

The **Wireless** 6^d **Constructor**

RADIO CONSULTANT-IN-CHIEF CAPT. P. PECKERSLEY M.I.E.E.

Vol. XI.

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No. 54.

READ ALL ABOUT THE NEW
WIRELESS CONSTRUCTOR
"EXTENSER" SYSTEM

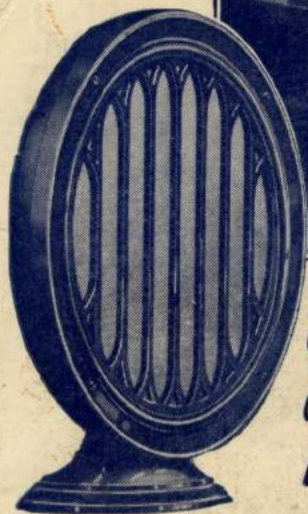
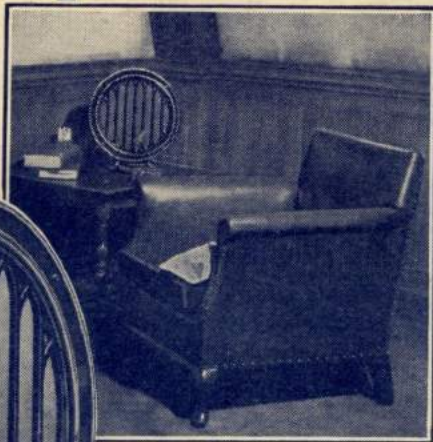
*In this
Issue*



**"THE GREATEST CONTRIBUTION TO SIMPLER
RADIO SINCE BROADCASTING BEGAN"**



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The graceful lines of the B.T.H. Cone will enhance the appearance of any room.

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Fit a B.T.H. Pick-up and Tone Arm to-day. You are not getting the best from your gramophone until you play your records this way.

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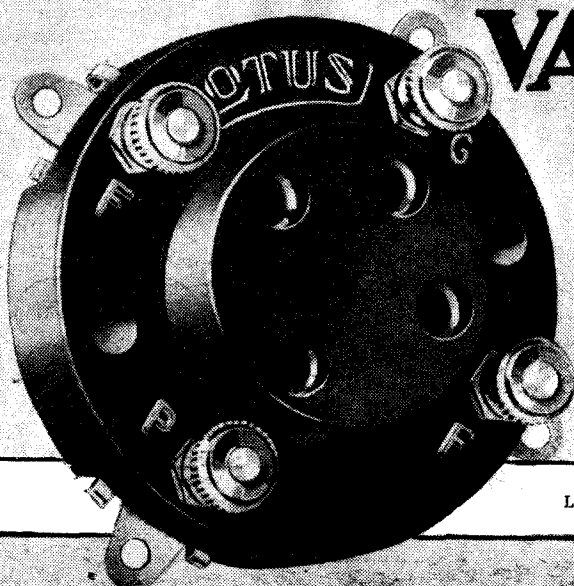
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As some of the arrangements and specialities described in this Journal may be the subject of Letters Patent the amateur and trader will be well advised to obtain the permission of the patentees to use the patents before doing so.

Chief Radio Consultant:
Capt. P. P. ECKERSLEY, M.I.E.E.



LOTUS MINIATURE ANTI-MICROPHONIC VALVE HOLDER



SPECIFIED IN THE "KILOTRAP"

The Lotus Miniature Type Anti-Microphonic Valve Holder is only 1 1/2 in. in diameter, and has all surplus metal removed from between the valve legs; the phosphor bronze springs and leg sockets being all in one piece. Made from finest bakelite mouldings, this valve holder is almost indestructible.

Price (with or without terminals), 1/6.

Also Anti-Microphonic Model (with terminals), 1/9; (without terminals), 1/6; and Rigid Type Valve Holder (for A.C. Valves) (with terminals), 1/-; (without terminals), 9d.

From every Wireless Dealer.

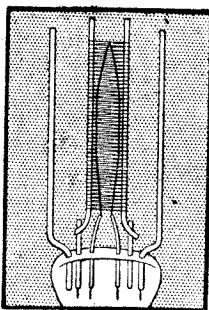
LOTUS RADIO, LTD., LOTUS WORKS, MILL LANE, LIVERPOOL.

210 H.L.



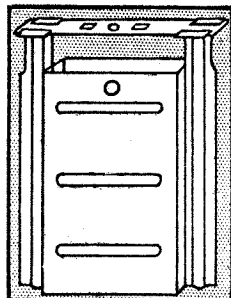
Designed for more efficient H.F. Amplification

The New Cossor 210 H.L. affords to all users of non-screened grid Receivers an opportunity of materially improving the performance of their Sets. Its favourable grid current characteristics enable it to give an unusual degree of H.F. amplification without the use of grid bias. Its advanced constructional features (described in detail below) result in great mechanical strength, which ensures exceptionally long life. And, by employing the famous seven point system of filament suspension the New Cossor 210 H.L. is rendered definitely non-microphonic. The use of this valve will considerably increase the efficiency of any non-screened grid Receiver.



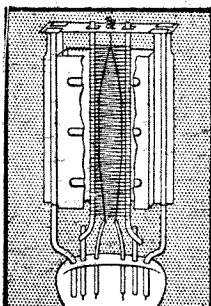
SEVEN POINT SUSPENSION

Practical experience has shown that the Cossor 7 point suspension system definitely eliminates microphonic noises. This system is employed in the support of the exceptionally long filament of the Cossor 210 H.L.



MICA BRIDGE MOUNTING

Permanent alignment of the electrode system is ensured by a stout mica bridge which forms an integral part of the anode assembly. When finally secured in position the whole structure becomes one interlocked unit.



UNIFORM PERFORMANCE

The Cossor mica bridge construction permits no variation of characteristics due to differences in inter-electrode spacing. Complete uniformity of performance is therefore ensured between all valves of the same type.

The new Cossor 210 H.L. 2 volts, .1 amp. Impedance 22,000. Amplification Factor 24, Mutual Conductance, 1.1 m.a./v. Anode voltage 8/6 75-150. Price

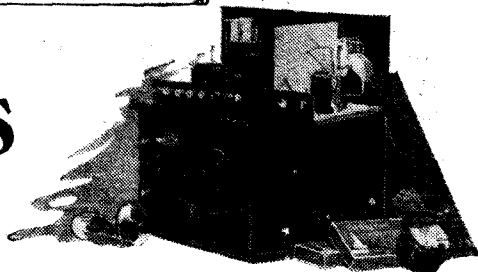
THE NEW COSSOR 210 H.L.

Be sure to get one of our novel, circular Station Charts, which give identification details of nearly 50 stations with space for entering your own dial readings. Ask your dealer for a copy, price 2d. or send 2d. stamp to us and head your letter 'Station Chart W.C.'

The WIRELESS CONSTRUCTOR

Published by the Amalgamated Press, Ltd., Fleetway House, Farringdon Street, London, E.C.4.

THE EDITOR'S CHAT



Introducing the New "Extenser" Tuning System—Making Radio Simpler and Surer.

IN this issue of the WIRELESS CONSTRUCTOR readers will find the first details of the "Extenser" system for simpler radio. This system, as you will see from the special articles describing it, is wonderfully wide in its application. It is not a system only for the benefit of the experimenter and the amateur set builder, but it is definitely one which can be applied with tremendous advantage to every kind of set.

Entirely New Development

The "Extenser" condenser is an entirely new development; and just as our "Explorer" coil, despite its admittedly more limited appeal, has been adopted by the trade with considerable success, so we are arranging that the "Extenser" shall in due course be placed upon the market and be made widely available in a commercial form.

The "Extenser" is a completely new thing for the trade, besides being an entire novelty for the home-constructor. Of course, a condenser is not

particularly easy to make, but I feel certain that from the details given in this issue many readers will be able to build "Extensers" for themselves.

Details are also given this month of the first set to include the "Extenser" condenser.

This two-valve set is fully described, and you will see for yourself how its potentialities are enormously increased by the inclusion of the "Extenser" condenser.

Another set in this issue which I feel will make a wide appeal is the "Kilotrap." This is a special short-wave receiver with which the Research Department have been experimenting for some time. It has now emerged from the test room with flying colours—and, in fact, arrangements have been made for special short-wave test transmissions from one of the best-known short-wave stations in the world, viz., Nairobi.

Thanks to the co-operation of the directors of this station, I shall be able in next month's issue of

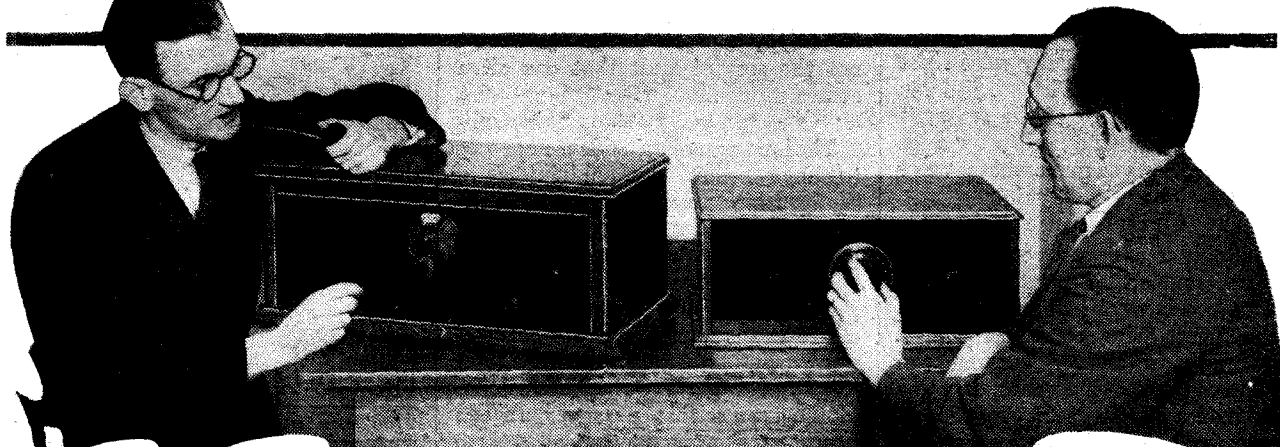
the WIRELESS CONSTRUCTOR to give a full time schedule of the tests which will shortly take place.

No Immediate Relief

The meeting of the Union Internationale de Radio Fusion, which has just concluded at Semmering, Austria, resulted, as we forecast, in few, if any, immediate benefits for the much-troubled listener. In reality, this meeting was for the preparation of an agenda for the full meeting of the conference at Madrid in 1932.

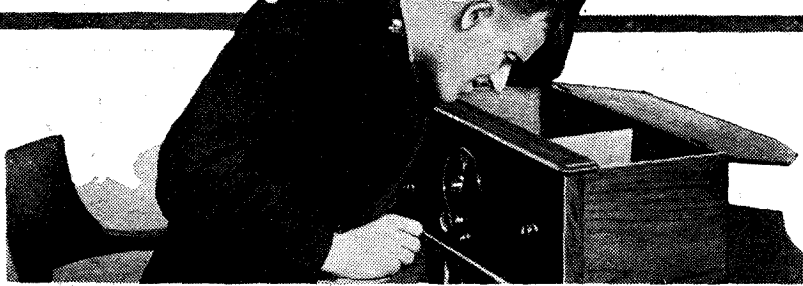
But one thing was arranged, and that was that during the next few months a series of tests will be carried out in which members of the Union in fifteen European countries will undertake to measure the field strength at which some 30 of the principal European broadcasting stations are received in their countries. It is hoped that the data collected from these tests will lead to a solution of the problems of interference created by the ever-increasing power and number of broadcasting stations.

MODERN RADIO'S MOST REMARKABLE SIMPLIFICATION



The old and the new—on the left is a wave-change set of the old type with a special switch for wave-band changing, and on the right is the new order of things: a receiver embodying the new "Extenser." Read all about this wonderful new system on page 337.

QUEER QUERIES



Some suggestions about unusual radio faults that may help you towards better reception.

By P. R. BIRD.

Can you guess—without looking at the answer lower down on this page—what was the cause of the following fault?

The set was a new three-valver. It had H.F. and det. stages tuned by a drum-drive condenser. It looked very “posh,” and was very loud and very clear.

It was being “tried out” without a cabinet, and stood on a low box, 2 ft. from the floor, so that its owner could look down and see every screw in it.

They Would Weaken

The loud speaker was working in another room, and presently it seemed to have weakened considerably, so the set was switched over to long waves and tried on 5 X X.

Perfect at first, it seemed after half an hour or so to get weak again; so its owner went back to it, tuned in Radio Paris at splendid volume, and went back to the other room to enjoy that.

For half an hour or so everything went beautifully, and then Paris weakened badly. So the tuning was altered again, this time to Kalundborg.

Nothing could have been finer than Kalundborg at first. But soon he, too, got weaker and eventually went right out!

So then the owner of the set went back—and found the fault after a lot of trouble. Can you guess what it was?

Quite Simple!

Probably not, unless you have had similar trouble, for it was a queer fault. This is what had happened.

The drum-drive condenser had a screw adjustment for varying the tension of the moving vanes, and this was inadvertently set very loose. Although one set of the vanes would “stay put” for a time, they tended to very slowly swing round and open out,

thus altering the tuning of this section.

Sometimes they would hold firm for half an hour, and then slowly swing away and detune the set. It would probably have been noticed immediately on an old set by the altered dial reading, but when looking down over a new set there was no indication, the movement being imperceptibly slow.

Once found, of course, it was put right in a second by tightening the adjusting screw. But it was certainly

IS YOUR SET O.K.?

If you are puzzled by a radio problem remember that the “Wireless Constructor” Technical Queries Department is fully equipped to help you.

Full details of the service, including scale of charges, can be obtained on application to the Technical Queries Department, “Wireless Constructor,” Fleetway House, Farringdon Street, London, E.C.4.

SEND A POSTCARD, on receipt of which the necessary application form will be sent by return.

LONDON READERS, PLEASE NOTE. Application should not be made by telephone, or in person at Fleetway House or Tallis House.

not the sort of fault that one often comes up against.

* * *

The long arm of coincidence appears to have been busy at Tipton, in Staffordshire, for a WIRELESS CONSTRUCTOR reader there tells of an experience which he and his friend had with wave-change switching. The sets were of different types, one a two-valver, and the other a three-valver, but both incorporated one of the three-way wave-change switches of the type with a plunger. In one position this connects all three contacts, and in the other it separates them all for the long waves.

Both sets worked well at first, but after a time both became faulty, and the medium wave-band seemed inoperative. No matter in which position the switch was put, only the long-wave stations could be heard.

