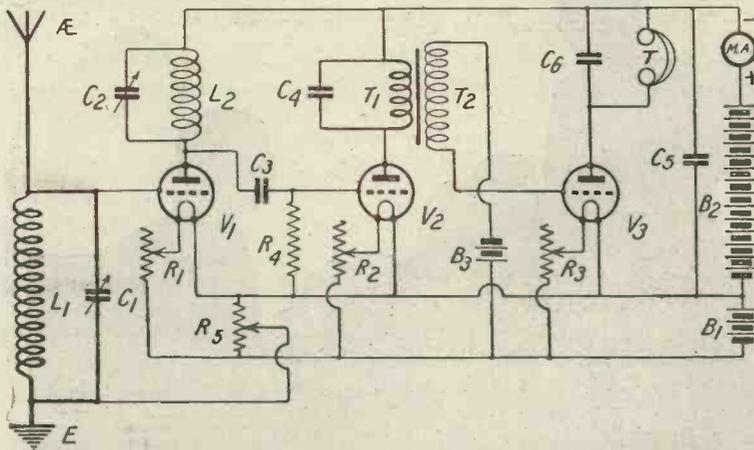


Fig. 1.—Indicating position of milliammeter when using a common H.T. voltage for all valves.

The power valve is becoming increasingly popular for note magnification, and with good

excessive their plate current may rise to quite an amazing magnitude. The writer was trying the

set or fixed to the table, the lead attached to the high-tension positive wander plug being connected to its plus terminal. In Fig. 2 is seen the position of the milliammeter in a set whose high-tension battery has three separate tapings in order to allow the correct anode potential to be given to valves working on the high-frequency side, as rectifier or as note magnifier. Here the instrument is placed at the negative end of the high-tension battery, since the negative lead is common to all valves, no matter what their plate potential may be. A simple way of doing

this, whether the milliammeter is mounted in the cabinet or fixed to the table, is to connect the negative high-tension battery lead to its negative pole, and the wander-plug lead to its positive.

The milliammeter, mounted as shown in either diagram, records the total current that is being taken from the high-tension battery, and one is thus able to keep a careful watch to see that overloading does not take place. If it is desired to see what any particular valve is taking, all that one has to do is to leave it glowing and to switch off the others.

R. W. H.

## Ready-Made Sets

**M**OST of the ready-made sets now available give excellent results, and are easily operated even by beginners. There is, however, one thing that I would like to see on them, and that is the provision of a means for supplying a higher voltage to the plates of note magnifying valves than to the rectifier. There are two ways in

which this can be done very easily. The first is to fit a second high-tension plus terminal marked "Extra H.T.+" If the user likes he can then place the wander plug corresponding to the first H.T.+ terminal in the 40- or 50-volt socket of his battery and the other in the socket which gives the greatest possible voltage. If he does not want to use two H.T. leads, he can simply short-circuit the terminals—a swinging hook connection might be provided for the purpose. The other method which has the advantage of extreme simplicity is this. Between

H.T.+ and the OP terminal of the transformer whose primary is connected to the plate of the rectifier is placed a resistance of suitable value. The plate of the note magnifier is connected *via* the telephones direct to the H.T. busbar with no intervening resistance. The effect of this is that, supposing that the single H.T. terminal is connected to the 80-volt socket of the high-tension battery, the note magnifying valve will receive 80 volts on its plate, whilst the rectifier will get only 50 or 60. If plate voltages are properly adjusted in either of the ways described, results are very much better, for no ordinary valve rectifies well with a high plate potential, and in the same way amplification is not good unless the plate voltage is high. If you give both rectifier and note magnifier the same H.T. voltage, best results will not be obtained. If the rectifier is functioning well the note magnifier will probably distort a little owing to the presence of grid current. Those who possess ready-made sets with only one H.T. terminal can alter them very simply on the lines indicated, and they will find that it is very well worth while to do so, for reception is very much improved, especially upon strong signals where the effects of distortion are very much more noticeable.

R. W. H.



Our photograph shows a huge "Brown" loud-speaker being placed in position at the Wireless Exhibition. On another page may be seen an "Amplion" loud-speaker, also of large dimensions.



THOSE who have visited the N.A.R.M. Exhibition at the Albert Hall will have noted the remarkably good reproduction of the 2LO programmes, and consequently great interest will be taken in the general circuitual arrangement for producing this result.

Those extremists who believe that the intervalve transformer

essential portions. The part to the left of the line A.B. includes the aerial and earth (no actual earth was employed), and a standard commercial receiver, which had been modified so as to give a stage of high-frequency amplification followed by a valve detector. I cannot actually guarantee that the circuit was identical with that shown to the left, but

former. The coupling condensers C<sub>4</sub>, C<sub>5</sub> and C<sub>6</sub> have a capacity of .5 μF, while the grid leaks R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> have a value of 150,000 ohms.

It is to be noticed that the grid of the valve V<sub>3</sub> is connected to a tapping on the grid leak R<sub>2</sub>, and by varying this tapping up or down R<sub>2</sub> it is possible to

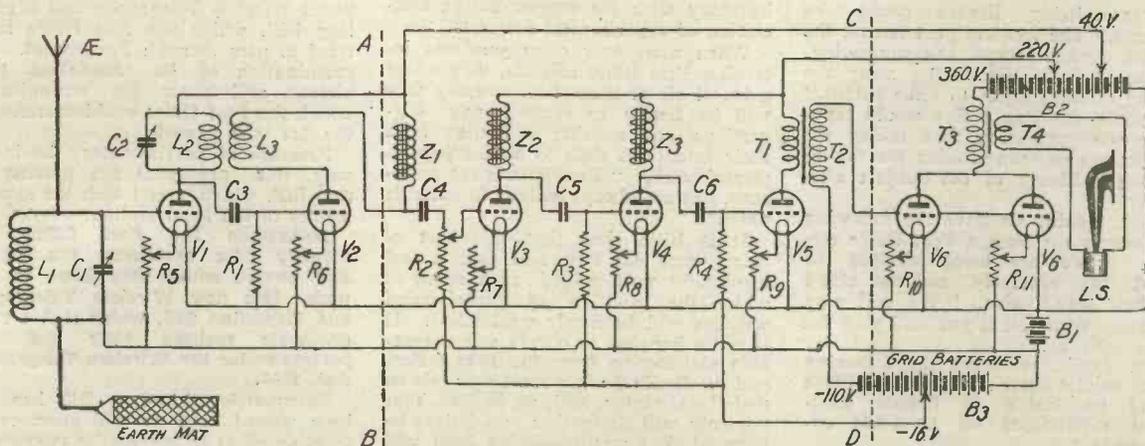


Fig. 1.—Showing the general principle of the circuit used by the B.B.C. for demonstration purposes at the exhibition.

is doomed will receive no small shock when they hear that three iron-core choke coils and two transformers are used in the apparatus.

This rather confirms my expression of opinion in these columns recently.

**The Circuit**

The general kind of circuit is illustrated in the accompanying figure, and, thanks to the courtesy of the B.B.C. engineering staff, I was able to examine the actual apparatus employed.

It will be noticed that in this figure I have drawn two vertical dotted lines, A.B. and C.D., and these are for the purpose of dividing the circuit into the three

exactly the same effect was obtained.

The portion between the lines A.B. and C.D. is the low-frequency amplifier, while the portion to the right of the line C.D. includes the power amplifying valves V<sub>6</sub>, of which there were eight in parallel, and an output step-down transformer T<sub>3</sub> T<sub>4</sub>, and a loud-speaker L.S.

**The Low-frequency Amplifier**

It will be seen that the low-frequency amplifier comprises several stages of choke couplings, the choke coils Z<sub>1</sub>, Z<sub>2</sub>, Z<sub>3</sub> being used. These chokes were of substantial dimension of the order of a large intervalve trans-

vary the strength of the output in the loud-speaker, this being a very convenient method of obtaining a regulation of signal strength.

**Grid Bias and Anode Voltages**

The anode voltages of the first two valves, i.e., the normal receiver, is 40 volts, while 220 volts are applied to the anodes of the valves V<sub>3</sub>, V<sub>4</sub> and V<sub>5</sub>. A tapping is taken on the battery B<sub>3</sub> so as to give the grids of V<sub>3</sub>, V<sub>4</sub> and V<sub>5</sub> a negative potential of 16 volts. The valves V<sub>3</sub>, V<sub>4</sub> and V<sub>5</sub> are of the L.S.5 type.

**The Power Amplifier**

The power amplifier consists of eight L.S.5A type, which has a

more open grid than the L.S.5, and has an amplification factor of from 2 to 3. These valves are all connected in parallel, and the output of the valve V<sub>5</sub> is fed into the grid circuits of the power valves V<sub>6</sub> by means of the transformer T<sub>1</sub> T<sub>2</sub>, which is a step-up transformer of 1 to 6 ratio. The grids of the eight valves, two of which are shown as V<sub>6</sub> in the accompanying figure, are given a negative potential by means of a grid battery of about 110 volts, while the anode voltage applied to these valves is 360 volts.

The very large output obtainable will be appreciated when it

is mentioned that the normal anode current is 300 milliamps. through the primary T<sub>3</sub> of the step-down iron-core transformer T<sub>3</sub> T<sub>4</sub>. The low-resistance winding T<sub>4</sub> is connected to the loud-speaker L.S., which is of a most modern type.

Lessons to be Learnt

This circuit diagram will be of great interest to those who desire to give experimental demonstrations of loud-speaker results, and the values given will indicate how the valves may be operated. There is certainly no shortage of iron in the circuit, and this alone

is rather enlightening as indicating that the B.B.C. themselves are not committed to resistance-coupling amplification.

I believe that the L.S.5A valves are not actually on the market, but are only provided to special order for certain commercial interests. I believe there is no particular reason why L.S.5 valves or valves of this type could not be used in the last stages, but since there is apparently a commercial demand for L.S.5A type, it seems strange that the valve is not standardised. Perhaps the makers can explain this.

Post Office Hypocrisy

Continued from page 743.

a transmitting licence could be granted. The ironical part is that the official cannot accept the suggestion, because "it is like taking away the liberty of the subject to some extent." No doubt the Post Office would repudiate the suggestion that to-day the restrictions on transmission are taking away the liberty of the subject altogether.

Then, again, we have the following pronouncement from a Post Office official: "We are most anxious to assist the amateurs and not stand in their way," also, "We will play the game with you if you will play the game with us."

Yet, again, we have the following in an official letter: "The Post Office would be loathe to impose additional restrictions on bona-fide experiments."

The position of the Post Office officials is truly a remarkable one. We have some officials as Vice-Presidents of the Radio Society of Great Britain. No doubt these appointments were made for the maintenance of friendly relations with the Post Office, although what these relations have brought we have yet to discover. The Post Office has flouted the Radio Society in no unmistakable manner. Whether officials of the Post Office admire Dr. Eccles or not, the President of the Radio Society, the other day, made it quite plain that the Post Office did not care two straws for the judgment either of Dr. Eccles or of any other member of the Council. We happen to know that applications for transmitting licences made through the Radio Society of Great Britain are given the most careful and thorough investigation, because the reputation of the Society is at stake in these matters. A specially compiled list of applicants forwarded by the Council were rejected *en bloc* by the Post Office, which continually expresses its considered policy of working in the closest

harmony with the representative association of experimental interests.

When newspaper correspondents interview Post Office officials, they adopt a bland air of innocence, and say they will be happy to receive any suggestions, and nothing is further from their intentions than to hinder experimental work. "Restrictions are necessary, but are always waived in suitable cases."

It is high time that this sort of thing were cut out, and that a real legal fight were staged, as a result of which the position of experimental wireless will be firmly established. It is quite hopeless to obtain any reasonable satisfaction from the Post Office, and the Radio Society must now rely on their legal rights, and, we believe, that not only will no further restrictions be imposed, but many existing ones will be wiped out as the result of a test case. The Radio Society now have funds for such a case, and we hope that the matter will be brought to a very early issue.