The curious fact that *two* sets should have the same fault rather fogged the issue at first, but in the end it was found that both were suffering from indifferent switch contacts. In one case it was the switch itself, which failed to make a good strong contact when in the short-wave position; the spring being weak and contacts being very chancy.

Watch for These

And in the other case the flex lead which was used to connect the plunger to the short-wave coil had broken through, and consequently the circuit was “open.”

In all such switch contacts where there is continual movement or where a flexible lead is employed these are possibilities which should be watched for. The moral is that contacts are all the better for an occasional examination and overhaul to make sure of correct connection.

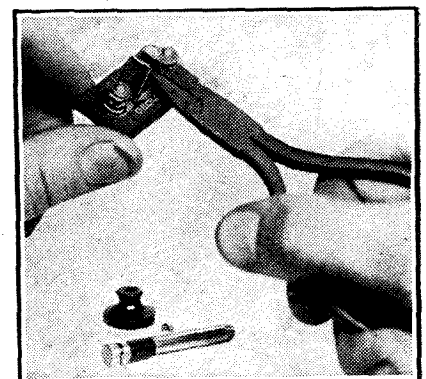
A Nasty Fizzle

“I’ve had fizzles before,” says a querist, “but this one was a *nasty* fizzle.”

Its speciality was a very peculiar one, for this observant reader noticed that it only got troublesome on strong signals. Any loud programme would cause the trouble, which disappeared when the programme was tuned out.

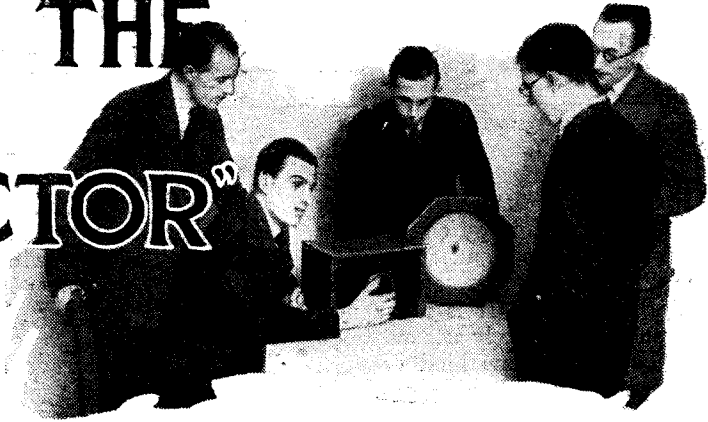
He tried changing things, and eventually he came to the conclusion it was the grid condenser. Tests proved that he was right, and that something inside this was “wonky” on loud signals, but appeared O.K. otherwise. Very tricky!

“A STITCH IN TIME . . .”



This constructor is tightening up the springs of his on/off switch before mounting it on the panel. He knows how loose springs can cause the most awful crackles and crashes.

ALL ABOUT THE "WIRELESS CONSTRUCTOR" EXTENSER SYSTEM



"THE GREATEST CONTRIBUTION TO SIMPLER RADIO SINCE BROADCASTING BEGAN."

READ ABOUT IT IN THIS SPECIAL ARTICLE BY VICTOR KING.

In introducing the new Extenser system to the WIRELESS CONSTRUCTOR readers I find it extraordinarily difficult to suppress the temptation to indulge in two or three pages of enthusiastic prologue. Indeed, I have already started this article about a dozen times, and on each previous occasion there was the keenest tendency for my typewriter to run away with itself!

A New Era

But this time I'm determined to get down to business as quickly as is humanly possible. You see, I realise that you will not thank me at all for wasting space on unnecessary words.

WHAT THE EXTENSER DOES

- (1) Simplifies Set Building.
- (2) Simplifies Set Operation.
- (3) Increases Receiver Efficiency.
- (4) Eliminates Wave-change Switches.
- (5) Enables One Set of Dial Readings to Cover Both Long and Ordinary Wave-lengths.

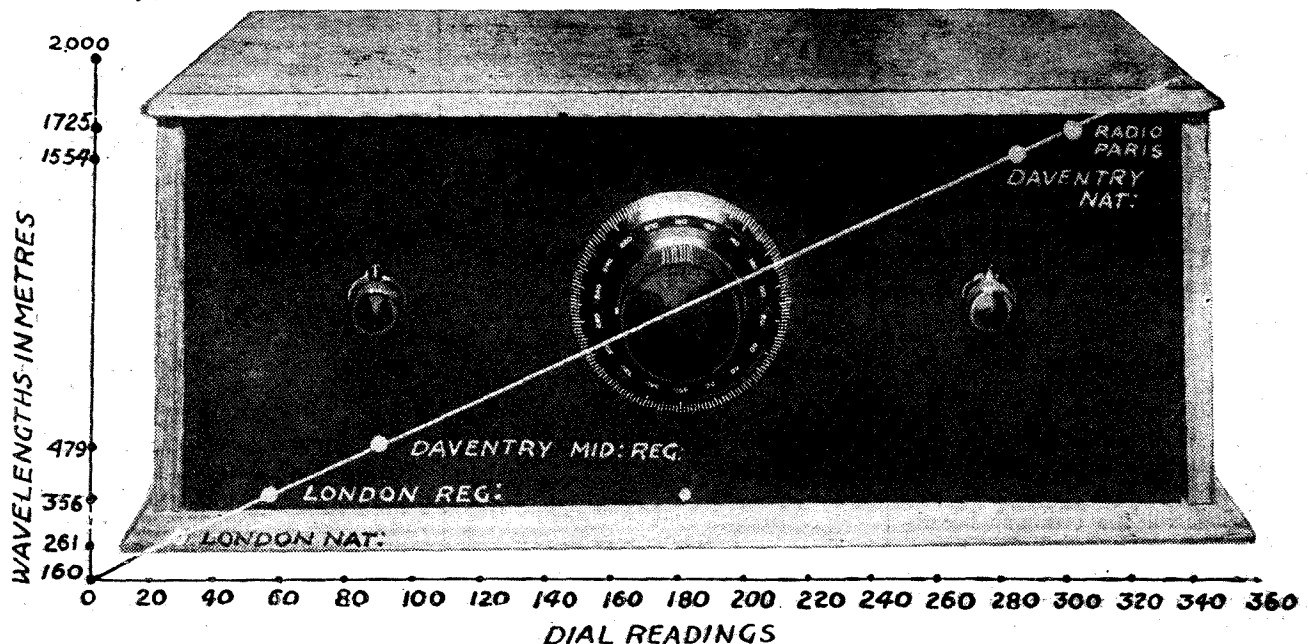
AND THE EXTENSER IS APPLICABLE TO EVERY SET IN THE LAND—CRYSTAL OR VALVE.

You want to know exactly what this Extenser system is and what it does, and, having obtained this knowledge, you will then be able to judge for yourselves whether or not we are justified in regarding "Extenser" as a word that denotes a new era in radio-set design.

Universal Agreement

Personally, I have no doubt at all as to the result. I feel we have something about which there can be no argument, no controversy, nothing but complete unanimity; except, perhaps, on the part of a few reactionaries who resent change of any kind. And I am convinced that we number

THE LONG AND SHORT WAVE-BANDS ARE WELDED INTO ONE



Your tuning dial becomes the true and only station selector when you use an Extenser. Without touching anything else at all, one complete rotation of the Extenser dial takes you through both wave-bands.

All About the "Wireless Constructor" Extenser System—continued

mighty few of these among the WIRELESS CONSTRUCTOR readers.

Well, here goes. The Extenser system is centred in an entirely new component evolved and designed in the WIRELESS CONSTRUCTOR Technical Department. It is not a new component that merely sets out to do a bit better the same kind of work that can be done by any existing device. It does things that no other component is able to do at all.

Simplifies Set Construction

The new component is the Extenser condenser, and if it strikes you as a simple sort of object to make such a fuss about, so much the better. Every worth-while contribution looks like that at first sight, and the Patent Office is lumbered up with beautifully complicated intricacies that are far

refer to two entirely different sets of dial readings. Fifty degrees, for example, won't stand for either London or Daventry 5 X X according to the position of a switch.

Full Range Dial

You will be able to cover both the long and medium wave-bands merely by rotating the one tuning dial. And the only other essential panel fitting will be the on-off switch. That, I fancy, is practically the ultimate, the ideal of simple radio.

The WIRELESS CONSTRUCTOR Extenser condenser is a full-range variable. That is to say, its moving vanes rotate through 360 degrees instead of the usual 180 degrees. Over one-half of the rotation you are on the medium wave-band, but immediately you turn the vanes into the other

the ubiquitous portable can benefit just as largely.

It doesn't matter what kind of switching is necessary, the Extenser self-changer will do it—providing the right model is employed. And, of course, it may be necessary in the very distant future to have one or two different switch movements to cover all requirements.

But that is a simple variation of detail and doesn't affect the main structure.

The Extenser is completely compensated for both wave-bands. It is "logarithmic" throughout.

Logarithmic Action

You know what logarithmic action implies, no doubt. In brief, it means that the variable condenser adds capacity to the circuit in such a manner that the stations are evenly placed around the dial. There is no crowding at one end of the scale and a widening out at the other.

You get this evenness completely and absolutely with the WIRELESS CONSTRUCTOR Extenser condenser. But this unique component embodies a second great practical advantage. The automatic switching has no appreciable effect on the smoothness of the adjustment. And the switching is definite and final. There are no wasted degrees to bring it into operation, no click, no relay, nothing to impede a perfect glide from the one set of stations to the other.

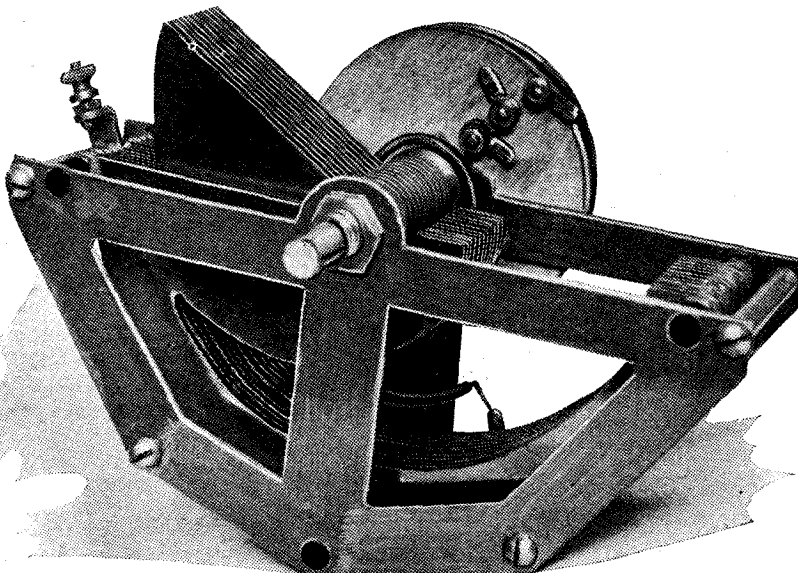
Not Expensive

And what of the cost of this device? That will, no doubt, be the first question occurring to mind. Well, Extenser condensers should cost no more than ordinary condensers plus the cost of a wave-change switch of an effective character. It should add nothing at all to the cost of a set. And in the future, when Extenser condensers are being widely manufactured, they should cost far less than present condensers of ordinary type, owing to the fact that their designs will be very much more universally standardised.

In the meantime, those of you who are handy with metal-working tools will be able to make these unique components yourself and actually save quite a bit on every set you assemble.

Extenser condensers also render the construction of receivers even

HERE IS THE EXTENSER



This is the original model entirely built in the "Wireless Constructor" workshop with no other tools than those commonly used by home-constructors. It is a perfectly straightforward component free from complications, as you can see. The three terminals on the circular plate at the back entirely replace a wave-change switch.

too involved in design ever to be practical propositions.

The Extenser condenser is whole worlds removed from things of that nature. It simplifies radio-set construction and operation without being anything but simple itself.

It brings all the ordinary broadcasting stations on to one dial. When your set is fitted with an Extenser condenser, as I presume will all British sets of the future, you won't have a wave-change switch to fiddle about with, and you won't have to

180-degree area a switch is automatically operated by the condenser itself and the tuning circuit is switched over to long waves with no other indication of this than the increasing dial readings!

Absolutely No Snags

There are no snags at all, and any kind of coil-switching can be carried out quite automatically. And this applies to the most complicated multi-valve receiver just as much as it does to the simplest crystal set. Even

All About the "Wireless Constructor" Extenser System—continued

simpler than they are already. In the first place, an Extenser replaces one ordinary variable condenser, and one, or possibly two, wave-change switches. So you see there is at least one less component to mount on the panel. In cases, only one hole to be drilled instead of a minimum of two.

Secondly, there is a gain in the wiring. It may frequently be found that a lead or two is saved, while

receiver with two or more tuned circuits.

No Wave-Change Switches

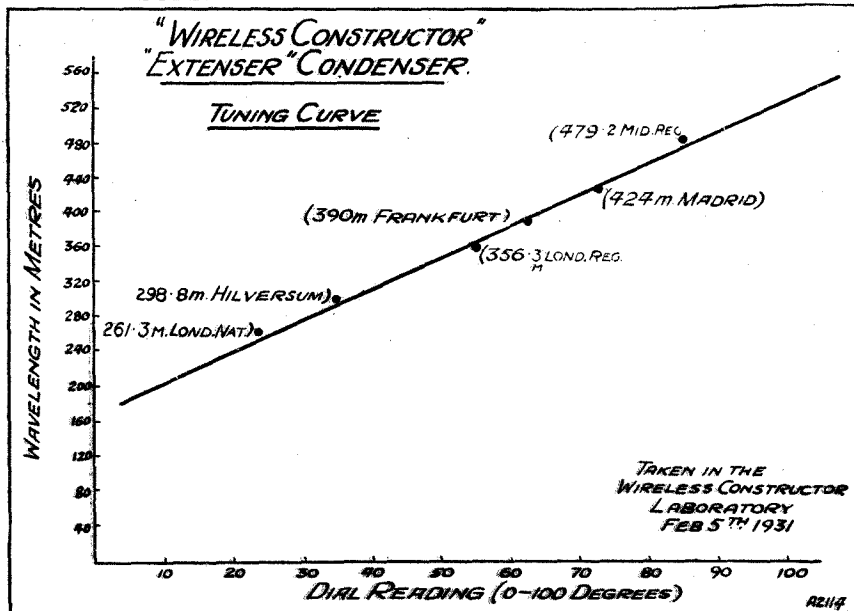
At times the designer resorts to a number of wave-change switches dotted along the panel. At other times the above-mentioned switch ganging is introduced. The Extenser sweeps all these clumsy expedients aside and takes the wave-change

mechanism right to the very points where it should be carried out in order to reduce H.F. losses to the barest minimum.

It's simplification, simplification all the way with the Extenser, and the more closely you examine the thing for snags the more gilt-edged advantages you seem to find!

Now for the Extenser's applications. To these there appear to be no limits at all. No radio set is complete in these modern times unless it is capable of covering both the medium and the long waves. And that means that any set not possessing Extensers is a definitely "minus quantity," as far as I can see it.

STRAIGHT-LINE TUNING THROUGHOUT



This is a particularly interesting diagram. It shows a tuning curve taken with the NEW HALF of the Extenser. The other half is of quite conventional wave shaping. Note how marvellously straight this curve is, and remember you get just as good results when the instrument is applied to long waves.

Fits Any Set

The Extenser can embody any kind of switching, from the simplest to the most complicated. A very elementary form of the Extenser is all that the modest crystal receiver needs.

Any existing set can be adapted to the Extenser system with the greatest of ease. If it already possesses some sort of panel wave-change all you have to do is to remove its present tuning condenser (or condensers) and its wave-change switch (or switches), mount a suitable Extenser and replace the wiring. It is the sort of job the average home-constructor could do in an hour or less.

With sets not already embodying some kind of wave-change the operation is a little more difficult. And,

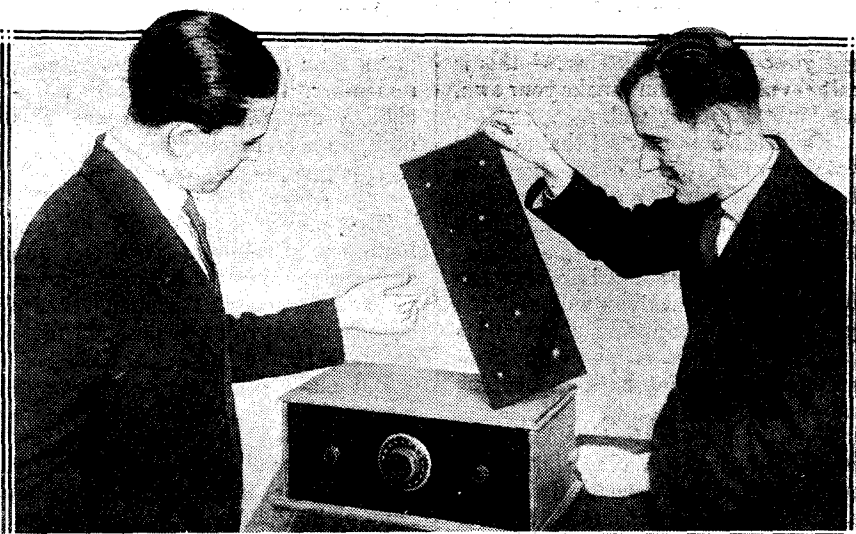
always the wiring will be simplified and some of the wires shortened. Incidentally, this will often mean greater efficiency. It can never mean the slightest loss of efficiency.

But when we come to the employment of two or three Extensers in one set the gains are vastly greater. There is not the slightest need for complicated schemes of ganged wave-change switches when Extensers are used. Each Extenser is its own wave-change. And, of course, the Extensers themselves can be ganged as easily as any other type of tuning condenser.

Very Great Gain

It will be quite unnecessary for me to enlarge on the technical advantages of Extensers in sets employing several tuned circuits. Here the gain may be very great indeed. Hitherto one of the knottiest problems in radio set design has been wave-changing a

MAKES SETS EASIER TO BUILD



Far from introducing complications, the "Wireless Constructor" Extenser condenser even makes set-building easier. There are fewer panel holes to drill, and often fewer wires to connect, and that makes for greater efficiency in working.

All About the "Wireless Constructor" Extenser System—continued

anyway, most such sets will be rather old and could well be replaced or rebuilt for other reasons than that of getting to grips with this WIRELESS CONSTRUCTOR Extenser business!

When you come to the construction of a new set, the matter is still more straightforward. You just use Extensers instead of ordinary tuning condensers and wire up accordingly. I believe all future WIRELESS CONSTRUCTOR sets are to be described for both Extenser and ordinary condenser constructions until such time as Extensers are quite universal.

No Need to Wait

I want to make the next point very clear, and I hope you will read the following paragraphs closely. It is inevitable that some little time must elapse before Extensers are widely

fixed and moving vanes. That we have proved. Individual manufacturers will be able to vary the vane forms to suit their own individual requirements. Some firms may like to produce very compact Extensers, and

**YOU CAN USE
EXTENSERS IN
ANY SET—
CRYSTAL OR
VALVE**

they will be able to do so quite easily. We made our model on fairly substantial lines so that its operation could very clearly be demonstrated.

pigtail so that a permanent connection results. You will see a pigtail in the original model if you examine the photographs.

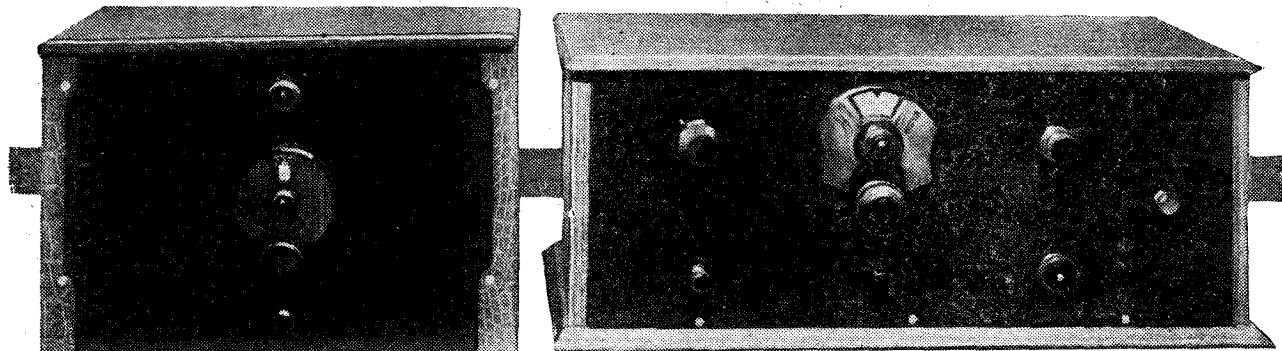
A definite stop is arranged, and at one certain point on the dial you turn one way into minimum long waves and in the other into minimum short waves. If you prefer it your Extensers can turn into maximums. Once again we have a feature that is elastic! Are you beginning to see how truly remarkable this Extenser is?

Extension of Trade

Slow-motion movements can be fitted as with any ordinary type of tuning condenser, and a direct drive provided so that you can swish through the stations as rapidly as you wish.

A slightly more elaborate Extenser is possible where a zero dial reading

THE NEW STYLE COMPARED WITH THE OLD



You will always want a station-selecting device on your set, and a switch for switching the set on and off is a necessity. The only other control that may retain its place on the panel is a volume control. You are now able to achieve this "ultimate" in set by using a "Wireless Constructor" Extenser. A set using one is shown above to the left and, for comparison, is lined up against a "multi-knob" outfit embodying ordinary panel wave-change.

marketed. But you need not hold up your set building until you are able to get your hands on Extensers—this is all providing you don't make your own, as doubtless many will.

Build the next new set that appeals to you, even if you cannot get Extensers. It will be an easy matter to make the change-over at some future date.

Now for a few words about the Extenser itself. As you will see from the curve that appears a few pages back, the action is perfectly logarithmic throughout both the tuning ranges it covers.

This remarkable feature has been made possible by a very skilful and scientific shaping of the fixed vanes.

But working on the same lines, it is possible to obtain a similar effect by other patterns of either or both

Even so, it occupies little more space on the panel and behind the panel than the average variable, and, remember, there is no panel wave-change switch, so the space this occupies is completely saved.

Truly Remarkable

The movement of the original Extenser is velvet-smooth, and the switch design is such that only an even resistance, such that actually renders its operation more pleasing and more accurate, results.

But many other methods of actuating the switch mechanism are possible (by cams, etc.), and that, too, gives the individual manufacturer great freedom of action in which to express himself.

The moving vanes of the Extenser can be provided with the conventional

corresponds with the switching off of the set, thus reducing the vital panel controls to one!

The radio trade should welcome the WIRELESS CONSTRUCTOR Extenser with open arms, for it is going to mean a marvellous extension of trade for them. I do hope they will make the most of their opportunities. If they enter into the manufacture and marketing of Extensers adventurously and with courage, a colossal export trade should supplement the big sales in this country.

Why, in Germany alone there are more listeners than in this country! It does seem to me that here is a golden opportunity for us Britishers to get a little of our own back by sending a new flood of apparatus abroad to help balance our ever-growing imports.

All About the "Wireless Constructor" Extenser System—continued

I am given to understand that arrangements will be made to regulate the commercial production of Extensers so that the market shall not be flooded with cheap and nasty models. It is for this reason that patents, etc., have been taken out.

Home-constructors can make as many Extensers as they like for their own use—the Extenser was, of course, primarily designed for the purpose of giving WIRELESS CONSTRUCTOR readers something that lifts their receivers above everything else. If you can make Extensers and build them into your sets you will have the vast satisfaction of knowing that your receivers are better, more up to date, than any other in the country.

A Unique Position

A unique position for the home-constructor. He was always able to be a bit in front of the commercial set maker, but now he is given the opportunity of leaping a few miles ahead. You see, fortunately for you, and unfortunately for the set maker, it is impossible to make drastic alterations in factory productions at a moment's notice.

It will no doubt be some time after Extensers are freely available for home constructors that set manufacturers will be able to switch over their designs.

I must not forget to add that the WIRELESS CONSTRUCTOR will not refuse to allow any reputable manufacturer to make Extensers. Certain of our trade friends are already getting down to the job, and the WIRELESS CONSTRUCTOR welcomes inquiries from all those others who may be interested in this wonderful new proposition.

As I have already said, it is essential that they should take this step before they go into production.

Ready for the Show

We have purposely delayed the introduction of the Extenser so that it shall coincide with a period when stocks of existing condensers should be fairly low. The trade can be ready for the next show at Olympia with this new component, while the ordinary types will be absorbed in what I can term the "interim" designs due to this and other journals.

It is inevitable that the period of transition from normal tuning methods to the universal adoption of Extensers (which, as far as I can see,

is sure to come) should be a wee bit difficult. There may be those in the trade who will accuse us of "springing" something on them, but to that I would answer that there will be no sale for anything but ordinary variable condensers until there is a big demand created for Extensers. And that demand won't occur until after we have told WIRELESS CONSTRUCTOR readers and their friends all about them.

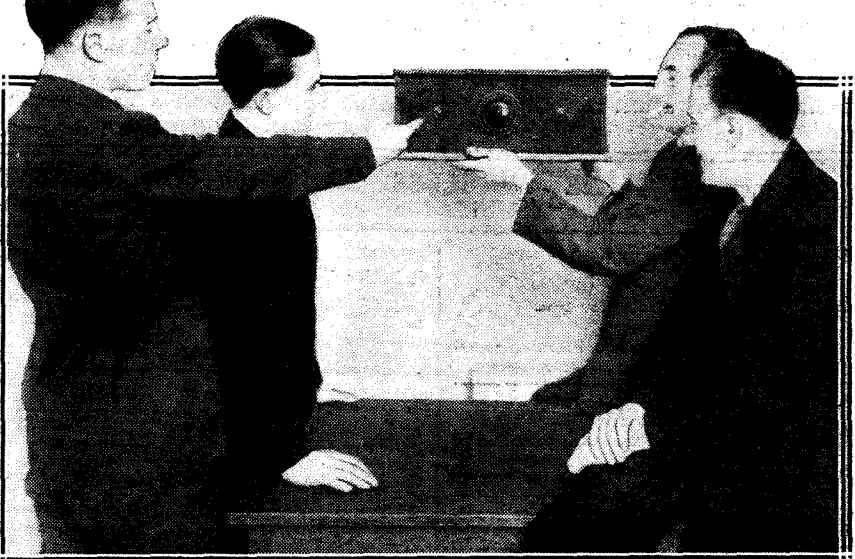
I don't think there is anything more that I want to say in this introductory article. You will find all the constructional details of the original Extenser in other pages. But I would just like to add this: There may be some of you who view a reduction of panel controls with some misgivings, thinking, perhaps, that you must be losing something somewhere in the process.

And then underline in your mind and ponder over the banishment of one set of dial readings, and the beauty of having all the stations, long and medium wave, all on the one set of continuous readings—one tuning curve for all waves, if you like!

The Ideal Set

It makes the "household" set a vital practicability. All its front panel need hold is one tuning dial—and that will always be necessary, you must be able to select your programmes—one switch to turn the outfit on and off, and, perhaps, a reaction control masquerading as a volume control. That's all. What an easy team to explain to "Grammie"! Your instructions for handling the set then need only be: "You just turn and push the things till you get the

A TRIUMPH FOR HOME-CONSTRUCTORS



Only the "Wireless Constructor" Extenser condenser makes possible the great advance in set simplification that is exemplified in the "Extenser" Two, which is described in detail elsewhere in this issue. The home-constructor is thus able to leap right ahead of the commercial set maker.

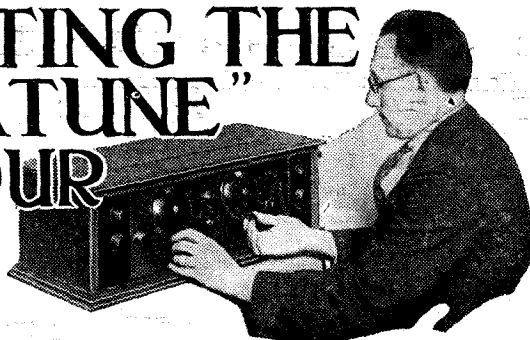
I know that feeling; it is common among all enthusiastic radio fans. I get it when I contemplate the ganging of tuning condensers. But set your qualms at rest—if you have any. There is nothing whatever to be gained in having a separate wave-change switch. Re-read the earlier parts of this article, the parts where I attempt to show how great are the advantages following the elimination of the old and clumsy method of going from one wave-band to another.

music you want. You can't do any harm providing you don't use a hammer."

And there will be no danger of someone pushing in a wave-change switch instead of the "on-off" and leaving the set running down its batteries all night. "On-Off," "Volume," "Tuning," that's all there'll be on the panel. And there'll be the full advantages of both wave-bands without any one of their usual snags.

OPERATING THE "PARATUNE" FOUR

Last month full constructional details of this remarkable four-valve set were given, and on this page the operating chart containing all the details about accessories, controls, etc., is shown.



LAST month in the article on the "Paratune" Four you will remember that the operating panel was promised for this month. You will find it below on this page.