We are able to disclose the fact that the recent restrictions inserted into new licences were made without the knowledge and against the wishes of Mr. F. J. Brown, the head of the department at the Post Office, who was away at the time. Mr. Brown, however, apparently disagrees with the insertion of these regulations merely because they are of a provocative character, but he maintains that the regulations are in force and that the Post Office have the power to make them. He has very graciously consented to change a prohibition into a permission with a restriction, a concession which leaves the position identically the same, and which is an insult to the intelligence of the Council of the Radio Society.

We publish in this week's issue an example of Post Office methods in the case of our Assistant Editor, Mr. Harris, one of the most competent experimentalists in the country, who has

just applied for a small modification of his transmitting licence. If this is the method of dealing with an application of this character, we must sympathise with the ordinary applicant.

Anyone who doubts the attitude of experimental wireless in this country need only look at extracts from the proposed Wireless Telegraphy and Signalling Bill, which the Post Office have tried to pass through Parliament. An examination of its scandalous provisions will show the stranglehold which the Post Office could exercise, if the Act were passed.

Pressure of parliamentary business, only, has prevented the passing of this Bill, which would filch the experimenter of his legal rights.

Meanwhile the Post Office are actually now exercising the rights and powers which they hope to get under this new Wireless Telegraphy and Signalling Bill, which rights they obviously realised they did not possess under the Wireless Telegraphy Act, 1904.

Fortunately, this new Bill has not been passed, and we will exert every possible effort to prevent its passage.

Meanwhile, it is interesting to reflect that the British Post Office officials, while quietly preparing this insidious proposed Bill, openly boasted of their desire to further experimental work and assist the amateur.

*There is only one attitude to take up towards such a Government department, and the Radio Society will be failing in its duty if it does not take up that attitude at once.*

THE Wireless Constructor

THE NEW SIXPENNY MONTHLY.

No. 1.

OUT NEXT WEDNESDAY, October 15th.

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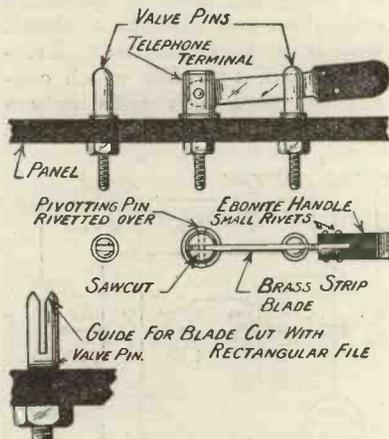
## A Simple Panel Switch

A SIMPLE panel switch may be constructed from spare parts, as shown in the diagram, all that is necessary being two valve pins, one telephone terminal, some strip brass, and a small piece of ebonite. The parts may be spaced upon the panel to such dimensions as best

The pin, which should be a little more in length than the diameter of the terminal, is then riveted over by flattening the projecting ends down with a hammer. The gauge of brass used for the construction of the blade should be a tight fit in the existing slot in the valve pin. The length of the

blade should, of course, clear the distance between the telephone terminal pivot and the valve pin. The blade is equipped with an ebonite handle, as shown. A guide for the blade should be filed on the valve pins, as shown in the enlarged diagram. To make a double - pole, double - throw switch all that is necessary is to use four valve pins, two telephone terminals, and two similar blades, the ebonite handle in this case passing from blade to blade.

H. B.



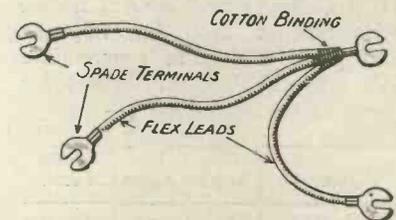
Constructional details of the switch.

suit the requirements of the constructor, or the space available upon the receiver. The blade, which is made of brass strip, is pivoted to a telephone terminal, as shown. To do this, first cut a slot in the terminal, insert the blade, and drive a pin through the existing hole in the terminal.

## Flexible Connecting Links

MUCH trouble is often experienced in making multiple link connections, where it is necessary to place three or more spade terminals under one terminal. The diagram shows a simple method of overcoming this little difficulty. The links may be made up to form two-way, three-way, or four-way connections. It will be seen at a glance

that instead of having to place three spade terminals under the desired panel terminal, the three leads shown in the diagram are bound together and attached to one spade terminal. If several of these are made and kept in



Illustrating the multi connecting link.

stock they will be found to be quite a useful acquisition for linking-up units or loose components.

H. B.



One of the exhibits at the "All-British" Wireless Exhibition is a giant Amplion loud-speaker. Some conception of its size can be gathered from comparison with the neighbouring people.

## Making the Most of Power Valves

NOT so very long ago it was almost out of the question for the amateur to use a power valve for note amplification purposes, partly owing to its enormous current consumption for filament heating—one ampere was nothing out of the way—and partly because to work properly it needed two or three hundred volts on the plate. The ordinary high-tension battery could not be used because its output was insufficient for these valves, which frequently passed up to 15 milliamperes in the anode circuit. To-day we have quite a variety of small power valves, such as B.T.H. B<sub>4</sub>, the Marconi Osram L.S.5, and the Mullard DFA<sub>0</sub>, DFA<sub>1</sub> and DFA<sub>2</sub>, whose requirements both for filament and plate are quite reasonable. We may tabulate the figures for these valves as follows:—

Valve.	Fil. Volts	Fil. Amps	Anode Volts.
B.T.H. B <sub>4</sub> ...	6	.25	80-100
L.S.5 ...	4.5	.65	100-150
DFA <sub>0</sub> ...	3.5	.35	50-100
DFA <sub>1</sub> ...	5.5	.2	50-100
DFA <sub>2</sub> ...	3.5	.25	50-100

With 100 volts on the anode and suitable grid bias the plate current consumption can be cut down to the following figures without any loss in signal strength:—

B.T.H. B <sub>4</sub> ...	4 milliamperes.
L.S. 5 .....	5 milliamperes.
DFA <sub>0</sub> .....	3 milliamperes.
DFA <sub>1</sub> .....	4 milliamperes.
DFA <sub>2</sub> .....	3 milliamperes.

To get the very best out of a power valve, however, one should use a telephone transformer and low-resistance receivers. The reason is this. The last note magnifier has pretty large voltage variations to deal with. It is desirable, therefore, that the working point should be as near as possible to the middle of the straight portion of the grid volts-anode current curve, or at any rate that it should be such that neither the tops nor the bottoms of oscillations raise it to the saturation point or lower it to the bend at the bottom of the curve. Now the higher the volt-

age we apply to the anode the more we throw the whole of the characteristic curve over towards the left.

### Grid Cells

There is no doubt that every set having even one stage of low-frequency amplification should be provided with a grid battery. Unfortunately many boxed-in sets are not so furnished, and there are hundreds of amateurs who have made up sets without this important fitting. Probably the best way to deal with the

battery to the plus terminal, and try the effect of using various grid voltages. As soon as the most satisfactory one has been found, the other tapings can be cut off. The battery can then be placed in a small box, and the leads taken to a couple of terminals placed on its lid. It will not, as a rule, be necessary to tap the first three cells, for there are few, if any, power valves needing less than 4.5 volts on the grid. If the task of breaking away the pitch of flashlamp cells does not attract, a simple way is to purchase two Ever-Ready No. 15 refills which consist of large cells with only a cardboard covering, which is

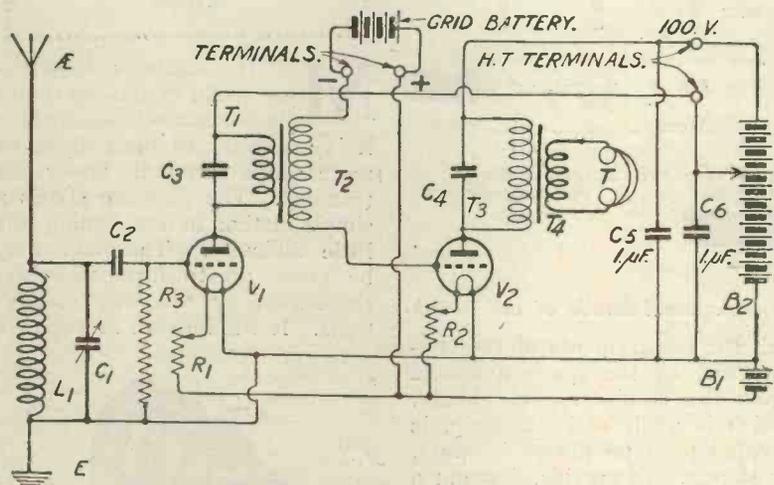


Fig. 1.—An ordinary detector and note-magnifier circuit adapted for applying negative grid bias and separate anode voltage to the last valve.

matter is to disconnect the lead which runs to the low-frequency interval transformer from L.T. negative, and to insert a pair of terminals in a convenient place upon the panel. Connect one of these to L.T.— and the other to the vacant transformer terminal. Mark the first plus and the other minus. Obtain a couple of flashlamp batteries and join them in series by soldering the short (positive) strip of one to the long (negative) strip of the other. Take tapings at each cell. This can be done quite easily by breaking away the pitch covering at the top and soldering flexible leads to the connecting wires. Take care, by the way, not to let the bared ends of your flexible leads touch, otherwise you will short-circuit some of the cells. Now connect the positive end of the

easily removed. As the cells are connected by brass strips, it is a simple matter to solder leads on.

### H.T. Voltage

The next problem to tackle is that of supplying a higher voltage to the anode of the power valve than to that of others in the set. It is first necessary to get a telephone transformer, which may be purchased cheaply from advertisers. There will generally be plenty of room for this beneath the panel. Keep it well away from the other transformers so that interaction will not take place. To wire this transformer disconnect the plate and H.T. plus leads from the telephone terminals, and connect the plate lead to one of the transformer primary terminals, connecting its secondary to the telephone terminals. Now mount an

additional H.T. plus terminal on the panel. Connect this to the unoccupied terminal of the telephone transformer's primary. The existing high-tension battery condenser should be left in place and a second should be fitted in shunt with the 100-volt high-tension lead. These small alterations can, as a rule, be carried out without much difficulty in any set, and it will be found that they will make an immense difference to its performances even if an ordinary valve and not a power valve is used as note-magnifier.

**Power Amplifiers**

The power amplifier excels for low - frequency amplification, largely on account of its design. Fig. 2 shows the parts of a typical small-power valve. As inter-electrode capacity will not be of much moment in a valve which has to deal only with low-frequencies, both the plate and

grid spiral can be made of large diameter. In most types they are oval in form, the grid being very open. The filament is much longer than is the case in valves of the ordinary type, and the volume of electron emission is therefore very great. Further, as the internal resistance of the

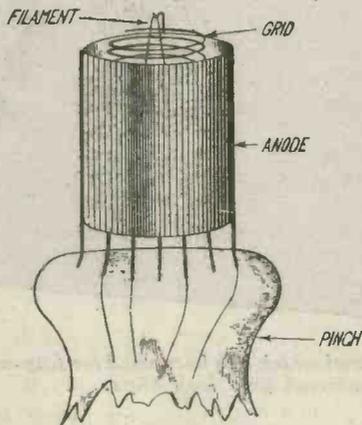


Fig. 2.—The electrodes of a power valve.

valve is generally not much higher than 10 or 12,000 ohms as compared with an average of 40,000 in ordinary valves, the power amplifier is capable of passing a greater amount of current in the anode circuit. The modern small-power valve is a dull-emitter, and it makes therefore a very small drain upon the accumulator. This low consumption is an enormous advantage, but the fact that they are dull-emitters brings one small drawback in its train. All valves fitted with filaments of this kind are inclined to be more microphonic than bright emitters, and small-power valves are no exception to the rule. However, if the set is placed upon a pad of baize or other material the microphonic qualities of the power valve will not be noticed unless it is actually tapped with the finger.

R. W. H.

**A Neat Wiring Tip**

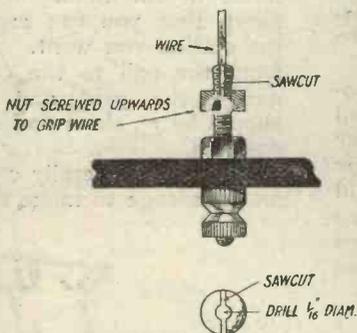
A SIMPLE device for neat wiring which entirely eliminates the using of solder may be achieved as shown in the diagram. Although a little time and trouble will

centre of the screw, as shown, and then make a cut across it with a fine hacksaw. When 1/16 in. square tinned copper wire is forced into the 1/16 in.

diameter hole drilled, the nut (which should be already on the screw) when screwed upwards will tightly grip the wire.