Inside the Set

You will remember that these operating panels, which are given for all the large sets in the WIRELESS CONSTRUCTOR, are the outcome of one of the meetings of the Ideas Committee, and are intended for cutting out and fixing on the inside of the set's cabinet lid. In the November last issue of the WIRELESS CONSTRUCTOR a special mounting frame was described for them, which, together with the chart, greatly improve the general effect of a set.

With all the vital details about operation, accessories, etc., inside your set, you need never worry about mislaying the issue in which the set was described. All the information you may require at some time or the other is ready for reference immediately.

But quite apart from the advantages of enabling you to give a desirable finishing touch to your set, and to have operating details to hand at a moment's notice, this method of presenting operating instructions has another big advantage. That is, the quickness with which you can look up any point.

You do not have to read through a long article to find out where the flex lead on such-and-such a component

goes, only to find what you want in the very last paragraph. Everything is tabulated out so that you can ascertain any such detail in a moment.

In order to keep the information as brief as possible in the operating panel of the "Paratune" Four recourse has been made to two small sketches, one showing the controls on the panel, and the other the flex leads, coil holders, etc., inside the set. These sketches save long wordy descriptions of the control or lead under consideration.

Mains H.T. Supply

Last month only the bare necessities in regard to operation were mentioned, and details of the types of valves to use, and the voltages for the various taps were not included. However, you will find everything in the operating panel.

Finally we would like to point out that the set is highly suitable for use with a mains H.T. unit, in fact it would be much more desirable to use one if possible instead of batteries. Of course, it is quite O.K. with dry battery H.T., but the latter must be of super capacity if anything like economical running is to result. With dry batteries use a small power valve and don't try to make it handle more volume than it can.

THE WIRELESS CONSTRUCTOR "PARATUNE" FOUR

Circuit: S.G.-Det.-2 L.F. Covers short, medium and long wave-bands.

VALVES

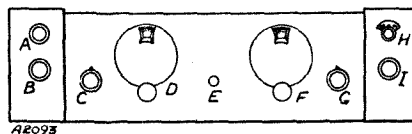
- 1st: S.G. type.
- 2nd: H.F. or special detector type.
- 3rd: L.F. type.
- 4th (nearest terminal strip): Power or super-power type.

VOLTAGES

- L.T.: 2, 4, or 6 volts, according to rating of valves chosen.
 - H.T. + 1: 50-80 volts. Adjust for smooth reaction.
 - H.T. + 2: 60-80 volts.
 - H.T. + 3: 120-150 volts.
 - H.T. + 4: 120-150 volts.
- (According to maximum rating of valves or amount of H.T. available.)

COILS REQUIRED

- In holder A (see diagram below): 250X coil for long waves, 4-6-turn for short waves.
- In holder B: 60X coil.
- In holder C: "Explorer" dual-range for medium and long waves. "Explorer" short-wave coil for short waves.



CONTROLS (see diagram above).

- A.—Selectivity adjustment for medium waves. Keep as near maximum as possible.
- B.—"Paratune" coil adjuster. Keep in step with tuning on medium waves, adjust to remove any medium-wave interference on long waves. Not used on short waves.
- C.—H.F. wave-change switch. Turn left for medium waves. Right for long and short waves.
- D.—Tuning condenser.
- E.—Det. wave-change switch. Pull out for medium waves, push in for long waves. Inoperative on short waves.
- F.—Tuning condenser.
- G.—Reaction control for all wave-bands.
- H.—On-off switch for set.
- I.—Volume control for all wave-lengths.

OPERATION

The shorting strips across the fixed condensers marked Y should be in place for medium and long waves. They are removed for short waves.

Adjust the slider of the potentiometer on the baseboard so that smooth reaction is obtained on all three wave-bands.

Join 1½-volt C.B. battery across leads 4 and 5. Positive to 4 and negative to 5.

Join positive of L.F. grid-bias battery to lead 9, and tap lead 7 into 1½ to 4½ volts and lead 8 into value of negative bias advised by makers for H.T. voltage in use.

Lead 6 goes to anode terminal on top of S.G. valve. Lead 1 goes to the particular tap on 60X coil which gives better results on medium waves.

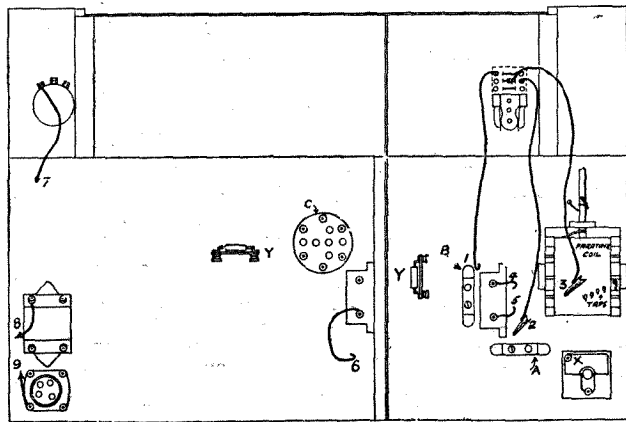
Lead 2 goes to tap on 250X coil which gives better results on long waves, and to turn on short-wave coil which gives best results when working on this band.

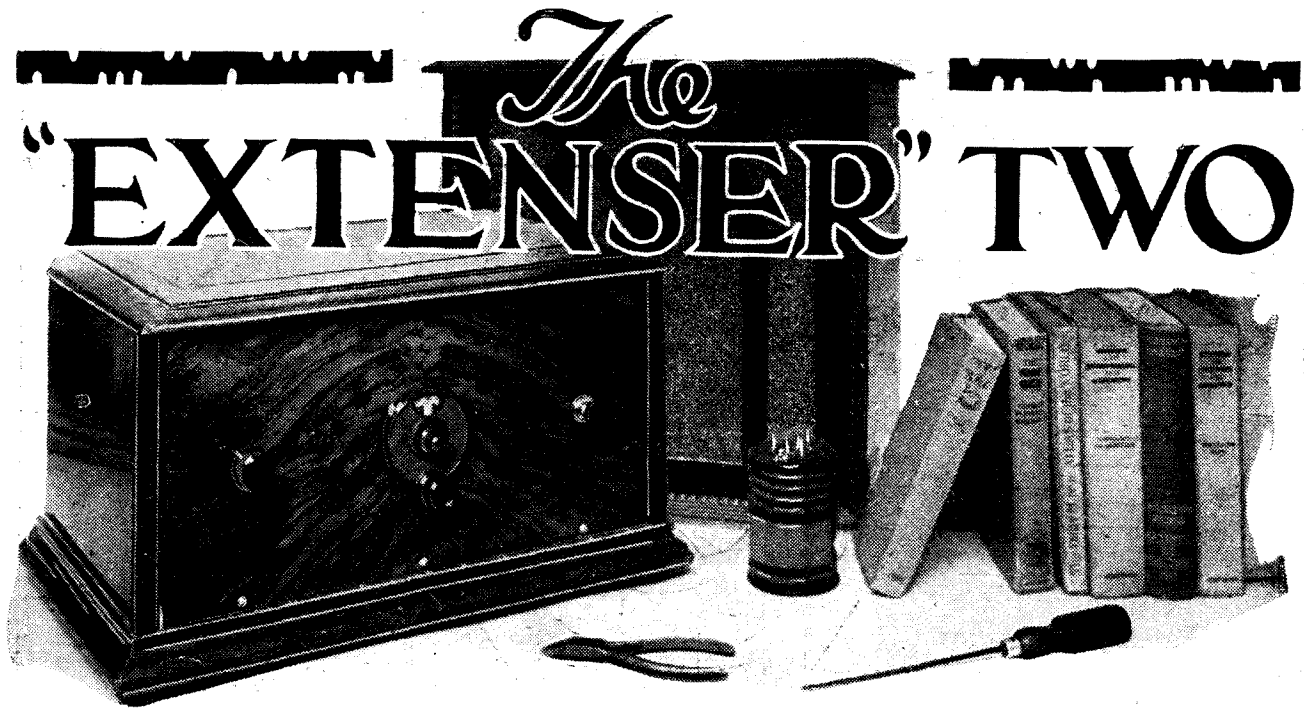
Lead 3 goes to tap on "Paratune" coil which gives best elimination of medium-wave interference on long waves, and to point X on neut.-type condenser when working on short waves.

If no medium-wave interference is experienced on long waves, put lead 3 on to "Paratune" slider when working on this band.

Adjust neut.-type condenser on short waves to ensure reaction over whole range.

Use aerial on A₂ for medium and long waves, and A₁ for short waves.





LONG waves mean extra stations, and to simplify the getting of these stations we have long ago done away with the tedious business of coil-changing and now use highly efficient wave-change switching circuits. But is that all that we can possibly do to minimise the inconveniences associated with dual-range coils?

No Wave-Change Control

Wouldn't it be rather marvellous if we could do away with the wave-change switch control and eliminate the present muddlesome business of recording two sets of dial readings on the one dial?

Picture, for instance, a single dial with which, in less time than it takes

By the "Wireless Constructor" Research Department.

Here is the wonderful "Extenser" condenser applied to a two-valve set of outstanding merit. Alternatively, you can use an ordinary '0005 tuning condenser with wave-change switch as explained, the simplicity of the alterations showing how very easily the "Extenser" system can replace the older and obsolescent method.

to say Jack Robinson, you could go from your local station to Rome on 441 metres, or to Radio Paris on 1,725 metres, without bothering yourself in the slightest degree about the position of a wave-change switch!

Just try to picture what it would be like to have a set with no wave-

change switching, no two sets of dial readings, in fact one set for all waves with no more trouble than is normally associated with a "one wave-band" set. And if you can imagine all that, then you have got a pretty good idea of the "Extenser" Two, because that is exactly what it does!

New Tuning Principle

The "Extenser" Two incorporates the great new WIRELESS CONSTRUCTOR principle of "Extenser" tuning, which is fully dealt with on other pages.

Have a good look at the circuit of this first "Extenser" set. You'll see that there is nothing complicated or unusual about it. In keeping with the whole idea of the "Extenser"

FOR THE "EXTENSER" TWO YOU WILL REQUIRE—

- 1 Panel 14 in. × 7 in. × $\frac{3}{16}$ or $\frac{1}{4}$ in. (Lissen, or Peto-Scott, Goltone, Parex, Permeol, etc.).
- Cabinet for the above panel, with baseboard 10 in. deep (Cameo, or Gilbert, Keystone, Pickett, Kay, Osborn, etc.).
- 1 '0005-mfd. Extenser. (See text.)
- 1 '0001-mfd., or any capacity up to '0002-mfd., differential reaction condenser (Ready Radio, or Polar, Lissen, J.B., Lotus, Dubilier, Igranic, Ormond, etc.).
- 1 L.T. switch (Bulgin, or Igranic, Lotus, Lissen, W.B., Benjamin, Ready Radio, Goltone, Keystone, Wearite, Magnum, Red Diamond, etc.).
- 1 "Explorer" coil with six-pin base (Wearite, or Ready Radio, etc.).

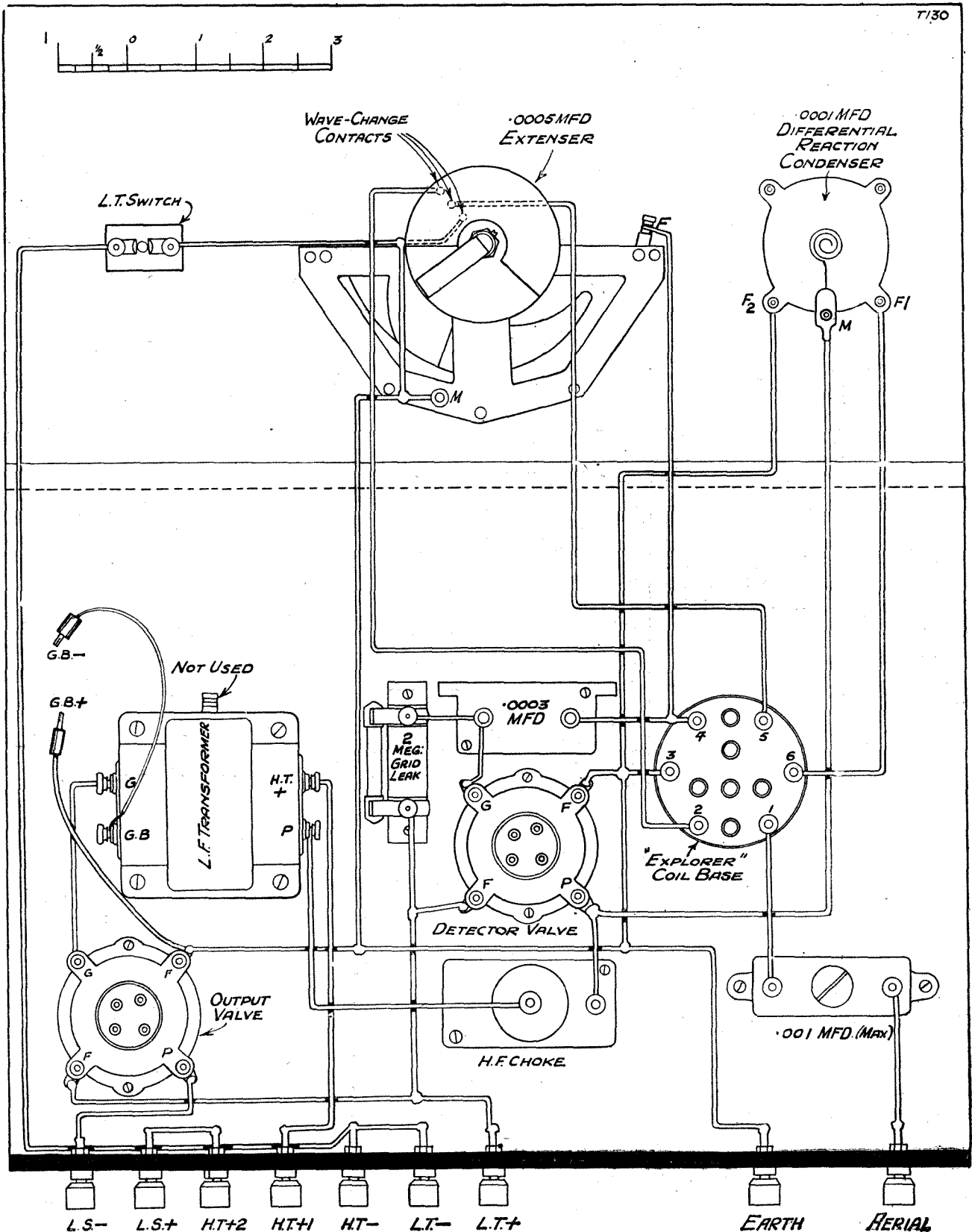
- 1 '001-mfd. max. compression type condenser (Formo, or R.I., Polar, Leweos, Lissen, etc.).
- 2 Sprung-type valve holders (Igranic, or W.B., Benjamin, Telsen, Lotus, Bulgin, Clix, Lissen, Formo, Magnum, Wearite, etc.).
- 1 '0003-mfd. fixed condenser (Lissen, or Telsen, T.C.C., Ediswan, Ferranti, Sovereign, Dubilier, Igranic, Mullard, Formo, Ready Radio, Watmel, Ormond, etc.).
- 1 2-megohm grid leak and holder (Dubilier, or Igranic, Ferranti, Telsen, Ediswan, Mullard, etc.).
- 1 H.F. choke (Leweos, or Varley, Telsen, Lissen, Ready Radio, R.I., Keystone, Parex, Magnum, Lotus, Wearite, Dubilier, Watmel, etc.).