H. B.

**FRENCH EXPERIMENTERS**



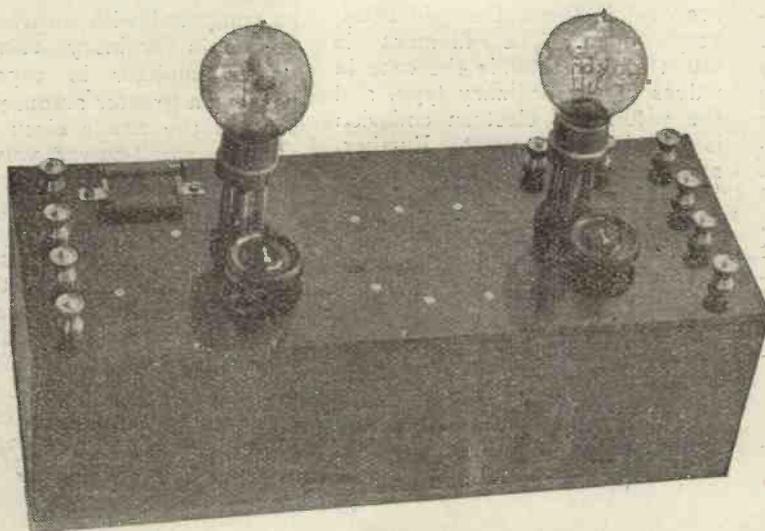
ENLARGED PLAN OF END OF SCREW

The wire fitted to the terminal.

be expended in preparing the panel fitting screws, it has its compensations by reason of the fact that the connections may be altered from time to time with a minimum of trouble, without having to get out one's soldering outfit. All that is necessary is to first drill a 1/16 in. diameter hole down the



An enthusiastic group of members of the Société Francaise d'Etudes de T.S.F. photographed during an experimental trip down the Seine. Note the loud speaker on the top of the cabin.



A detector and note magnifier panel which has been used for fifty-metre reception. Note external grid leak clips.

It is only a year or two since all wavelengths below 600 metres were looked upon as "short," but nowadays the experimenter who cannot go below 200 metres on his tuner is looked upon as out of date. Our old friend KDKA, which last winter amused and intrigued us by working on the fascinating wavelength of 100 metres, has now abandoned this common playground and slid down to sixty metres or so, on which adjustment his strength of signal is about double what it was before. In the United States the amateurs are preparing to go as low as four or five metres, but there are some really big problems to solve before satisfactory reception is likely on such waves.

#### 75-100 Metres.

Meanwhile, it will be interesting to consider a few points in tuner design for wavelengths in the neighbourhood of 75 to 100 metres — a most interesting band for the listeners who have become interested in something more than broadcast programmes.

Now, excluding super-heterodynes, specially designed neutrodyne receivers, and others of considerable complication, it is next to impossible to get satisfactory high-frequency amplification on such short waves as these.

The efficiency of radiation is exceedingly high on the short waves, and it will be found that in practically all cases a detector and one note-magnifier will give all that is required. Incidentally this is the combination used by most of those British

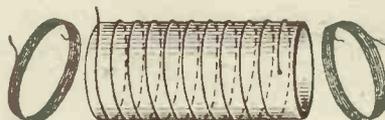


Fig. 1.—Diagrammatic representation of a simple short-wave tuner.

amateurs who are working two-way schedules with the United States, and now that the darker evenings and better atmospheric conditions are coming, it should be possible to receive 100-metre signals from the United States almost any night with this arrangement.

#### Short Wave Circuits

I have tried a number of different circuits on short-wave reception, and have come to the conclusion that there is nothing to beat a loose-coupled combination with reaction on to the secondary coil and an aperiodic aerial coil consisting of a few turns of wire wound in a hank as shown in Fig. 1. A good

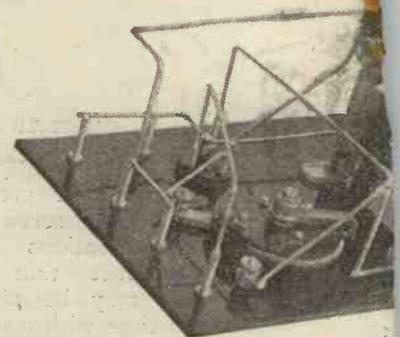
## One Hundred ... and E

By PERCY W. HARRIS

Some Points on Short

tuner for 100 metres can be made up with five or six turns of wire as the aperiodic aerial coil with a .0001 fixed condenser in series with it, and about 20 turns of No. 16 or 18 d.c.c wire on a three-inch tube not shellaced or treated in any way, as the secondary. If you shellac or wax the coil you add to the self-capacity and reduce the efficiency considerably, so I recommend you to wind it on a tube of either pure ebonite or of well-dried cardboard, the latter not waxed, but very lightly shellaced, after baking, to make it impervious to moisture. The reaction coil can be 15 to 20 turns of No. 18 or 20-gauge wire. The secondary should be tuned with a variable condenser not bigger than .0002 mfd., or the tuning will be so sharp that you can easily miss the station you want. All leads from the coil to the condenser and to the grid and filament should be as short and direct as possible.

It is now generally considered an advantage to make the coup-



A back of panel photograph showing

# ed Metres Below . . . .

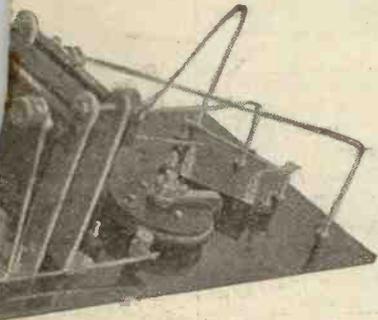
IS, Assistant Editor.

rt Wave Reception.

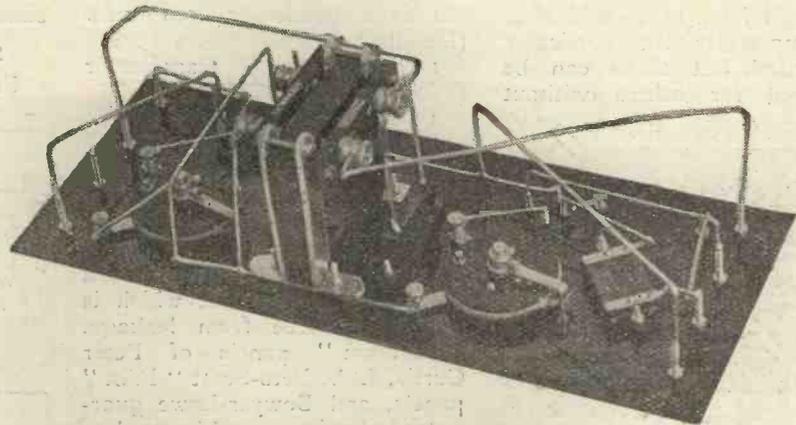
ling between the aperiodic aerial coil and the secondary coil variable, while, of course, the reaction coil must have a coupling which is variable in relation to the secondary coil. A very good make-up is to tie the aerial and reaction coils on wooden rods provided at each end with bearings, so that they can be easily rotated. Whether or not you find a series condenser in the aerial necessary will depend upon your aerial, and you will be surprised to see how loose the coupling between your aperiodic aerial coil and your secondary can be on short waves.

### Low Capacity Valves

You need not make any special endeavour to get very low capacity valves, unless you are working below 75 metres. Low-capacity valves of the tubular type have particular virtues when we use them in high-frequency circuits for short waves, where the capacity between electrodes is the unwanted source of feedback.



ing the simplicity of the wiring.



A photograph of the underside of the panel showing disposition of components.

As we have no radio-frequency tuned circuit connected in the plate there are no two tuned circuits to interact. The value of the grid leak should be watched carefully on these short waves.

In making up your tuner keep the tuning coils well away from

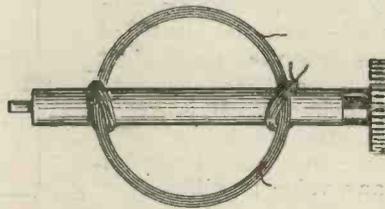


Fig. 2.—Method of securing the hank coil.

the panel and from the base-board. A good plan is to keep them about at least two inches from both of these, by means of wood brackets or supports. The construction of the aerial coil is a very simple matter. It is only necessary to take some cylindrical object about three inches diameter (a jug or bottle will do), and to wind the turns round it, slip them off, and tie them in three or four places with stout thread; the coil can then be tied to a rod (see Fig. 2), and mounted so as to be able to rotate it as closely as possible to the secondary coil. An alternative variable arrangement is made by sliding the coil to and from the secondary coil or by hinging it so that it can open away from the end of the coil when necessary.

Whatever form of tuner you use you will need a detector and note-magnifier panel, and this can be made up in permanent form for use on any wavelength. I am illustrating in this article my own detector and note-magnifier panel, which I have used successfully with various kinds of tuner down to about 50 metres. There are no particular novelties in its make-up except that the clips for the grid leak are placed outside the panel so that various values can be tried at will. You may wonder why I have not fitted a variable grid leak instead of clips and fixed leaks, thus saving myself trouble. The answer is that I have yet to find a really reliable and permanent variable grid leak which can be calibrated. There are several variable grid leaks which are capable of adjustment through a wide range of values, but not one of them is sufficiently constant in its setting to be calibrated. I hear rumours that a well-known firm is shortly to place a really reliable and calibrated variable grid leak on the market, and I hope the rumour is true. Meanwhile, I keep on the bench a box of calibrated grid leaks from  $\frac{1}{2}$  to 5 megohms, and I substitute these as and when necessary with full confidence that I am getting the values indicated.

Notice particularly that the leads inside this amplifier are exceedingly short.

The component parts necessary to make this panel are as follows. I have mentioned after the components the particular makes used, but these can be exchanged for others without

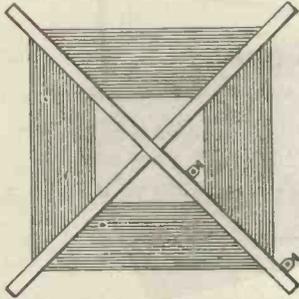


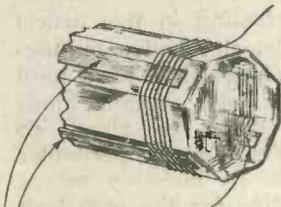
Fig. 3.—The Harris lowloss coil.

detriment, provided the substitutes are of good quality.

One panel, 14 x 5½ x 3/16 (Radion panel).

10 terminals.

2 filament resistances (Ediswan).



CARDBOARD STRIPS.

Fig. 4.—A simple way of making a low loss coil, due to M. B. Sleeper. The wire is wound over gummed strips which hold the coil when the bottle is withdrawn.

2 sets valve sockets.

1 pair of clips for grid leak.

1 fixed condenser .0003 mfd.

(Dubilier).

10 terminals.

Set of grid leaks, or, if only

one is decided upon, the usual value of 2 megohms.

1 fixed condenser .001 mfd. (Dubilier).

1 intervalve transformer (Woodhall).

1 box about 5 in. deep.

Square wire for wiring.

There are no particular difficulties in the constructional work. If you use a Radion panel you can make up your set on this right away, as it has a polished black surface which is guaranteed free from leakage. "Paragon" panels of Peter Curtis, Ltd., Peto-Scott "Pilot" panels, and Bowyer-Lowe guaranteed ebonite can all be used as received from these people, but all unguaranteed ebonite requires the surface to be removed. It is high time manufacturers stopped selling panels from which it is necessary to remove the surface before commencing work. The average experimenter has quite enough to do without the laborious process of rubbing down ebonite with emery. Now that—thanks to consistent advocacy in this journal—there is plenty of guaranteed ebonite obtainable, I strongly recommend readers to insist on having it. It is worth paying a little more for such ebonite, if you consider your time of any value at all.