- 1 L.F. transformer (Telsen, or Lotus, Ferranti, Lissen, R.I., Igranic, Varley, Leweos, Mullard, etc.).
- 9 Engraved type terminals (Belling & Lee, or Clix, Eelex, Igranic, etc.).
- Strip of ebonite 14 in. × 2 in.
- Wire, flex, screws, wander plugs, etc.

If you make the modified version you will require in place of the Extenser:

- 1 '0005-mfd. variable condenser, slow-motion type, or with vernier dial (J.B., or Lotus, Lissen, Dubilier, Ready Radio, Polar, Ormond, Igranic, etc.).
- 1 Three-contact type wave-change switch (Red Diamond, or Ready Radio, Bulgin, Wearite, Keystone, Magnum, etc.).

The "Extenser" Two—continued



Note the simplicity of wiring that results from fitting the Extenser. Refer also to the diagram on page 346.

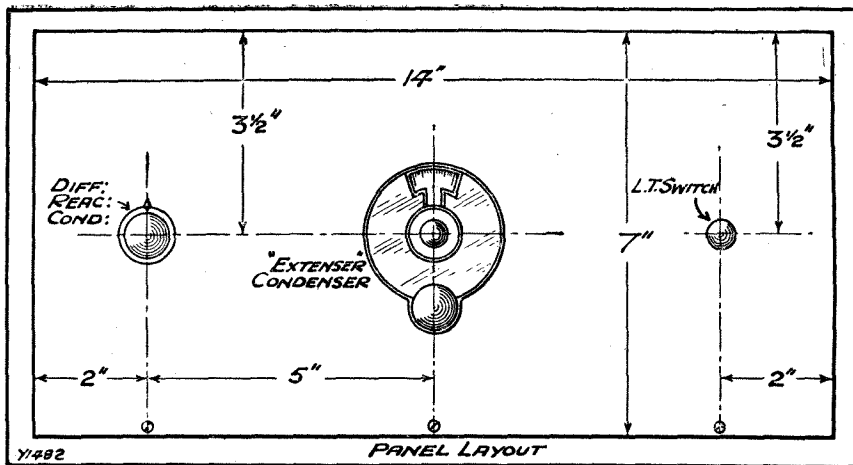
THE "EXTENSER" TWO

—continued

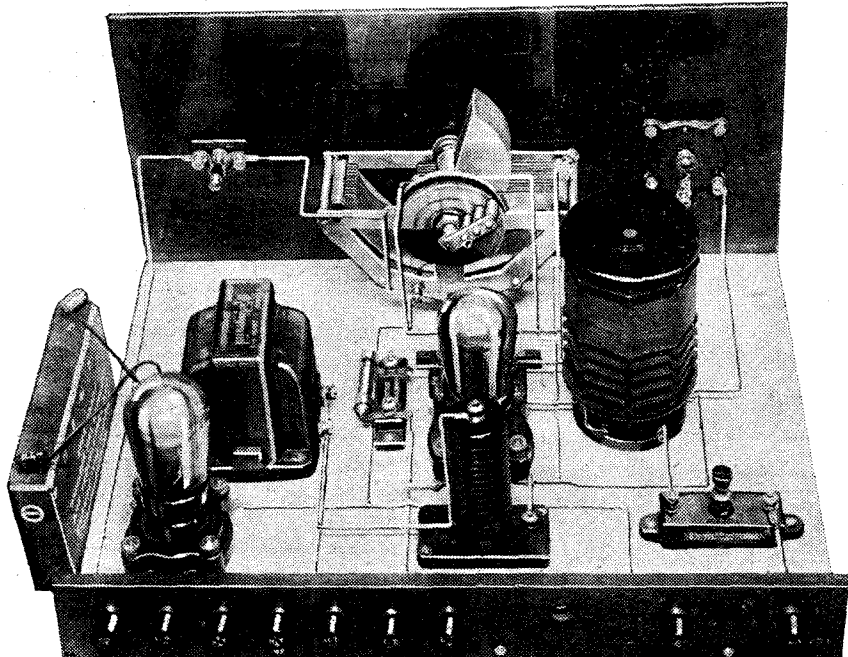
principle of Simpler Radio, it is about as "frill-less" as could possibly be imagined. And yet, with all this, it is a surprisingly efficient two-valver.

You simply must try the "Extenser" scheme, and we'll warrant that after your very first experience with it you will never want to return to the present-day principle of wave-change switches and ordinary variable condensers!

The only likely difficulty in the



SWITCH AND CONDENSER IN ONE



Even the panel is simplified, for the "Extenser" condenser incorporates the wave-change switch.

will make sure of being early in the field!

Partly for the benefit of readers who are looking for a good two-valver, and who at the moment do not wish to wait for an "Extenser," but mainly for purposes of comparison, we are publishing in addition to the ordinary wiring diagram another diagram in which the alternative connections for an ordinary wave-change switch and variable condenser are shown.

This latter diagram is drawn in a similar way to the principal wiring diagram, so that you can easily compare the two, when the modifications will become quite clear. But that is just by the way.

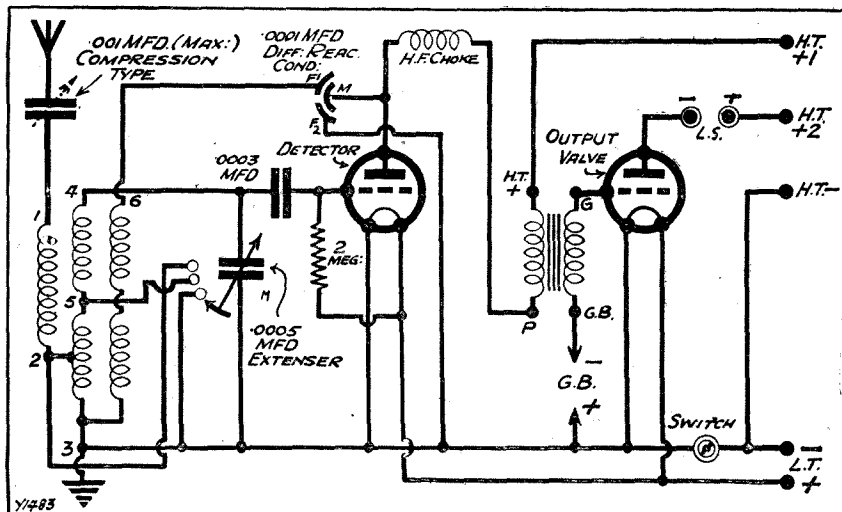
To return to the "Extenser" Two, a full list of the parts required, together with makes used in the

Hardly any extra space is required behind the panel, for the moving vanes, in any case, would "swing out" to the left.

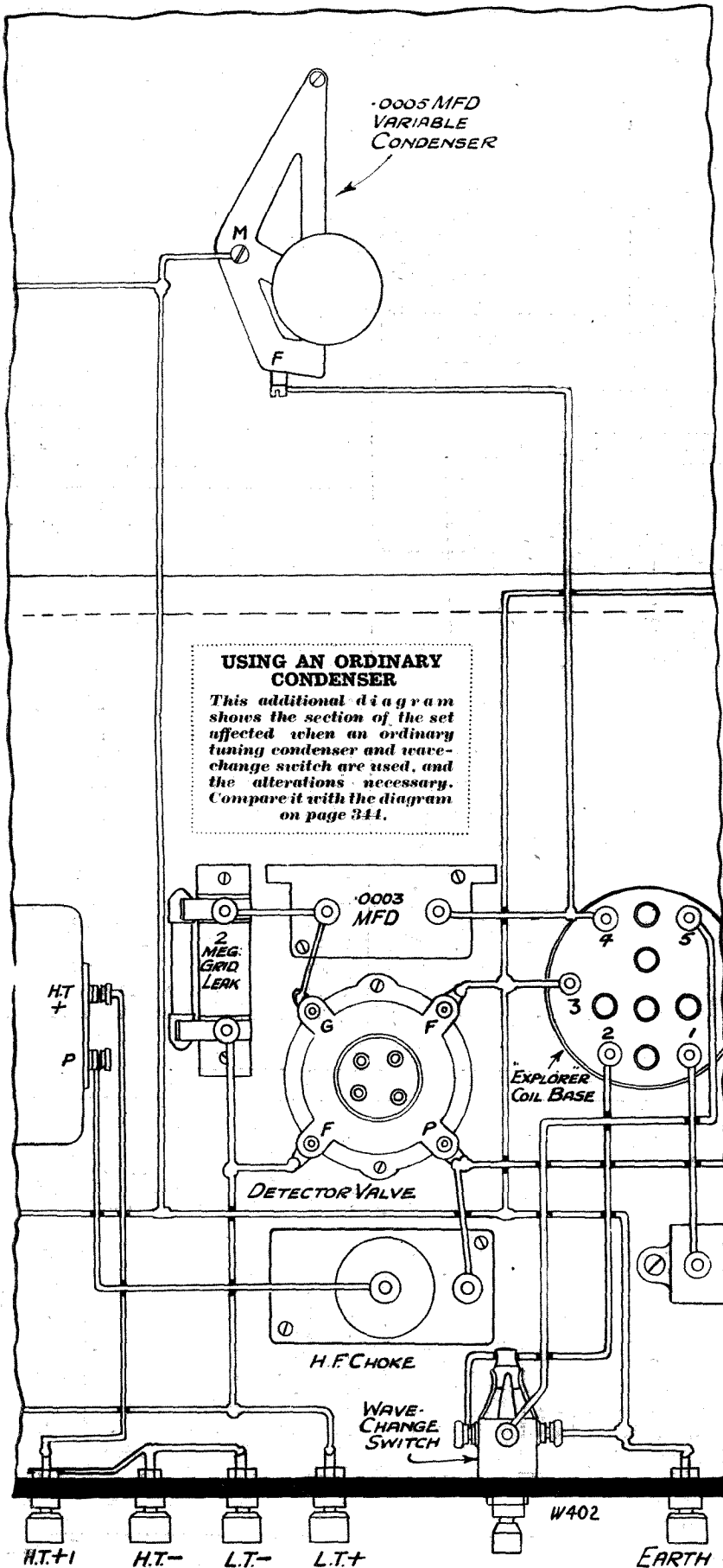
construction of the "Extenser" Two—and it will very shortly be removed—is obtaining an "Extenser" condenser. But full constructional details of the original model are given elsewhere in this issue for the benefit of all CONSTRUCTOR readers who revel in home construction and are moderately skilful with tools.

We would advise others to go straight away to their local dealers and place orders for "Extensers." Commercial models are already under consideration, and when the first ones are available to the public, which we hope will be very shortly now, the first demand is almost sure to exceed the supply. Those who order now

A VERY ENGAGING SCHEME!



As the .0005 is adjusted the arrowed contact engages with the three wave-change contacts and, lo, the set is tuning on the other wave-band! Simplicity itself.



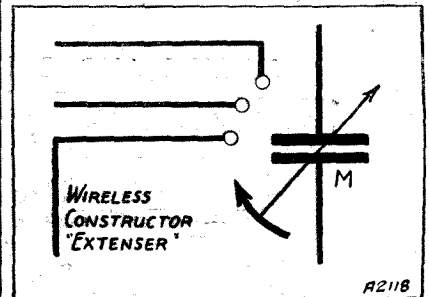
THE "EXTENSER" TWO

—continued

original, and alternatives, is given elsewhere in the article. The "Explorer" coil you can obtain ready wound, or alternatively you can quite easily wind it yourself from instructions given on page 240 of the September, 1930 issue.

When you have collected your parts, start the construction in the usual manner by marking and drilling

OUR NEW SYMBOL

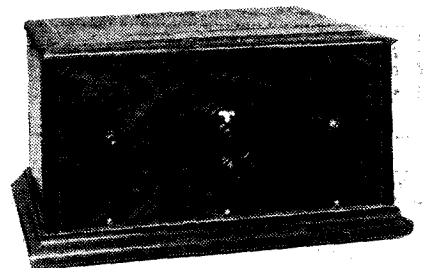


The idea is so revolutionary that the new radio symbol (above) had to be evolved to show the condenser-controlled system of switching.

the panel. This, by the way, shows up another very strong point in favour of the "Extenser" scheme, because no longer have you to be concerned with the positioning of the wave-change switch, which no longer requires a place on the panel.

Not only does it save panel drilling, but it makes it possible at last to obtain a beautifully symmetrical panel layout.

STRIKING SIMPLICITY

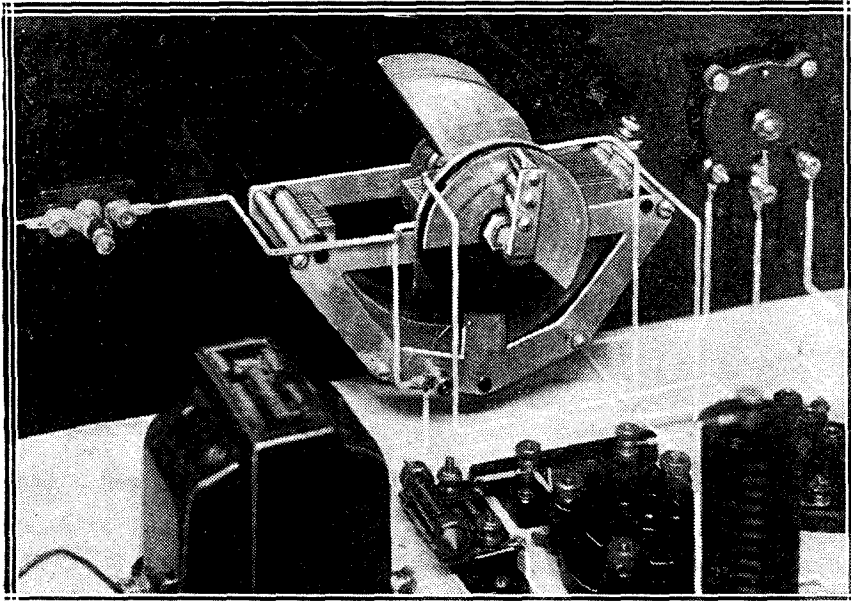


By reducing the number of controls the appearance of the set is greatly enhanced.