Filament Resistances

So far as the filament resistances are concerned, these, of course, should be bought for either bright or dull emitters as required, or you can, if you wish, use the type of resistance such as Burndept's, which can be used

for either bright or dull emitters, according to the position of the slider.

Short-Wave Plug-in Coils  
Burndept's and Gambrell's,

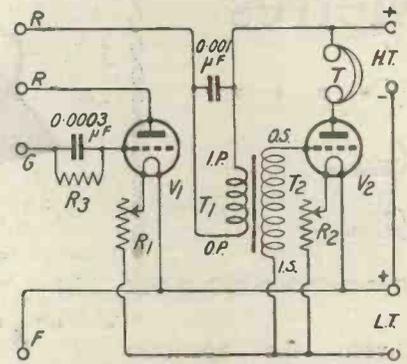


Fig. 5.—Circuit of the detector and note magnifier panel.

and just recently one or two other firms, are selling special short-wave coils, which are very good for 100 metres work. These

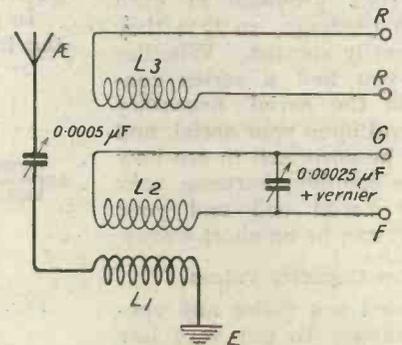


Fig. 6.—Three coil tuner for the Fig. 5 circuit.

can be used in a three-coil holder with a series condenser of .0005 mfd. in the aerial and one of

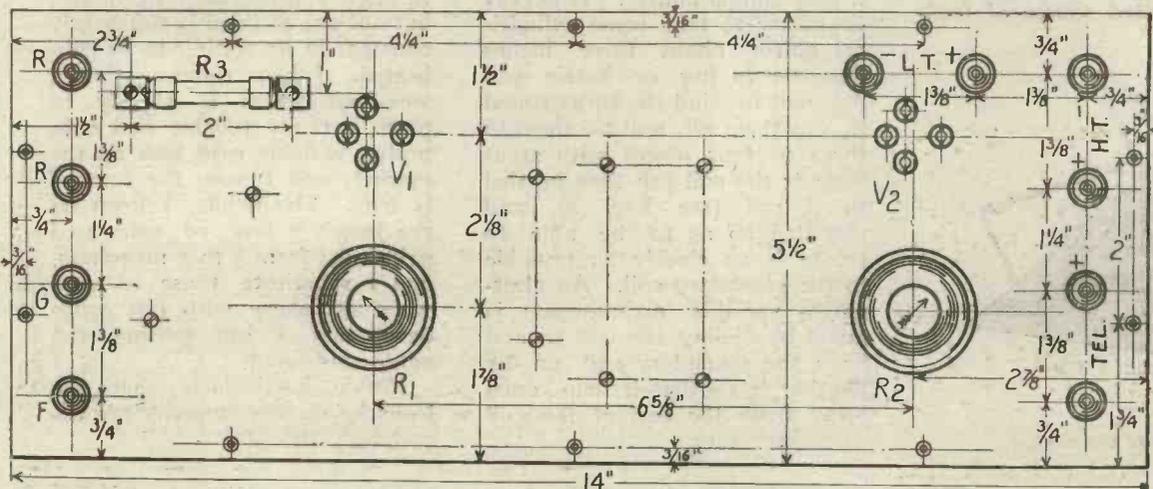


Fig. 7.—The layout of the panel and drilling dimensions.

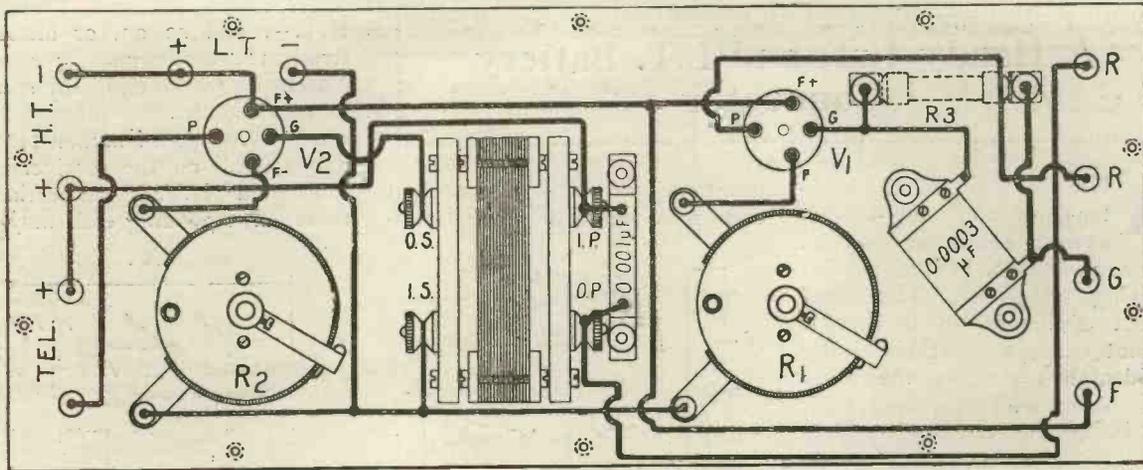


Fig. 8.—Practical back of panel wiring diagram.

.0002 or .00025 mfd. in the closed circuit. A vernier is preferable on the closed circuit condenser. For 100 metres reception it is practically useless to endeavour to receive with a direct-coupled circuit, so do not waste your time in this way if you want results. At first, though it might appear that handling a loose-coupled tuner on 100 metres would be a very critical matter, actually the tuning of the aerial

is not at all critical; it is the secondary tuning which requires care.

**Use a Heterodyne Wavemeter**

To do any really successful work it is imperative to have a separate heterodyne properly calibrated as a wavemeter. I described one of these in *Wireless Weekly* last winter, and it has since proved very useful. It is also recommended in considera-

tion of other listeners who will be annoyed by any autodyne reception on your part. Of course, when you react on to a secondary circuit which is loosely coupled with the aerial, you might imagine that practically nothing will be radiated, but, owing to the efficiency of radiation on these wavelengths, you may actually cause a good deal of interference in this way.

□ □ □

**The Proposed Wireless Telegraphy and Signalling Bill.**

**A**N extract from a bill which the British G.P.O. have been trying to get passed by Parliament. This bill has been previously published, but it is very relevant at the present crisis as showing how the Post Office have vainly attempted by this proposed Act to gain powers which they are, in fact, now illegally exercising. The passage of this Act, unnoticed, would give the Post Office unlimited powers, and deprive every private citizen of the right to possess or work a wireless set. Our own comments on the consistent repressing attitude of the Post Office appear in the Editorial.

Copies of this proposed Act may be obtained from Members of Parliament.

BE it enacted by the King's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1.—The Wireless Telegraphy Act,

1904 (hereinafter referred to as the principal Act), shall become a permanent Act, and any provision in any Act in force at the time of the passing of this Act which limits the period for which the principal Act is to remain in force shall cease to have effect.

2.—(1) The Postmaster-General may, notwithstanding anything in the principal Act, make regulations—

- (a) as to the terms, conditions, and restrictions on or subject to which licences of any class of licence under the principal Act are to be granted, renewed, suspended, or withdrawn; and
- (b) requiring any operators or other persons engaged in the working of wireless telegraphy to be provided with certificates, and making provision as to the manner and conditions of the issue and renewal of any such certificate, including the examinations and tests to be undergone, and the form, custody, production, cancellation, suspension, endorsement and surrender of any such certificate, whether issued before or after the passing of this Act; and
- (c) for preventing interference with the working of wireless telegraphy by the generation or use of etheric waves for any purpose

other than the transmission or reception of wireless messages; and

- (d) for giving effect to, and securing compliance with, the provisions of any international convention signed on behalf of His Majesty, and any regulations made thereunder, so far as the same relate to wireless telegraphy; and
- (e) prescribing, subject to the consent of the Treasury, the fees to be paid in respect of the grant or renewal of any licence or certificate.

(2) Regulations under this section may provide that any person acting in contravention of or failing to comply with the regulations or any of them, or the terms, conditions and restrictions or any of them, on or subject to which any such licence or certificate as aforesaid has been granted, shall be liable, on summary conviction, to imprisonment for a term not exceeding three months, or to a fine not exceeding fifty pounds, and, in the case of a continuing offence, a further fine not exceeding five pounds for each day during which the offence continues.

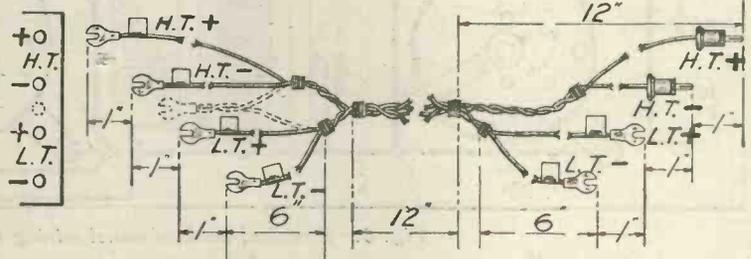
(3) Subsection (6) of section one of the principal Act is hereby repealed.

3.—Subsection (1) of section two of the principal Act, which makes special provisions as to licences for experimental purposes, shall cease to have effect, and licences for those purposes shall be subject to the general provisions as to licences for wireless telegraphy contained in section one of the principal Act.

## A Handy H.T. and L.T. Battery Connector

**A** HANDY combined high-tension and low-tension battery connector may be made as shown in the accompanying diagram. The chief object of its design is that it cannot cause a short circuit by accidentally bringing the leads into contact with each other, each tag being shorter than the preceding one. A piece of twin insulated flex 3 ft. long will be required for the high-tension battery connections, and a further piece of twin flex, 2 ft. 6 in. long, for the low-tension battery connections. The H.T. flex should be blue silk covered, and the L.T. flex red silk covered, or any two distinct colours may be used. The two lengths of flex are bound together, as shown in the

diagram, and each of the eight ends provided with spade termi-



*Constructional details and dimensions of the battery connector.*

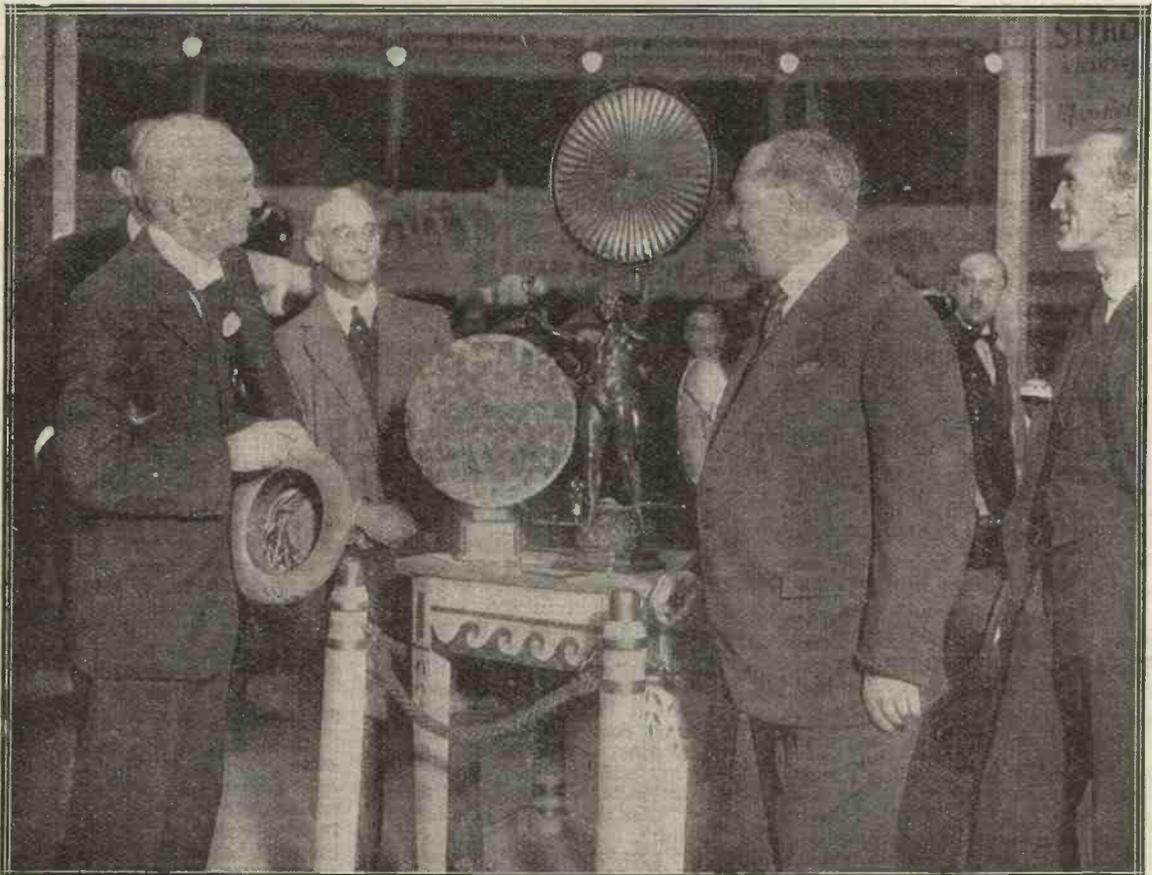
nals or wander plugs, as desired. To ensure the elimination of any possible mistakes in linking-up the connector between the batteries and the receiver, paper tags may be secured to each of the eight ends and labelled H.T. +

H.T. -, and so on, or alternatively, the distinguishing marks may be engraved upon the spade terminals or wander plugs themselves. Where a common terminal is used on the receiver for L.T. and H.T. - connections, these corresponding ends may be

bound together on the connector and secured by one spade terminal, as shown in dotted lines, resulting in this case in three ends only on one side and four on the other.