It was because it seemed such a pity to interfere with the attractive layout that the wave-change switch was placed on the terminal strip at the back in the alternative arrangement, although as we all know it is far from being convenient from the point of view of accessibility in this position, and would never be so placed in any ordinary design. But then, you see, this is *not* an ordinary design!

The "Extenser" Two—continued

A CLOSE-UP OF THE "EXTENSER" IN ACTION



Impossible as it may seem, this is the tuning and wave-change wiring, simplified almost beyond recognition by the wonderful "Extenser" system.

The fixing of the panel and baseboard components and the wiring is simple enough if you refer to the wiring diagram, but there is just one point in connection with the fixing of the panel components which perhaps requires elucidation.

The "Extenser" Dial

If you make your own "Extenser" then you will have to devise a dial to go with it, which, as it so happens, is not a particularly difficult task. Quite a number of the commercial slow-motion dials at present available travel through the whole scale of 360 degrees, and on one or two of these dial readings up to 100 or 180 degrees are shown round each half of the dial with a zero position in the centre.

A dial of this type will answer the purpose quite well, and it should be fixed to the condenser spindle in such a way that zero is recorded when the condenser moving vanes are all-out, which should also be the position in which the switch mechanism at the end of the condenser is just—but *only* just—about to press the metal plate down on to the contacts.

Final Details

Your dial can then be turned in either direction from the zero central position, and you will be going up in wave-length on either wave-band.

"For the first position—the detector valve—use a valve of the H.F. or special detector type, and in the other stage a small power valve.

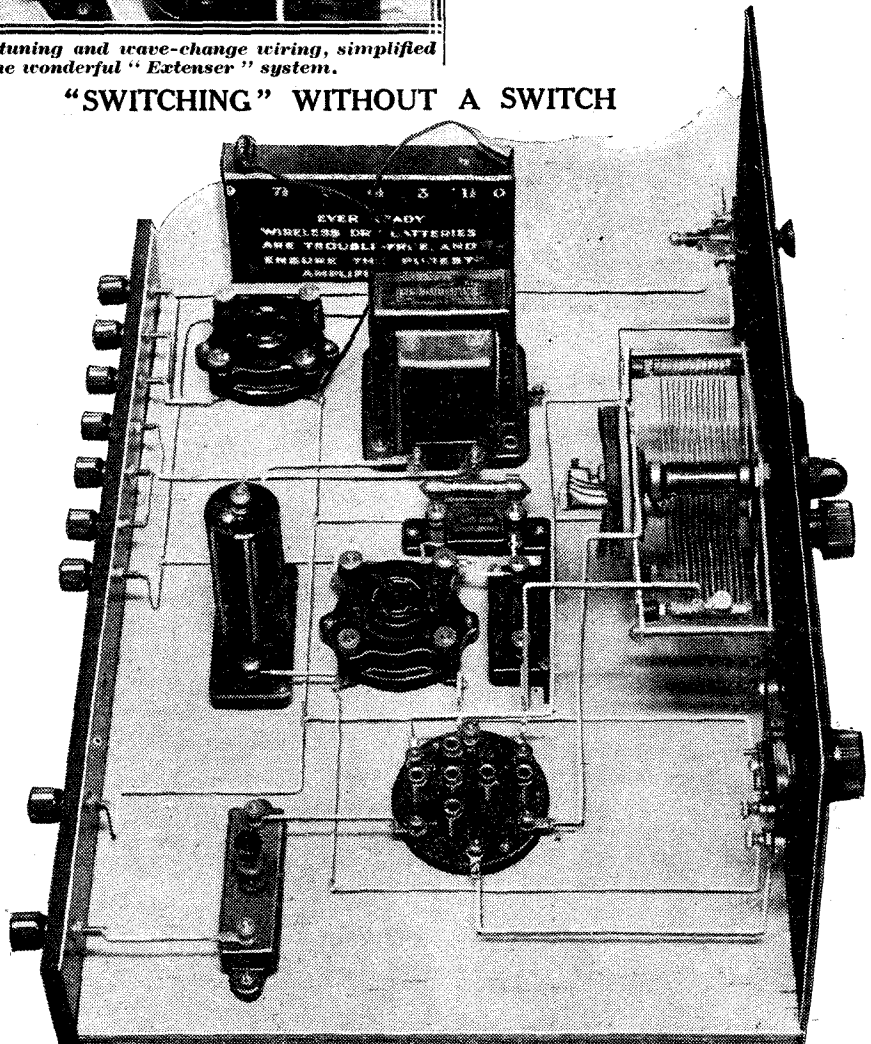
Join up the various leads in accordance with the terminal markings at the back of the set.

The "Extenser" idea makes for such delightfully simple operation that there is not much that I can say in this connection. There is nothing to tell you about wave-change switching, because it is all automatic!

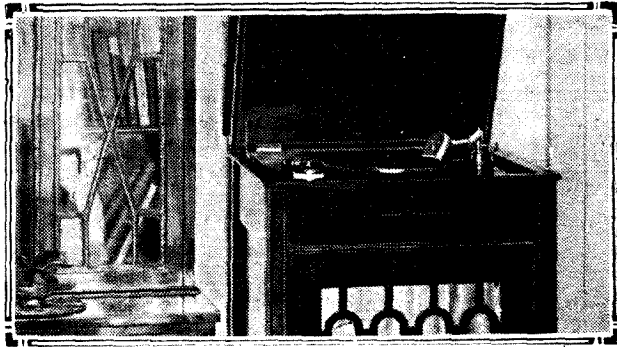
Adjusting the Selectivity

The only thing which perhaps I should mention is the small compression-type condenser fixed to the baseboard near the aerial terminal. This is intended for use as a selectivity control, and once it has been adjusted to suit your own particular requirements it need not again be touched.

"SWITCHING" WITHOUT A SWITCH



The wave-change contacts on the condenser shorten the wiring as well as simplifying it to a remarkable extent, as this illustration clearly shows.



WITH PICK-UP AND SPEAKER

Self-capacity Effects in Switches—Eliminating Unwanted Capacity in Wiring—A New Pick-up.

Conducted by **A. JOHNSON-RANDALL.**

HAVE you ever considered the effects of self-capacity in a switch? Take, for instance, the ordinary single-pole two-way variety in which the metal spindle acts as the main connection and two metal tongues the others.

It is usual for these tongues to be of different lengths so that when the

leak and condenser, the detector valve then functioning as an L.F. amplifier.

So far so good, but unfortunately the self-capacity of the switch comes into play and the little condenser formed by the tongue connected to the grid leak and condenser and the spindle which is joined to the valve

the H.F. valve can be switched off.

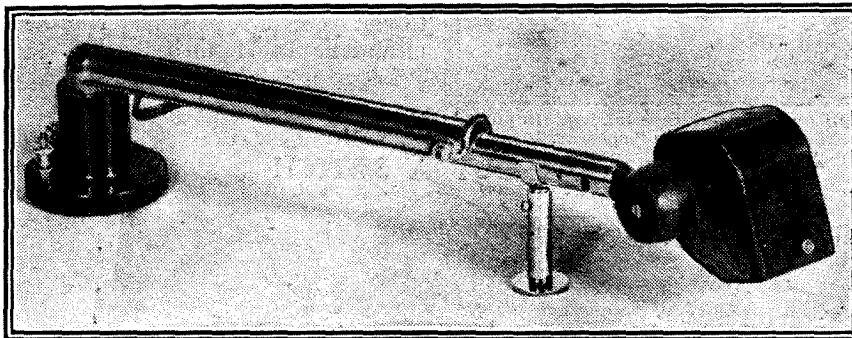
These self-capacity effects are not only due to the switch itself. The wires from the grid condenser and grid terminal of the valve holder are sometimes taken right across the baseboard to a convenient point on the panel or terminal strip. Thus you have another small condenser in parallel with the self-capacity of the switch.

There is a way of overcoming this, and the idea was first brought to my notice by a colleague.

The switch is mounted on an angle-bracket close to the valve holder and components to which it is to be wired.

Thus the leads, as far as the radio side is concerned, can be kept short. An extension rod is joined to the switch spindle, and is taken through the panel in the usual way. The scheme does away with one of the difficulties—and that is, long leads.

A NEW PICK-UP—THE A.E.D.



The A.E.D. pick-up and tone-arm has a special earthing terminal, and the pick-up can be rotated in order to facilitate needle changing.

knob is pushed in contact is made between the spindle and one tongue, and vice versa.

Now the trouble is this. These tongues are perhaps an inch in length and one quarter of an inch in width. Consequently there is a definite capacity effect between the tongue not in use and the spindle. In other words, the tongue and spindle form the plates of a condenser.

A Path for H.F.

What happens in practice? Well, let us first bear in mind the conventional method of joining one of these switches in circuit for pick-up work.

Suppose it is inserted in the grid circuit of the detector valve. The spindle will be joined to the grid of the valve and one contact or tongue to the grid condenser and leak. The other tongue will go to one side of the pick-up.

When we switch over to the pick-up we break the detector circuit on the radio side by disconnecting the grid

may permit some of the radio to interpose itself as a background to the gramophone record.

The danger can be reduced by choosing the type of switch used with

A Pick-Up From Brighton

We have just received a new pick-up for test purposes. It is marketed by Messrs. Auto-Electric Devices, of Diamond Works, Brighton. The

PLEASE DON'T BLAME US!

<p>POST CARD THE ADDRESS TO BE WRITTEN ON THIS SIDE</p> <p><i>Queries Dept Wireless Constructor Greeting House Farningham St London E.C.4</i></p>	<p><i>Please send Literature for Queries</i></p>
--	--

This is typical of many letters and post cards received by the Technical Query Department. It will be seen that no name or address is given. In these cases we are, of course, quite unable to assist readers unless they write in again.

care and eliminated by throwing the receiver out of tune—since the trouble is only likely to occur when the set is adjusted to the wave-length of the local transmission. Disconnecting the aerial is another dodge, or, alternatively, if an H.F. stage is employed

pick-up retails at 42s., and it is claimed to be highly sensitive. It is a well-made job and very nicely finished. It is at present undergoing tests in the WIRELESS CONSTRUCTOR laboratory, and we hope to publish a full test report in our next issue.

HOW TO MAKE The Wireless Constructor



EXTENSER

FULL CONSTRUCTIONAL DETAILS

THE greatest contribution to simpler radio since broadcasting began!

Just think for a moment exactly what that means to every reader of the WIRELESS CONSTRUCTOR who is at all interested in the constructional side of radio. It means that for the first time for many years you are to have the opportunity of making for yourself a truly remarkable piece of apparatus, which at the moment is absolutely *priceless* because it cannot be obtained commercially.

Ahead of the Firms!

The time is not far distant when Extensers will take their place in the radio markets of the world just as does the ordinary variable condenser to-day. That development is inevitable.

But at least for the moment every one of you WIRELESS CONSTRUCTOR readers has the opportunity of making something which will do more than just make you up to date—it will *actually place you ahead of commercial radio!* The arrival of the Extenser is the greatest advance that the radio world has seen since the introduction of the S.G. valve, and for WIRELESS CONSTRUCTOR readers it is an absolutely golden opportunity to be ahead of the times. Therefore, do not miss the chance because you doubt your ability to make one.

Few Tools Needed

Have a look in your tool cupboard: Is there an ordinary fretsaw? There is; good, then that is item number one settled, for you can soon obtain some suitable metal blades for the job. Next, what about a couple of good

Below we give exclusive and most minute details for the construction of this marvellous development in the art of tuning. The Extenser inaugurates a new era in radio reception, station selection being completely revolutionised.

metal files, and a hand-drill with quite an ordinary selection of drill sizes, and one or two taps? You've got those, too? Then with the exception of one or two screwdrivers and a pair of pliers, which surely every wireless man possesses, you've got pretty well everything that is likely

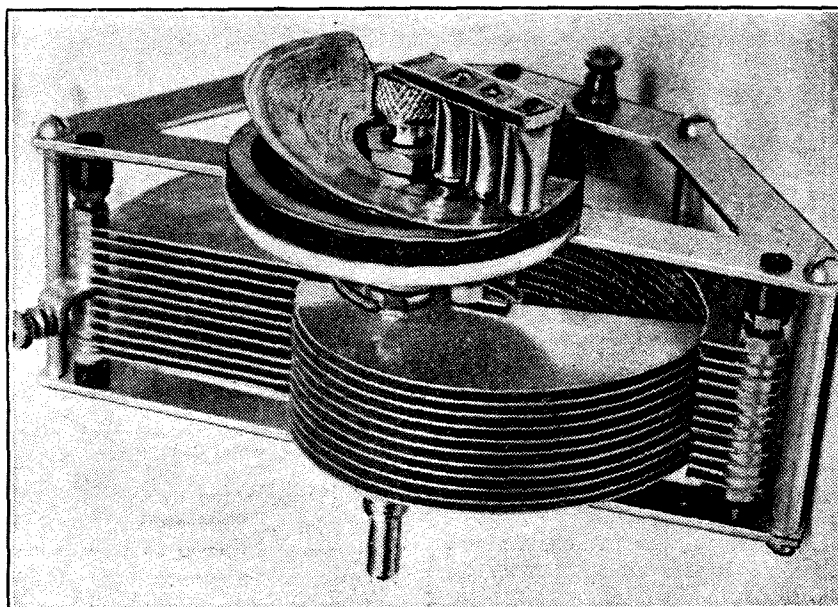
to be required for the construction of the Extenser.

There is just one other thing that we have not so far mentioned, and that is patience! It would not be fair to say that the construction of the Extenser is a particularly easy matter. Without a doubt it is a job which calls for careful and accurate workmanship; but even that is not such a terrible obstacle, because we are going to describe the construction in the minutest details.

Materials to Make It

Every measurement, every screw-hole position, in fact every possible detail, is to be given in this article,

THE EXTENSER SELF-CHANGER



There are two main secrets of success in the Extenser—one is seen above. It is the ingenious "self-changer" which enables the long and short wave-bands to be united into one progressive straight-line tuning-scale.

How to Make the Extenser—continued

and if you proceed exactly in accordance with instructions there is absolutely no reason why you should not succeed.

And now, without further delay, we are going to set about telling you how to start, with—as a logical beginning—a reference to the materials you will require.

The actual plates are cut from No. 26 gauge hardened brass, and for the twelve fixed plates and the eleven moving you will require a sheet not less than 24 in. by 12 in. The end-plates are made from $\frac{3}{8}$ -in. or $\frac{1}{2}$ -in. brass or aluminium sheet (the latter is more easy to work with,

which is really beyond the home-constructor, and that is the main spindle and the two ball-bearing cups.

To obtain these you can either dismantle an old variable condenser of suitable dimensions, or else you can take the details to your local garage or metal-working shop, who will no doubt be able to turn them up for you without much trouble, and for very little cost.

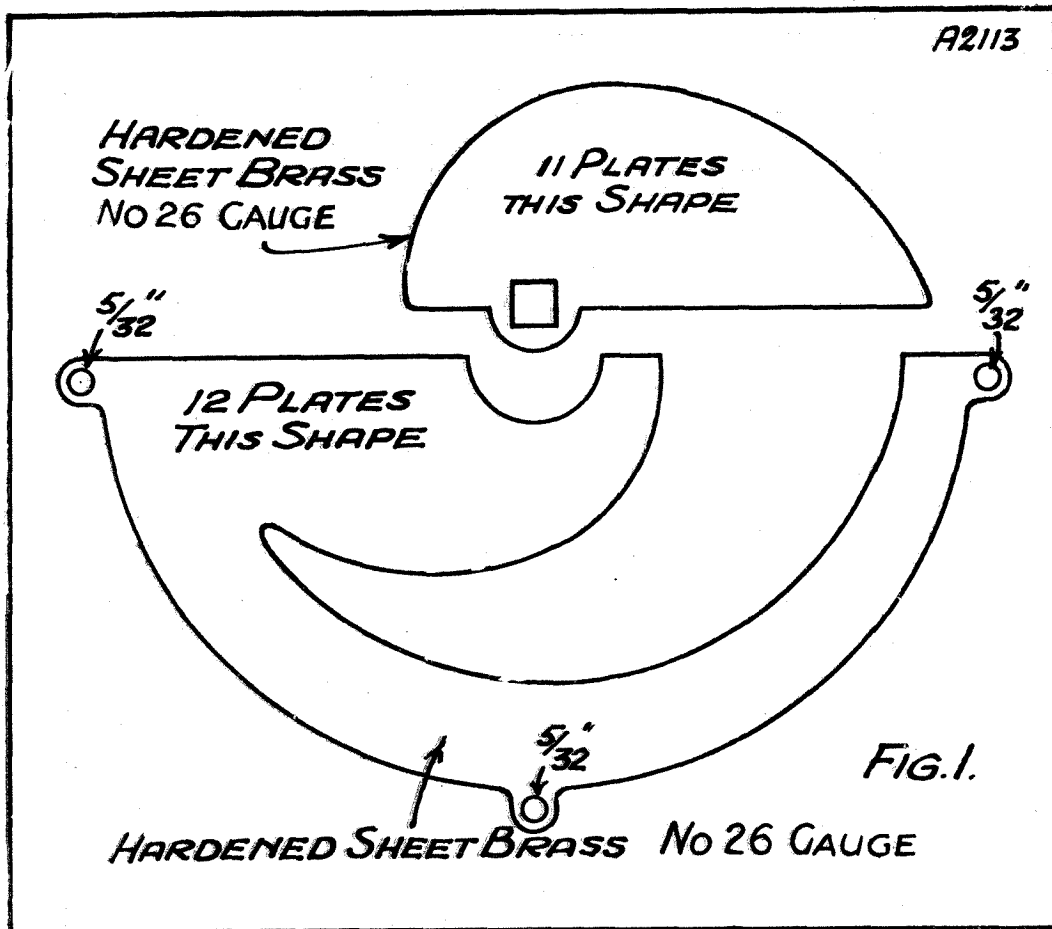
The Shaped Spindle

All that is required is a brass spindle with a squared centre section and a small threaded portion in the positions shown in Fig. 3 (C), so that the ball-

exactly the right thickness, in case you do not happen to have an old condenser by you from which to obtain washers of suitable size.

The spacing washers, both for the fixed and moving vanes, are $\frac{1}{100}$ of an inch thick, and if you experience any difficulty in obtaining them the right thickness the best plan would be to obtain some sheet brass of this gauge and to make them yourself.

This may sound a bit of a laborious business, but there is no real reason why they should be round, and if you cut out squares of the metal, after having previously drilled clearance



USE THIS AS A TEMPLATE

The moving and fixed vanes must be cut exactly to the sizes shown in order that the straight-line tuning over both wave-bands shall be maintained. The diagram is life-size, so you can use the two drawings as templates when cutting out the fixed and moving vanes of the Extenser. The unusual shape of the fixed vanes is the result of elaborate calculations made so that a design of plate should be found allowing a perfect tuning chart to be obtained in respect to both short and long wave-bands.

though not, perhaps, quite so rigid), and of this material you will want a piece slightly larger than 6 in. square.

The various nuts, screws, etc., we shall have to refer to as we go along; and, in any case, since they are mostly of standard sizes you will probably already have them in your junk box. There is only one part of the condenser

bearing cups can be screwed on to each end to hold the moving plates in position. The squared centre-piece, by the way, should be exactly $\frac{3}{16}$ in. long, and the overall length of the spindle is $3\frac{3}{4}$ in.

While you are getting these jobs done it might save you time and trouble at a later stage if you also get the garage to cut spacing washers of

holes for the spindles, the difficulty will soon be overcome.

We do not imagine, however, that this procedure will be necessary, because even if you cannot get a local firm to supply you there are several radio "sundries" firms who will probably be willing to undertake the work.

Possibly one of the most monotonous

How to Make the Extenser—continued

jobs of the whole lot is that of cutting the plates, because unless you happen to be particularly skilled at metal work we are doubtful whether you will be able successfully to cut more than one at a time.

But, even so, it is not quite so bad as it sounds, and if you proceed in the following manner, with the exception of the possibility of breaking a few saws (we broke more than a few when making the original!) you won't be likely to encounter any insurmountable difficulties.

Cutting the Plates

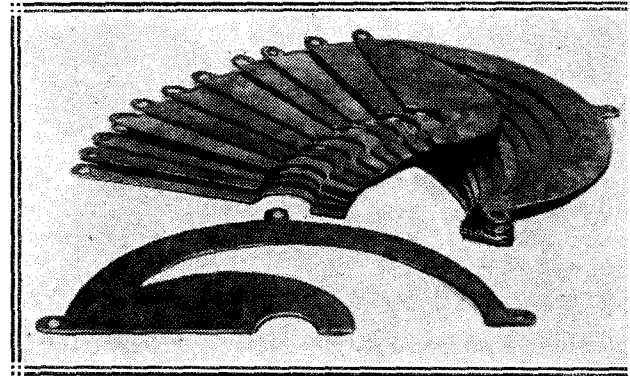
First of all, make an accurate cardboard template of both the moving and the fixed plates. This is easily done with a piece of tracing paper, or, if you prefer, you can actually cut out the shapes shown in Fig. 1 and stick those on cardboard, because they are actual size. Now for the sheet of brass.

Scribe a line centrally down it lengthways for a distance of 18 in., and mark at right-angles to this line six divisions each 3 in. wide. Divide

the remaining piece into twelve equal parts (the size of each should be roughly 3 in. by 2 in.), and when it is all marked out use the fretsaw and cut the sheet into pieces as marked.

blades, yet it was undoubtedly more economical as well as easier than would have been the case with coarser blades.

When you have cut all the bits out,



READY FOR ASSEMBLY

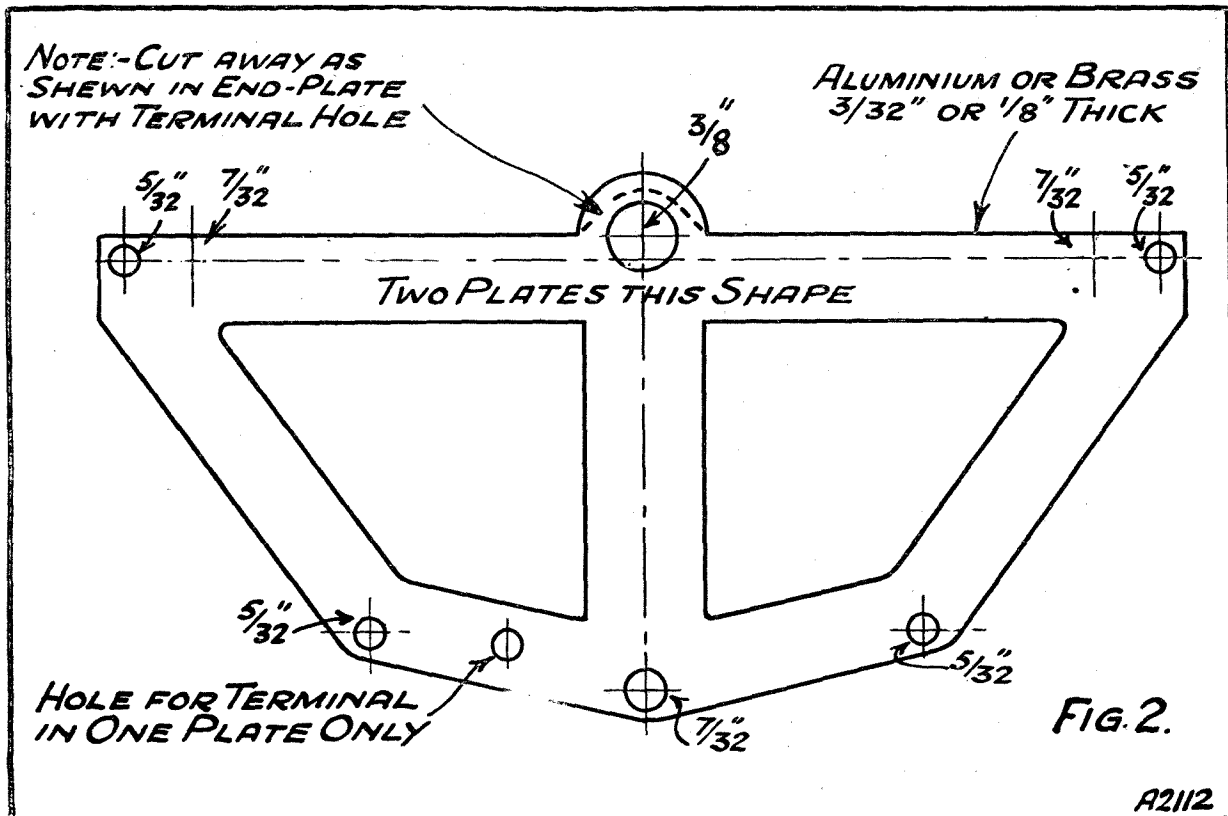
The finished moving and fixed plates, cut to the shapes and sizes shown in Fig. 1, ready for mounting on the centre spindle and the three clamping rods respectively. This process is clearly illustrated in Fig. 3 on the next page.

By the way, when cutting the brass you will find it necessary to use very fine metal blades for the job, otherwise you will break a blade at every $\frac{1}{2}$ in. or so! We used No. 0 metal blades, which are about the finest it is possible to obtain; and although it probably took longer with such fine

you can then proceed to make use of the templates, using the larger pieces of brass for the fixed plates, and the smaller for the moving. The actual cutting of the plates, we warn you, will take time, and will probably tax your patience.

That being the case, let your

HOW THE END-PLATES OF THE EXTENSER ARE SHAPED



This is another template giving the exact dimensions of the end-plates. These are cut out of aluminium or brass, and the holes must be drilled in exactly the positions shown or trouble with assembly of the Extenser will be encountered.

How to Make the Extenser—continued

thoughts be filled with the prospect of what you are going to get out of it when the job is completed, and we are sure that all will then be well!

For Accurate Spacing

Before you finish with the saw, when you have prepared the fixed and moving plates—by the way, you will have one of the smaller pieces of brass over, as there are only eleven moving vanes—proceed to cut out the end-plates. Here, again, the diagram is reproduced exactly full size, so that it will merely be necessary to use it as a template.

The next part of the construction is (comparatively!) easy. It consists

the centres, and then clamp both the end-plates to the drilling board, and do them together. One end-plate, as you will see from the diagram, requires an extra hole for a terminal, and is cut away at the position where the spindle passes through.

When the plates are all drilled, and when you have removed the burr caused by the drill with a file, "thread" all the fixed vanes on to bolts and secure them tightly together with nuts, and you can then use a file to put a finish on the edges. The moving vanes and the end-plates can be treated in exactly the same way.

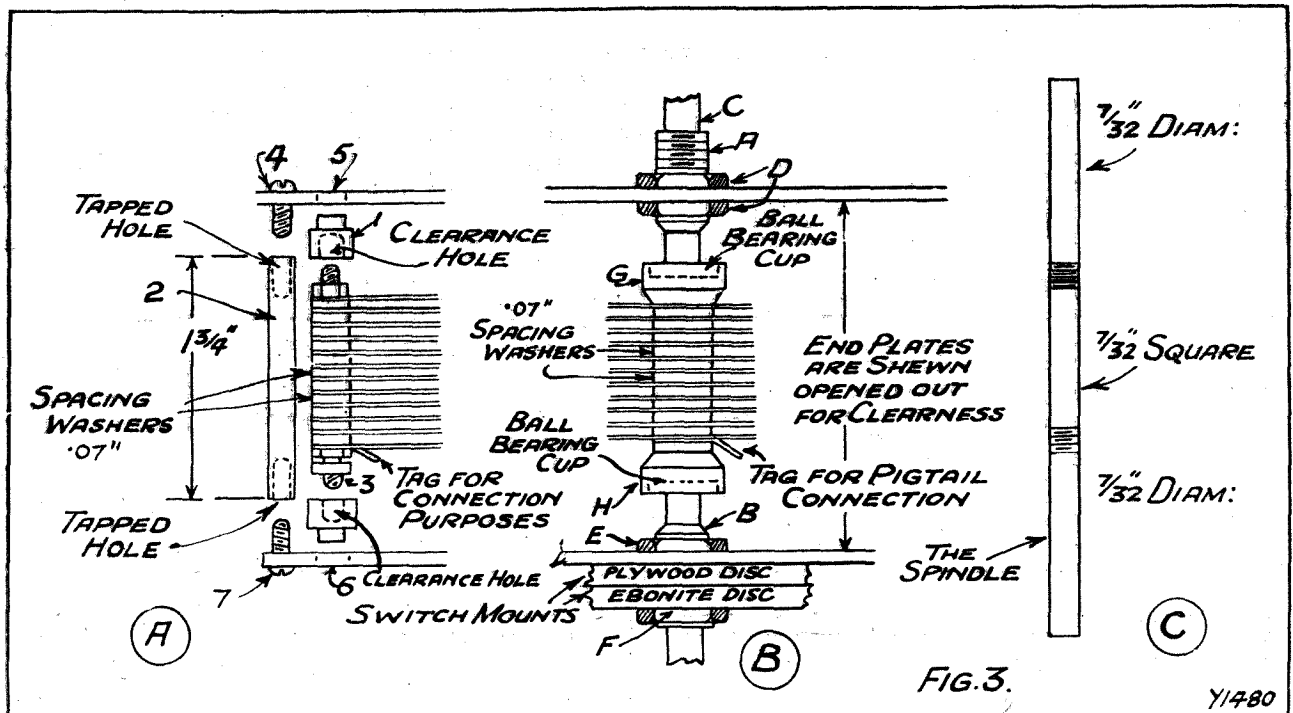
Before the condenser can be assembled there are just one or two other

you don't happen to have them by you, your dealer will no doubt be able to supply you from stock. And for each piece you will require three nuts. The end-plate separators are perhaps not quite so straightforward, but even these are not difficult to prepare if you work carefully and in accordance with instructions.