H. B.

## THE EXHIBITION



*Our photograph shows Lord Riddell on the left, inspecting a very handsome loud-speaker made by Sterling's. Mr. W. W. Burnham, chairman of the N.A.R.M., may be seen on the right.*

## A Dull Emitter Warning

I suppose that most of those who live in the country like myself make use of dull emitter valves of one kind or another chiefly because it is so difficult to get accumulators charged. There is always the bother of lugging them round to the charging station, and unless you keep a watchful eye on those who do the job you may easily find the battery is quickly ruined by their attentions or lack of attention. With the dull emitter the charging problem is greatly simplified, for a visit to the station every two or three months will usually suffice. There is one point which dull-emitter users do not appreciate. When you are using bright emitter valves consuming from  $\frac{1}{2}$  ampere to  $\frac{3}{4}$  ampere apiece, the accumulator very soon lets you know when it needs to be charged by

simply refusing to light up the filaments at their proper brilliance. But with dull-emitter valves this warning is not so obvious. Nor will a voltmeter always give a proper indication of the condition of the battery owing to the smallness of the load. It may thus happen that a battery is run down without the owner's realising it. Many an accumulator is ruined in this way, for to run it down too low means nearly always that sulphating will occur, and that spells disaster to the plates. The best tip I find is to keep on the wireless table a small piece of cardboard on which are made a number of strokes or "ones" equal to rather less than the hours of service that the battery should give. Suppose that your battery is rated at 50 ampere hours actual, and that you are

using two dull-emitters whose filaments each consume .25 ampere. Your consumption per hour is  $\frac{1}{2}$  ampere and the battery should give a 100 hours of service when it is newly charged. Make ninety strokes on your card and cross off one for each hour that the set is used. The card then gives a good indication of the state of the battery, and there is no danger of running it down too low.

R. W. H.

□ □ □

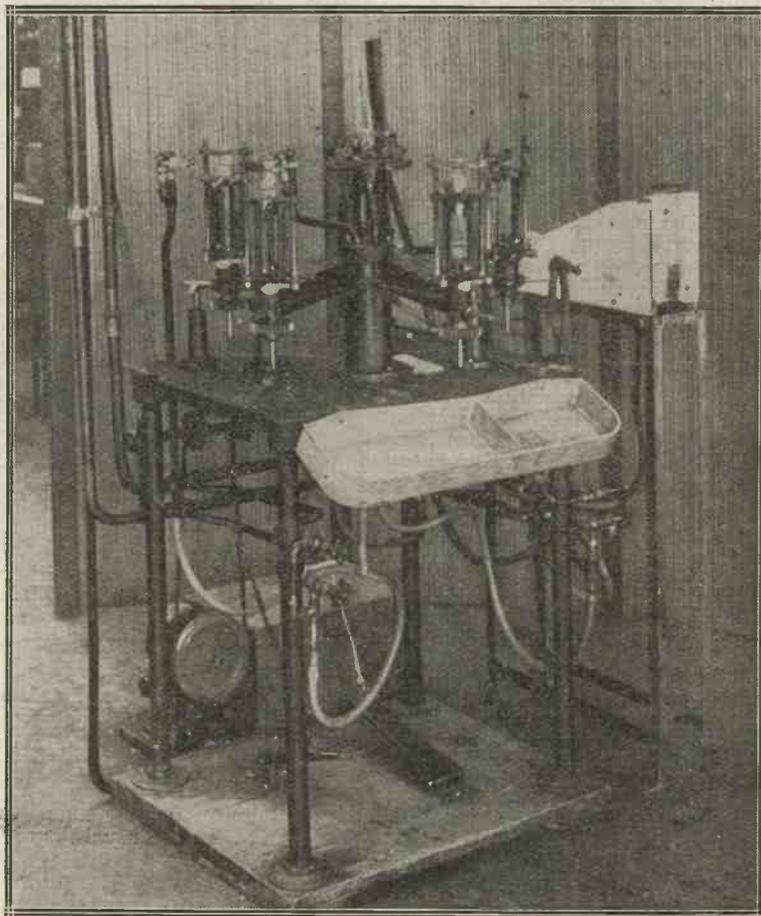
## Note on Headphones

THE writer would like to bring a little suggestion before the notice of manufacturers, who may be interested in a small improvement to headphones, resulting in greater comfort to the wearer. In most of the patterns at present on the market the ear pieces are attached to the headbands by means of a spring clip which is pivoted on to the metal portion of the ear piece. This results in a certain amount of discomfort, as the headbands are stretched over, and do not fit on to the head, the earpieces themselves also having an angular position when worn. This could be simply remedied by pivoting the ear piece, not on the metal container, but on the ebonite cap. The point of pressure is then direct on to the ear, the headbands fit round the head and are not unduly stretched, and greater comfort is obtained. The writer has tried and found this device satisfactory.

H. B.

## BLUE PRINTS

Full-size blue prints of the wiring of all the principal *Wireless Weekly* and *Modern Wireless Receivers* can be obtained from the Sales Dept. of Radio Press, Ltd. In some cases blue prints of the panel drilling can also be obtained, the price in each case being 1/6 post free.



A "pinch" making machine at the Marconi Osram valve works.



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

### Terminals

Messrs. Gent & Co. have submitted for our inspection samples of their "Tangent" terminals for electrical connections. In these, the tendency generally displayed by terminals to squeeze out the wire sideways when an attempt is made to tighten them up for secure connections (particularly when more than one wire is placed on one terminal) is effectively combatted by making the surface of the fixed portion of the terminals in the form of a curved groove, whilst the nut has its lower portion shaped to a rounded cone (roughly hemispherical in the smaller size) of a nearly equal radius. The result is that a wire, once inserted in the groove, is forced down to the bottom of the latter, rather than squeezed out sideways, when the nut is screwed down, giving a most secure hold and greatly facilitating rapid connections and disconnections.

On trial, it was found that secure connections could be made with wires of different sizes with the greatest ease, even when only one hand was available. Quite thick wires were readily secured, without bending the end into a loop. The terminals did not appear to be adapted for spade ends, which, however, become unnecessary with this type of binding-screw. The samples submitted were highly finished and nickel-plated; they were of substantial build, the bases in particular of the larger sizes being quite massive. For thick aerial and earth connections, and especially for telephone leads, these can be heartily recommended.

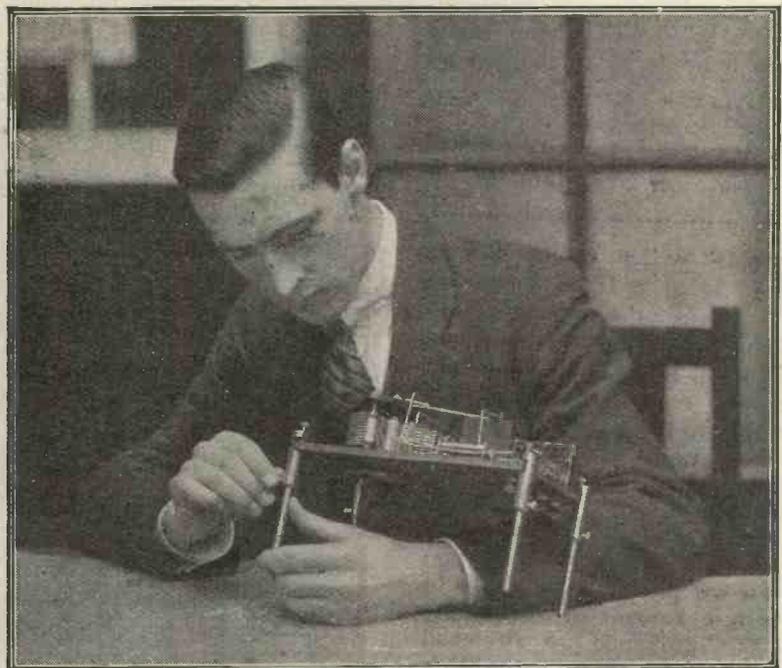
### Plug-in Coils: "Pentawave"

A set of four plug-in coils of a particularly compact form has been submitted for test by Messrs. Thomas & Co. These are all  $2\frac{3}{8}$  inches outside diameter, by  $\frac{5}{8}$  inch thick; are enclosed in a smooth, black cover of neat appearance, and are provided with the usual plug-and-socket mounting. The small size, and unusually high D.C. resistance of these tuning coils appeared to suggest the probability of a fairly large H.F. resistance; this

was confirmed in actual test, considerable difficulty being experienced in obtaining oscillation with the No. 1 in the aerial-tuning position, when using a liberal bright-emitter valve and ample H.T., and whether with series or parallel tuning-condenser. The tuning was also noticed to be markedly flat.

The makers give particulars of tuning range with these coils, which appear on close examination to have been based on a minimum tuning

wavelength, or to just under 1,800 metres with the No. 4 and .001  $\mu\text{F}$  tuning condenser. An appreciable gap was left between the No. 1 and the No. 2; under these circumstances No. 3 had to be used for reaction with both Nos. 1 and 2. When effective reaction was once obtained a test in actual reception of local broadcasting came up to about the usual level of plug-in coils.



An interesting panel support.

capacity for a P.M.G. aerial plus stray capacities of the set, etc., of about .0006  $\mu\text{F}$ , with a maximum tuning capacity (.001  $\mu\text{F}$  tuning condenser) of about .0016  $\mu\text{F}$ , which does not correspond with the best practice on the shorter waves. With a low-minimum .0005  $\mu\text{F}$  tuning condenser and the more usual figure for a P.M.G. standard aerial of .0003  $\mu\text{F}$  plus casual capacities of, say, .0001, the ranges recorded were actually, with the samples submitted, from about 350 to 1,420 metres

### Drilling Jig for Valve-Legs

Messrs. Baker & Fennemore, Ltd., have sent us a sample of their drilling-jig for valve-legs. This is a hardened rectangular steel plate  $2\frac{1}{2}$  inches by  $1\frac{1}{2}$  inches, with a centre hole for a No. 4 B.A. bolt, and the four holes for the valve-leg spacing. This is to be bolted down on the panel by a No. 4 B.A. bolt (one of which is provided with the fitting), a No. 26 drill making the necessary hole; and the other four holes are then drilled through the

jig guiding-holes. The rectangular plate facilitates the setting true to the edge of the panel.

On trial, this jig proved convenient in use, and gave the correct setting of the legs for the average valve. It is evidently carefully made, and is highly finished.

**Wander-Plug**

From Messrs. A. H. Hunt, Ltd., comes a sample of a new type of wander-plug. In this plug the wire comes out at the top of the insulating handle, a bared portion being nipped between an internal cone in the latter and the conical end of the brass plug, which screws into the former. The usual split tail is provided to obtain secure contact in the battery terminal holes. This makes an extremely neat and effective fitting; and on trial the wire was found to be nipped tightly, a good electrical connection being readily made.

**Fixed Condensers**

Messrs. Peter Curtis, Ltd., have sent us a sample of the new "Paragon-Curtis" one-piece condenser which is moulded in "Paralite" insulating material forming a closed case, so that the makers claim that it can actually be boiled for 24 hours without showing any change.

In the sample submitted small screws were provided for terminals,

projecting from the side of a case of the usual size, viz., 2 inches by  $\frac{3}{4}$  inch. As the nominal capacity was not marked on the condenser, the accuracy and permanence of capacity could not profitably be tested.

**A Two-way Vernier Attachment Coil Holder**

Messrs. Burnley Components, Ltd., have sent for test a sample of their two-coil holder, for panel or cabinet-mounting, with a fine-adjustment feature. In this instrument one coil-plug is mounted on a spindle controlled by the usual ebonite knob, turning stiffly in an ebonite base. The other is also pivoted, at a distance of about  $1\frac{1}{4}$  inch centres from the first, but is moved through an angle of approximately 15 degrees by a micrometer screw operative in either direction, working in a swinging bridle. The first holder having a range of over 90 degrees of arc, considerable latitude of adjustment of coupling is thus provided, with a fine or "vernier" adjustment available at any point of adjustment.

The instrument is quite compact, being mounted on a base but  $2\frac{3}{4}$  inches square. The two controlling spindles are necessarily at right angles to one another; the fine-adjustment spindle being of good

length (about 4 inches) and insulated from the coil-connections the hand-capacity effects are reduced to a minimum. On trial, the mechanism operated smoothly, and gave the desired fine control over coupling of the coils. By tightening sufficiently a set-screw at the end of the main spindle the holder could be made stiff enough to carry the largest and heaviest sizes of plug-in coils.

**Panel Supports**

We have received from Messrs. Prince Bros., of Cleckheaton, a set of "Constructor's Panel Supports," for use by constructors when building up a new set.

The ebonite panel is secured in the milled slot at the top by the knurled set screws. The panel can be marked off and drilled, the components fitted and wires soldered, thus obviating the old method of packing with boxes.

This operation completed, the panel can be reversed, and the legs adjusted till components clear the work bench, when a test can be performed.

We can unhesitatingly recommend these supports, which are a great help to the home constructor. Our only criticism is that they might with advantage be longer.

**REDUCTION IN PRICES OF B.T.H. RADIO APPARATUS**

*Announcement!*

THE demand for B.T.H. Radio Apparatus is constantly increasing, and so also is the output of our factories. Because of this, we are now able to announce the following substantial reductions in the prices of "Bijou" Crystal Receivers, Loud Speakers and Amplifiers.

**Radiola "Bijou" Crystal Receiver**  
(Without Headphones). A highly efficient easily tuned receiver. Old Price £2 5 0 NEW PRICE £2 0 0

**Type C2 Loud Speaker.**  
A beautifully finished instrument for general use in and out of doors. Old Price £5 5 0 NEW PRICE £5 0 0

**Type D Loud Speaker.**  
A super-sensitive electro-dynamic pattern suitable for large halls or outdoor use. Old Price £12 10 0 NEW PRICE £9 10 0

**Two Valve Power Amplifier.**  
An amplifier designed for use with loud speakers when a large volume of sound is required. Old Price £16 0 0 NEW PRICE £12 10 0

**Type C1 Loud Speaker.**  
The ideal loud speaker for a small room. Old Price £3 0 0 NEW PRICE £2 10 0

**Type C3 Loud Speaker.**  
A gramophone attachment having the same element as the C1 loud speaker. Old Price £2 7 6 NEW PRICE £2 2 0

**Single Valve Unit Amplifier.**  
Fitted with plugs and sockets for the inter-connection of two or more units. Old Price £3 5 0 NEW PRICE £2 15 0

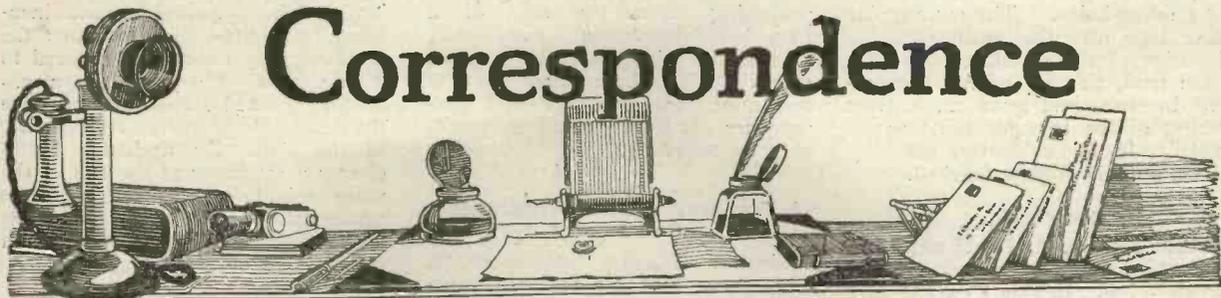
Obtainable from all Electricians and Radio Dealers.

**The British Thomson-Houston Co., Ltd.**  
Works: Coventry. Offices: Crown House, Aldwych, W.C.2.

Branches in all Large Towns.



# Correspondence



## TYPE W1 RECEIVER

SIR,—Herewith brief report on stations received on the above set. Birmingham, Manchester, Radio Belgique, Chelmsford, Eiffel Tower, Radiola, London, Bournemouth, Cardiff, Nottingham, Newcastle, Glasgow, Aberdeen, P.T.T. and Petit Parisien all audible on loud-speaker.

Madrid, Hilversum, Frankfort, Konigwusterhausen, etc., Voxhaus on 'phones, also four German and three other foreign stations whose call signs I cannot understand. All the above using constant aerial tuning, amateurs 43, including 2VG and 2KV and 2LF. The following Morse stations were logged on August 6: OAA, 8BV, 8BN, 2TF, IRA, 8NK, INA and 5JX.

The only variation from specifica-

tion is the use of a Sterling square law condenser.—Yours faithfully,  
TALBOT.

Coventry.

gested in your article.—Yours faithfully,

FIDDIAN, BAWTREE & Co.  
D. W. BAWTREE.

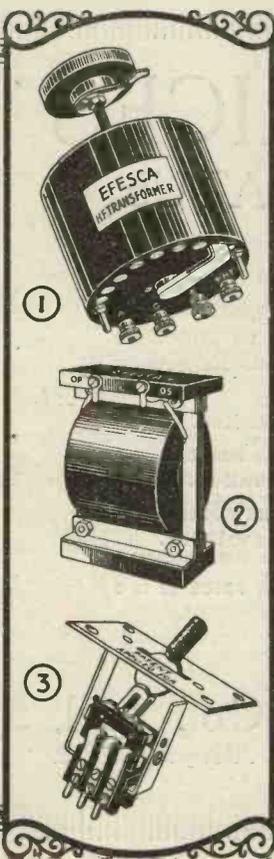
W.6.

## CONSTRUCTING COILS

SIR,—With reference to your article on p. 555 August 27, on "A Low Capacity Coil," we have for some time been experimenting with this type of coil, British Patent Number 196986, and think perhaps the following labour-saving device may be of interest to your readers. If headless nails are used and a piece of card is pressed over them before winding on the wire, the completed coil may be removed, by lifting the card, without the trouble of displacing, and afterwards replacing, any of the nails, as sug-

## SINGLE-VALVE REFLEX

SIR,—I have just constructed the single-valve Reflex receiver shown in *Wireless Weekly* of September 3 and 10 in the article entitled "How Every Crystal User May Become a Valve Expert," by E. Redpath. I feel I must write and thank Mr. Redpath for this excellent article; the results with the set are splendid. It is only a rough job, but the following stations prove it to be efficient, viz., London, Manchester, Newcastle, Glasgow, Belfast, Birmingham, Aberdeen and L'Ecole Superieure, Paris, and these on the



The Components illustrated are:—

1. EFESCA HIGH-FREQUENCY TRANSFORMER.—Specially recommended where more than one stage of high frequency amplification is required. Can be employed immediately preceding a reactance coupling to form two high-frequency stages or any number of separate transformers may be used in combination. Can also be used as a Tuned Anode Transformer by shunting the primary with a .0003 mfd. variable Condenser in any number of stages. Wavelength range, 150-2,600 metres, complete as illustration, wound on ebonite former, 21/-. Ditto, embodying Grid Leak and (.0003) Condenser, for use as Transformer connected to Detector Valve, 25/-.

2. EFESCA SPEECH AMPLIFYING TRANSFORMER TYPE "C." This Transformer is designed to give the amplification of a power Transformer without the loss in purity of reproduction generally experienced with power amplification. The coil is wound in a special manner to neutralise resonant effect, while the laminations of the core are extra carefully insulated from each other to localise eddy currents and thus prevent distortion. Ratio 2—1 one hole fixing 25/-.

3. EFESCA ANTI-CAPACITY SWITCH (Patent applied for).—A double pole, double throw switch, specially designed to minimise the capacity which exists in most change-over switches. The contact brushes are of phosphor bronze and present only their edges to each other with a comparatively wide air gap—thus practically eliminating all capacity effects. The operating lever is at no time in electrical contact with the carrying block which makes contact with the brushes. Price 8/- each.

You can build a better set with



### ONE-HOLE FIXING WIRELESS COMPONENTS.

There is hardly a wireless enthusiast who is entirely satisfied with his set. He wants still better results—and they can be had by building with Efesca parts. Each is designed to give the maximum efficiency. A combination of Efesca components, therefore, leaves nothing to be desired. Each part is the outcome of much careful study—a real scientific instrument of unique design and first class workmanship. They are stocked by wireless dealers, ironmongers, and electricians.

Learn more of Efesca parts by sending for Catalogue 522 which contains the full range. It's FREE.

For those not interested in the constructional side there is a wide range of complete Efescaphone Sets from the simple crystal set to the multi-valve receiver for loud speaker and long range work.

Wholesale only:—

FALK, STADELMANN & CO., LTD.,  
Efesca Electric Works, 83-85-87,  
Farringdon Road, LONDON, E.C.1.

And at Glasgow, Manchester, and Birmingham.

first "try-out" night after the construction was finished, with only Igranic coils Nos. 35, 50 and 75 in use. I have constructed one or two previous sets from the articles in your excellent papers, notably the Two-Valve Universal Receiver in *Wireless Weekly* of December 5, 1923. This was a fine set, but my single-valve Reflex gives much better results.

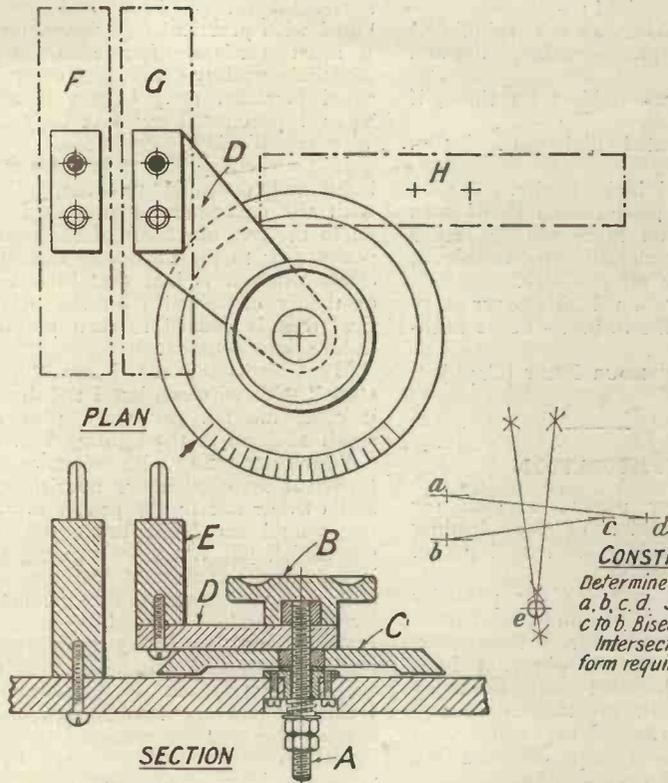
I am using 0.0003  $\mu$ F variable condensers, as I happened to have these by me.

With the best of wishes for the future of your excellent papers, *Wireless Weekly* and *Modern Wireless*.—Yours faithfully,

Northwich. T. N. G.

**AN EASILY MADE COIL HOLDER**

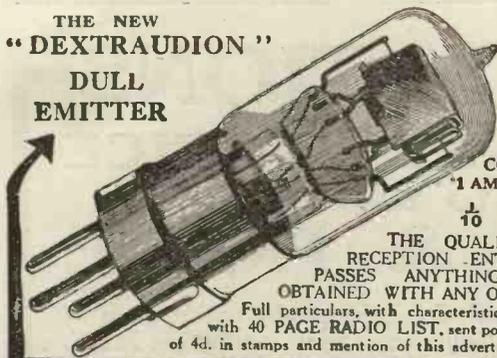
SIR,—I enclose herewith a rough sketch of an easily-made variable two-coil holder. It was inspired by the article on "Cross-Coupling" in *Wireless Weekly* of June 11, 1924, p. 185. Everything can be bought from stock except the shaped piece of ebonite D. This is easily designed and made with the help of a pair of compasses and a drill. It is easy to see that by making a second movable holder with the shaped arm D reversed and the spindle placed at right angles to the first spindle, the position in Fig. 5 in the



above-quoted article is obtained when fully open.

An attachment can easily be added for fine coupling if desired.

**THE NEW "DEXTRAUDION" DULL EMITTER**



PRICE 21/-

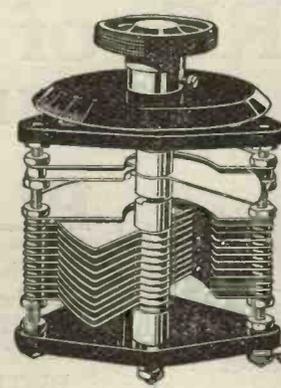
MAXIMUM CONSUMPTION 1 AMP. AT 1 VOLT.

**1/2 WATT!**

THE QUALITY OF THE RECEPTION ENTIRELY SURPASSES ANYTHING HITHERTO OBTAINED WITH ANY OTHER VALVE.

Full particulars, with characteristic curves, together with 40 PAGE RADIO LIST, sent post free on receipt of 4d. in stamps and mention of this advertisement.

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The patented features of the Bowyer-Lowe Square Law Condenser make it unique among instruments of the kind.

The moving plates are semi-circular, so that no sagging can take place as a result of unequally disposed weight.

Its construction reduces minimum capacity to so minute an amount that the capacity ratio is the highest in wireless—150-1 in the .0005.

In addition to simplicity of tuning and calibration, Bowyer-Lowe Square Law Condensers make your set selective, increase its wavelength range and yield signals of astonishing purity and volume.

Order Bowyer-Lowe Condensers by name and insist on having them in all your sets.

Standard, Vernier, Double and Triple types in all capacities, each one tested and guaranteed. Prices from 16/-

**Bowyer-Lowe Tested Square Law Condensers**

Good dealers stock them. In case of difficulty order direct. Descriptive brochure free for postcard.

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Articles required:—

(a) Revolving switch spindle A with bush, spring washer, nuts and knob B.

(b) Two coil holders (or three, if required).

(c) Graduated dial with nut in centre.

(d) Some 1/4 inch ebonite.

The coils used should be of even depth and not more than 4 inches diameter; preferably the Gambrell, as these are all one size.

Wishing your valuable paper every success for the future.—Yours faithfully,

B. SEYMOUR BAILY (Capt.)  
Plymouth.

APPRECIATION

SIR,—Allow me to express my keen appreciation of your leading article in Vol. 4, No. 20 issue of *Wireless Weekly*.

You have indeed given publicity to the thoughts of hundreds of mere practical constructors. Personally, in my own small sphere, I have seen and handled sets built by amateurs with no theoretical and very little practical experience, and naturally the results obtained are anything but encouraging.

About two years ago I began to search for really modern technical matter, something that could be

successfully applied to and combined with practical experience, and I must confess after about six months' wading through complicated formula, etc., I gave it up. Then I purchased my first copy of *Wireless Weekly*.

It is surprising how many sets are built and operated unsuccessfully, with the consequent blame thrown on to the manufacturer of the components or to the author of the circuits, when it is just that little bit of theory combined with the practical that is needed to turn partial failure into success.

My friends tell me I am "hot stuff" with wireless, but I tell them it costs me 6d. per week plus a small addition to the lighting bill.

Your suggestions with reference to technical instruction are admirable, and carried out in the proper manner would no doubt prove highly successful, but I venture to suggest it would need men of the proved ability of your own staff to conduct lectures, and I would even go farther than this and suggest that Radio Press, Ltd., be adopted as a national institution. At all events, I can but add my humble appreciation of the services rendered to me by Radio Press, Ltd., through the various publications emanating from Devereux Court, and I sincerely hope success will attend the new home and ventures of the company,

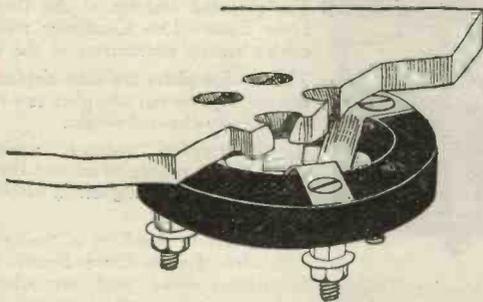
as I feel sure it will.—Yours faithfully,

C. H. WHITE.  
Luton.

THE RADIO CRITIC

SIR,—Your excellent journal is, for the experimenter and home constructor, a most valuable production. I feel, however, that it does not devote sufficient space to the listener who is a listener pure and simple, i.e., to the person who is absorbingly interested in wireless as a means of entertainment, but has neither the inclination nor the time to dip into its technical intricacies. The prime concern of this huge body of enthusiasts is to obtain good programmes from the B.B.C., and plenty of them. Now, you publish many letters from constructors of sets, but few from listener-critics? Why is this? Do they not write to you, or do you think their utterances out of place in your journal? Until the day comes when an enterprising publisher brings out what we are all eagerly waiting for, a critical paper devoted to the interests of listeners, the wireless press would be well advised, I think, to give more space to criticism of programmes, and of the general activities of the B.B.C.

**BEWARE of IMITATIONS**  
**IMPORTANT NOTICE**  
to the  
**PUBLIC & TRADE**



TYPE C (below panel).

Type A (above panel), Template Supplied ... 1/9  
Type C (below panel), Template Supplied ... 1/6

The design of the H.T.C. Valve holder is both unique and original and are the valve-holders extensively used by *MODERN WIRELESS* (The Radio Press, Ltd.) in their published circuits.

**INSIST upon the ORIGINAL. BEWARE of IMITATIONS.**

If your local dealer cannot supply write direct to:  
**H.T.C. ELECTRICAL CO. LTD.**

2 & 2a, BOUNDARIES ROAD, BALHAM, S.W.12.

Trade Enquiries Invited.

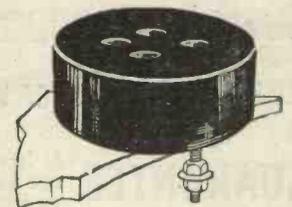
Telephone: Battersea 374

We, The H.T.C. Electrical Co. Ltd., hereby notify users of valve-holders that they should insist upon getting the H.T.C. Valve-Holder, which is *not* sold without drilling template bearing the name H.T.C.

**BRITISH and FOREIGN Patents** are applied for and all steps necessary for the protection of the public, the trade and the patentees will be taken as occasion arises.

Mr. John Scott - Taggart, F.Inst.P., A.M.I.E.E., writes in the September issue of *MODERN WIRELESS* on "Multi-Stage High-Frequency Amplification."

"Much can be done with the ordinary type of valve, provided a suitable valve holder is used. Quite apart from other merits, the widely-spaced contacts on certain types of special valve holders are particularly suitable for high-frequency work. The ordinary arrangement where the socket pins are very close together, the nuts and washers being frequently only a matter of 1/16th inch apart, is entirely unsuitable for high-frequency. **OR, IN FACT, FOR ANY OTHER WORK.**"



TYPE A (above panel).

This model especially appeals to those who prefer above-panel mounting.

To set the ball rolling, I venture to draw attention to the following:—

(1) The listener is the keystone of the wireless arch. He pays the piper and has the right to call the tune.

(2) Every legitimate taste, if held by a sufficient number of people, should be catered for. It is the business of the B.B.C. to ascertain those tastes; ours to enlighten them.

(3) A necessary corollary of (2) is that we will not have what we don't want for any reason, least of all because some faddist or fanatic in the B.B.C. thinks it good for us. (The bearings of this observation lie in the application of it!)

(4) There is widespread dissatisfaction with recent B.B.C. programmes, times of transmission, etc. We want an outlet for ventilating this dissatisfaction. Will you give us space until The Radio Critic arrives to promote and protect our interests?

(5) The alternative programme is long overdue.

I hope you will consider the suggestion here made worthy of your consideration. I am sure you would receive many interesting letters from your readers which would tend to make your Journal more attractive than it already is.—Yours faithfully,

P. C. MAYWOOD.

Teddington.

**SIMULTANEOUS BROADCASTING**

SIR,—I should be glad if your independent columns could contain a protest against the present "S.B." policy of the B.B.C. In complaining to the company one is replied to in round terms (so round that it looks "circular") to the effect that S.B. is generally liked and is confined to artists of world-wide fame. Now the latter statement is capable of proof, and I think the artists in question, say, on a "play night," would be the first to deprecate any idea that their personal fame extends to the Antipodes.

Apart from the question of the nature of S.B. programmes (to which many strongly object), distortion and land line noise coming on top of the poisonous brand of Morse we have in this district, is enough to completely spoil enjoyment.—Yours faithfully,

IVOR P. JONES.

Taunton.

**ENVELOPE No. 3**

SIR,—I have recently constructed the "Simplicity three-valve receiver," and am more than delighted with it.

Using two valves only (Cossor H.F. and Mullard Detector) the following stations can be picked up nightly: — Sheffield, Nottingham,

Hull, Leeds and Bradford, and all the main B.B.C. stations except Cardiff and London (although I can pick up London when Sheffield Relay is not working), Stuttgart, Frankfort, Hamburg, Breslau, School of Posts, Petit Parisien and Madrid, and a German station working on about 410 metres, which I have not yet managed to identify.

Recently I also picked up Rome on 425 metres, after 10 p.m.

Belfast comes in at fair strength, but is badly jammed by Morse.

In daylight, in addition to the above mentioned relay stations, Birmingham and Manchester come in at very good strength, whilst Newcastle is comfortably audible. On two occasions I have picked up Frankfort before 7.30 p.m.

All these stations have been heard on three coils (Igranic), viz.:—35 and 50, and 50 and 75, and I have no doubt that larger coils would bring in the higher wavelength Continental stations.

I have only found it necessary to use three studs of the tuning switch, viz.:—4, 8 and 9, and find that the A.T.C. in parallel gives the best results.

The total cost of the set, less valves, accumulator and H.T. was less than £5, which sum includes R.I. transformer and Igranic rheostats.

My aerial is a standard outdoor



Ask your Local Retailer for the

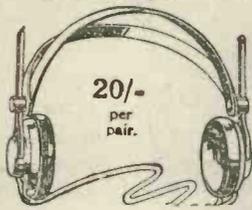
**"MORRIS"**  
(ALL STEEL)  
**VALVE TEMPLATE**

No Centre Punch required, no instruments.

Post Free  
**10½d.**

NOTE THE ADDRESS:

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**GENERAL RADIOPHONES**

20/- per pair.

Sensitive to 00000000011 of an ampere. Matched tone earpieces. Special sound chambers. Weight 7 ozs.

Ask your dealer about them.

**GENERAL RADIO COMPANY**

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Telephone: Mautfair 7152. Telegrams: "Algenrad, London."

**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.,**  
Wireless Dept., WINDSOR HOUSE, VICTORIA ST., LONDON, S.W.1

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**IS WAITING FOR YOU**

Write for FREE LISTS of (a) Complete Sets, Home Construction Sets and Unit Sets; (b) H.F. Valve Couplings and Reaction; or send 3d. stamps to include also Complete Catalogue of Accessories and Components for every Wireless purpose.

VISIT STAND No. 81, ROYAL ALBERT HALL.

**RADIAX, LTD., 50, Radio House, Percy Street,**  
Tottenham Court Road, London, W.1.

one, barely 30 feet high at its highest point, and running very nearly due north and south.

Please allow me to offer you my congratulations. May I also congratulate you on the Envelope System as a whole.—Yours faithfully,  
G. M. EADON.

Dore, near Sheffield.

**MORSE TRANSMISSIONS**

SIR,—Reference your article in the double number of *Modern Wireless*, by Mr. A. R. Burrows.

I am of the opinion that these transmissions would be of invaluable aid to many experimenters should they be of a slow and progressive nature—remembering always the Army rule: to march at a pace suitable for your slowest men.

The transmissions would be best after the broadcasting programme, say for 20 minutes, with the exception of the late nights devoted to the Savoy dance bands.

Experimenters surely have at least one valve, and I think this would bring in almost any B.B.C. station on Morse, so that the one broadcasting station need not have the whole of these transmissions. I am thinking of the engineers and the late hours that this would entail, and I think the work could be divided up, say, between several stations, without fear that the Morse

practice would not be heard by any.

One thing is clear, that the transmission must be dogmatically slow to start with, and should be progressively slow enough so that none loose interest. Those that can read eighteen words a minute can find numerous stations at all hours of the day and night, so it is not for them that I presume your scheme will be intended.

Others join with me in asking your valuable publications to push this scheme, and express our indebtedness to Mr. Burrows on such an enterprise.—Yours faithfully,  
R. L. THOMPSON.

Whittlesford.

**ENVELOPE No. 4**

SIR,—About three weeks ago I purchased the envelope containing particulars regarding the "All Concert Receiver," and wish to give you my results.

I am situated about 2½ miles from the Newcastle station and in a direct line south. My aerial is a single strand, and just on a level with the tops of some very high trees.

I was rather disappointed with the results at first, but am now getting excellent ones.

I am now using B.T.H. B4 valves in all the stages, and have had 50 per cent. better results than when

using a Cossor for the H.F. and a Mullard or Marconi for the detector.

Without any wave-trap, I am able to tune in 2BD. at excellent loud-speaker strength and with very slight interference from 5NO. The only other set which I can do this on is the four-circuit Cockaday.

When using bright emitter valves I could not get 5NO up to strong L.S. strength, but now I have to de-tune, as it is much too loud even with the filament just glowing.

I have included a switch for reversing the reaction coil, and I find it very useful.

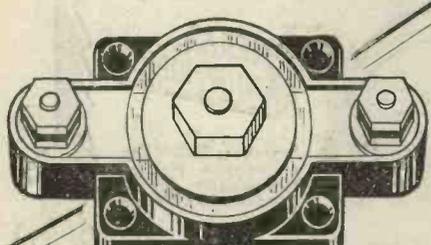
Radio-Paris .. Loud Speaker.  
5XX ... Good } These are all  
5NO ... Excellent } the B.B.C. sta-  
2BD ... " } tions which I  
5SC ... Good } have bothered  
with so far.

Le Petit Parisien Loud in phones.  
Vox Haus ? Fair L.S.  
(woman an-  
nouncer).  
Hamburg ... Good "  
Breslau ... Fair "

I have had many more foreign stations than these, but have not heard their call signs.

Trusting these particulars may be of interest to you, I remain,—Yours faithfully,

HENRY R. MYERS,  
Durham.



No  
Renewals  
Necessary.

## FINSTON Fixed Condensers

### == LAST FOR EVER ==

<p><b>FINSTON FEATURES</b></p> <p>Reliability of Capacity. Finest grade Mica Dielectric. Highest possible quality Copper Foil. Adapted for Terminal or soldered connections.</p>	<p><b>CAPACITIES</b></p> <p>.0001 to .001 Price 1/3 each. .002 to .006 Price 2/- each.</p>
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'Phone: London Wall 2475.



Trade Terms on Application

Barclay's 126



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

2/6

6 ohms  
15 ohms  
30 ohms

Winding cannot be damaged by ordinary use.  
Size. 1¼ ins. diameter, ½ in. high.  
From all Wireless Stores or direct from:  
The Bedford Electrical & Radio Co., Ltd.,  
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22, Campbell Road, Bedford.

Patent 12852.

Say "PEERLESS JUNIOR" When you want a better Rheostat



Established 26 Years.

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TO HEADPHONES  
TO LOUD SPEAKERS  
TO COILS

REWOUND to any RESISTANCE & MADE EQUAL to NEW.  
PRICE QUOTED ON RECEIPT OF INSTRUMENTS.  
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### IT'S all in THE LEAK



Patent Pending.

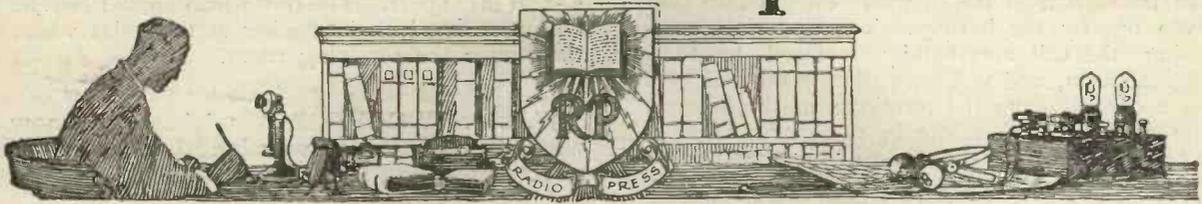
The "Bretwood" Grid Leak tunes a carrier wave from the silent point up. The "Bretwood" is recognised by highest experts and experimenters as the only variable and reliable Grid Leak.

PRICE 3/-  
Pat. 3d.

If you are not satisfied within 7 days, money will be refunded.

**RADIO IMPROVEMENTS, LTD.**  
12-18, London Mews, Maple St., London. W.

# Information Department



SUPPLIED BY RADIO PRESS SERVICE DEPT., LTD.

**F.W.B. (LIVERPOOL)** asks what is meant by hand capacity effects and how can they be avoided ?

If the hand of the operator is brought near to a condenser, inductance coil, or any other metallic part of the receiving set connected to a point of more or less high potential, the capacity to earth or merely the self capacity of the operator's body will alter the tuning of the apparatus. This effect is particularly noticeable in high-frequency amplifiers, and in the reception of short-wave signals, particularly those from continuous wave stations. The effect may be minimised, if not entirely prevented, by screening the variable condenser by means of a thin metal plate secured to the under side of the panel and connected by means of a wire to the earth terminal. The insulating extension handles now on the market

also minimise this hand-capacity effect by making it possible to operate the condensers from a reasonable distance. It is mostly in the adjustment of condensers that the trouble is experienced, as they are usually used for the final fine tuning.

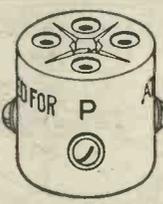
**J.V.H. (CROUCH END)** asks what is the difference between primary and secondary batteries ?

A primary battery is one in which the chemical change which produces the electric current is not easily "reversible," that is, the substances which result from the change cannot be re-converted into their original form by passing a charging current through the cell in reverse direction. Hence, when all the active substance has reacted with the exciting agent, the cell is "run down"



## Reversible VALVE HOLDER

The Universal Valve Holder.  
One Hole fixing and will fit front or back of vertical or horizontal panels.  
Lowest Capacity and  
**HIGHEST INSULATION OBTAINABLE**



**1/3**

PATENT APPLD FOR.

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CORNET ST., HIGHER BROUGHTON, MANCHESTER.  
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# Safety first

## FROM LIGHTNING

No matter how fierce the storm, there is no better protection for house, home and wireless set than an aerial, provided it is fitted with a

## PRESSLAND SAFETY LEAD-IN

To Aerial



To Earth

To Set

—the only scientific method of dealing with the lightning problem—externally from the house. There is no leakage with the Pressland Lead-in, it gives a straight path from aerial to earth and is a premiumless policy against damage.

Made in usual lead-in sizes.

Length 6" - - -	3/-
Length 9" - - -	3/3
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This little accessory stands for immunity from danger. Fit it. Ventilation

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We wait to send you whatever information or advice you may require. Write us fully and your letter will receive immediate and individual attention. You may depend on getting a helpful and fully detailed reply. With your query please enclose P.O. for 2/6 to cover cost of work involved, but if you require complicated diagrams or calculations, 4/6 is necessary.

**RADIO INQUIRIES,**  
Imperial Buildings, Oxford Road, Manchester.

We're Here to Help.

and must be discarded. A secondary battery, on the contrary, operates by virtue of a chemical change which can be reversed by passing a current through it in the opposite direction to that given out by the battery. The materials composing the cell are thereby restored to their original form, and will once more react and give out a current from the terminals of the battery. The battery can therefore be re-charged when it has run down, and the cycle of changes can be repeated almost indefinitely. Secondary batteries, of course, are commonly known as accumulators, though the name is something of a misnomer.

**N.A.G. (LEEDS) desires to know the best type of outdoor aerial where space is strictly limited ?**

A single-wire aerial of restricted length and height will have a short natural wavelength, and will not intercept and collect much energy from passing electro-magnetic waves. If the dimensions are particularly small, a large amount of inductance (in the tuning coil or coils of the receiving set) will have to be added in order to tune it to the desired wavelength, and the resistance of these turns will cause considerable damping. Under the circumstances, the best thing to do is to increase the number of wires in the aerial, thus increasing the capacity and consequently its natural wavelength. The disadvantages of a large-capacity aerial have already been

mentioned in answer to an earlier question. A good effect can be obtained by the use of spreaders, say 7 ft. 6 ins. long, carrying four wires spaced 2 ft. 6 ins. apart. The down-lead should also be of four wires joined together at the point where they enter the receiving room.

**W.E.M. (WOODFORD) wishes to know whether the natural wavelength of an aerial affects reception and transmission ?**

Certainly. If the natural wavelength of an aerial is 400 metres, and it is desired to receive waves 300 metres in length, the natural wavelength has to be artificially reduced by the use of a small series condenser, which appreciably lessens the efficiency. On the other hand, if the natural wavelength of an aerial is about 200 metres, and it is desired to receive waves 3,000 metres in length, a very large amount of inductance has to be added in series with the aerial. The resistance of the turns of wire forming the inductance introduces what is known as damping and the efficiency is again low. It will be understood, of course, that in order to operate the receiving apparatus, there must be a certain number of turns of the tuning inductance in circuit. In practice the best possible results are obtained when the natural wavelength of the aerial is from two-thirds to three-quarters the wavelength which it is desired to transmit or receive.

**“Perfect Reception”**  
**GUARANTEED**  
 WITH OUR  
**REPAIRED VALVES**

Whenever your valves burn out or filaments are damaged in any way  
**Send them to us**  
 We repair them equal to new.

**DON'T DELAY**

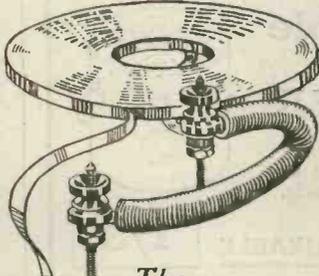
*The actual valve you send us is repaired  
 :: and returned to you within 7 days. ::*

PRICE	POSTAGE	PRICE
<b>6/6</b>	<b>3d.</b>	<b>6/6</b>
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Manufactured under  
 Patent No. 25976/22

**DON'T LOSE  
 SIGNAL  
 STRENGTH!**

*The*  
**AMPLIFYTONE AERIAL**

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