Fixing the End-Plates

Get hold of some $\frac{3}{16}$ -in. diameter brass rod, or, better still, brass tubing, so long as the hole in it is not too large, because that will save you the trouble of drilling holes in each end, and cut three pieces each $1\frac{3}{4}$ in. long. Next tap each end of each one of

THE EXTENSER IS NOW NEARING COMPLETION



This shows how the fixed and moving vanes are assembled. Note the brass ball-bearing cups on the centre spindle and the position of the soldering tags on moving and fixed plate assemblies.

of cutting first of all with the fretsaw the square holes in the moving vanes, and then drilling the holes in the fixed vanes of the end-plates.

If you clamp the moving vanes to the drilling board very tightly, half a dozen at a time, you'll find it possible to drill them in one operation. This, apart from simplifying matters, will ensure that you get the holes accurately placed.

To obtain accurate spacing of the holes in the end-plates, use one of the fixed plates as a template to obtain

things that you will require. You will want, for instance, three lengths of 6 B.A. tapped brass rod, each $1\frac{3}{4}$ in. long; three $1\frac{3}{4}$ -in. lengths of $\frac{3}{16}$ -in. diameter brass rod, indicated at 2 in Fig. 3(A); half a dozen ebonite insulators to hold the fixed vanes away from the end-plates; and a couple of tapped brass bushes, with nuts, shown at A and D and B and E, Fig. 3(B). And so we had better deal with each of these in turn.

The three lengths of tapped brass rod are easily enough obtained. If

these pieces for a depth of about $\frac{3}{8}$ in., and obtain half a dozen bolts that will screw into the tapped holes. The B.A. size of these bolts, and of the holes, is naturally not of very great importance, but for convenience you would be wise not to exceed 4 B.A. In any case, the bolts should not be longer than $\frac{3}{8}$ in.

This is undoubtedly the most satisfactory method of spacing the end-plates, although, as a matter of fact, there is an alternative method for those who may not fancy tapping

How to Make the Extenser—continued

into brass, and that is to use ordinary tapped brass rod and nuts.

With regard to the ebonite insulating pieces, these are made from ebonite rod not less than $\frac{5}{16}$ in. diameter. You will not require very much, as a matter of fact 2 or 3 in. will be ample, and it should be cut into $\frac{5}{16}$ -in. lengths.

Putting Your Collar On!

Place each piece separately in the vice, and drill a hole slightly more than half-way through, and of such a diameter that the tapped brass rod intended for holding the fixed vanes together will just slide into it.

The other end of each piece should next be filed down as shown at 1 in Fig. 3(A) until it is $\frac{5}{32}$ in. in diameter; in other words, until it is of the same diameter as the larger holes in the end-plate. The depth of this collar, by the way, need not be more than the thickness of the end-plates.

The Ball-Bearing

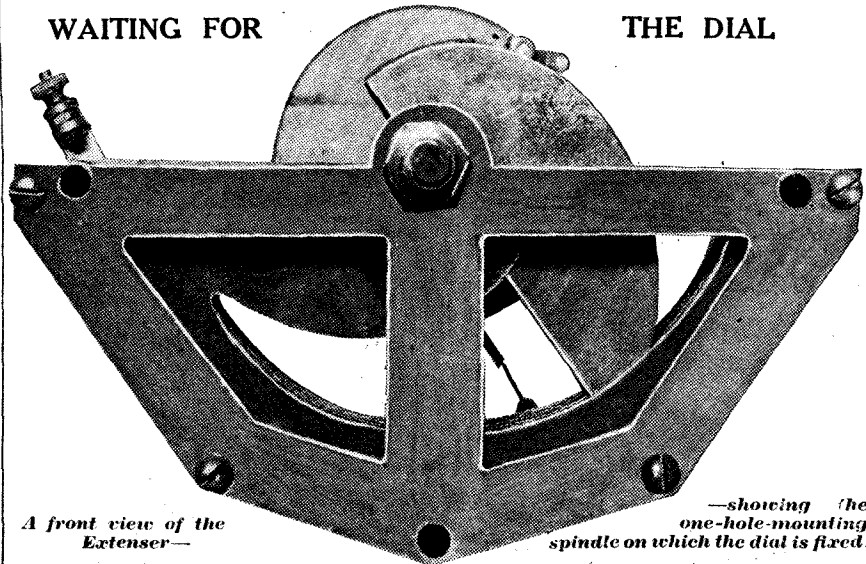
The two tapped bushes through which the centre spindle passes you are not expected to make yourself, for even if you do not happen to be able to obtain them from an old condenser they are quite a standard sort of fitting, and should be obtainable from your local radio shop.

The only thing that you have to do with them is to file one end of each as shown at B in Fig. 3(B). The purpose of this cone-shaped end is to hold the ball-bearings in position when the condenser is assembled.

ball-bearing cup at one end as a stop and the second ball-bearing cup as a means of holding the plates in position when, with the appropriate spacing washers, and the soldering tag as shown in the diagram, Fig. 3,

WAITING FOR

THE DIAL



A front view of the Extenser—

—showing the one-hole-mounting spindle on which the dial is fixed.

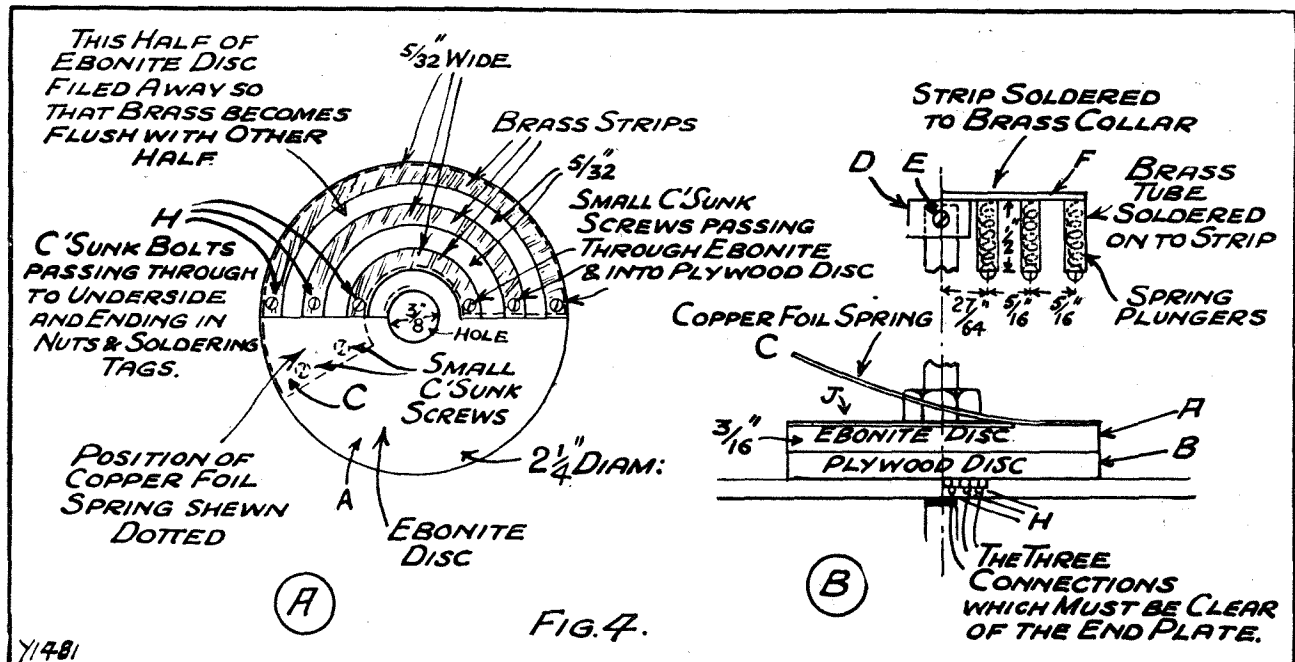
There is a certain procedure to be followed in the assembly of the condenser which tends to make the job an easy one if you follow it out carefully. Start, first of all, by assembling the moving vanes on to the squared section of the centre spindle, using a

are all on the spindle.

Now put the moving vanes aside for the moment, and start to assemble the fixed vanes, but do not, for the time being, secure them between the end-plates.

(Now please turn to page 394.)

THE CONSTRUCTIONAL DETAILS OF THE SELF-CHANGER



Here we give the details of the self-changer which links up the long and short wave-bands. The small countersunk screws at "C" are so placed that they do not foul the three plungers that slide over the foil.

The "KILOTRAP" COIL



How to make the new "Standard" "Wireless Constructor" short-wave coil used in the "Kilotrapp" receiver described elsewhere in this issue.

THE new special short-wave coil unit which has been designed in conjunction with the WIRELESS CONSTRUCTOR Research Department, and used for the first time in the new "Kilotrapp" receiver, is to be adopted as a standard design for short-wave sets.

Wide Wave-Band Covered

Nowadays, perhaps more than ever before, readers are beginning to take a really lively interest in the reception of stations thousands of miles away through the medium of short waves, and we feel that the time is appropriate for the introduction of an efficient coil unit which can be used, not only in this new set, but in pretty well every standard short-wave circuit that is likely to be published.

The "Kilotrapp" coil unit, in so far as short waves are concerned, is one of the most efficient coils that has

ever been designed, and it is possible with suitable tuning arrangements to cover with one coil a band of wavelengths from approximately 17 metres to well over 50.

As those of you with any past short-wave experience will realise, that is a very wide (and very useful) range for any single coil; but, even so, since the coil is intended for universal use, it is not quite wide enough.

Universal Application

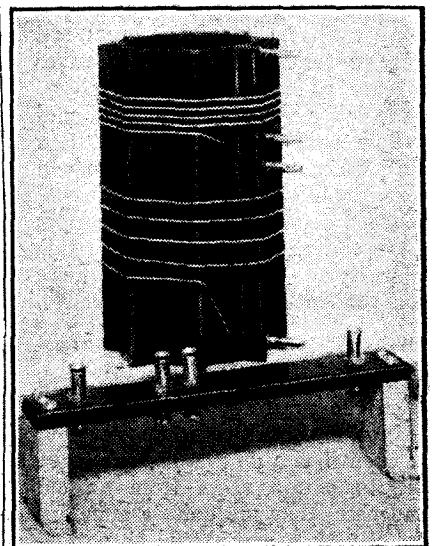
There are stations, though not perhaps quite so many of the really distant ones, transmitting on waves above 50 metres, and as it is not possible to extend the higher range of the present coil without sacrificing stations at the lower end, we have designed a second coil with which it will be possible to hear the stations operating between 50 and 100 metres.

The extent of the universality of our new coil will be adequately demonstrated next month, when we propose to publish a number of interesting short-wave circuits in which it can be used; but meanwhile, while on the question of its application, you will no doubt be interested to learn that coils for the medium and long waves are at present being designed which will plug into the standard short-wave coil unit base.

Only One Receiver Needed

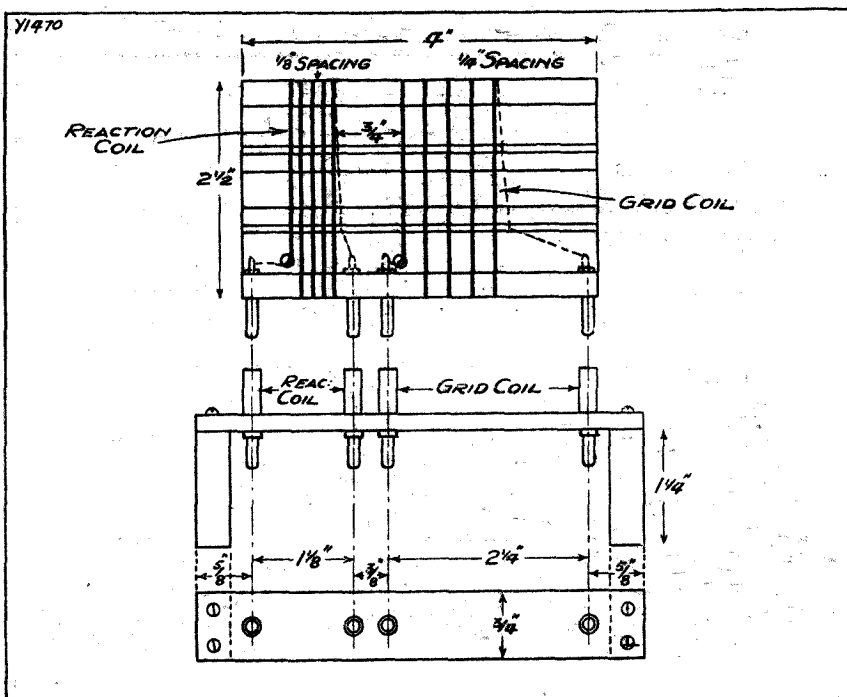
So that if you are interested in this new high-efficiency short-wave coil unit you need not be handicapped by

THE COMPLETED COIL



The original coil standing beside the special raised base.

ALL THAT YOU HAVE TO DO



The "Kilotrapp" coil is as simple to make as it is efficient in use, and the above diagram illustrates all you have to do to make it and the base on which it is mounted.

the thought that you will require another set in addition to your ordinary broadcast receiver before you can try it out. Whether you choose to build the "Kilotrapp" (and after having heard it demonstrated in our laboratories you have our strongest recommendation to do so!), or whether you prefer to build a set from one of the circuits to be published next month, it will serve you not only for the reception of stations as far distant as Australia and South Africa, but for your "locals" and some continentals as well.

Constructional Details

It seems unnecessary to detail further the whys and wherefores of this new universal coil unit beyond saying that if you are interested in the slightest degree in the reception of short-waves (and this applies whether you build the "Kilotrapp" or not) you will be doing yourself a good turn if you construct it either

(Please turn to page 396 for the continuation of this article.)



This remarkable receiver sets a new fashion in short-wavers, a fashion that is born of sheer practicability and not merely the desire to be different. The "KiloTrap" is a world-getter, and to enable you to test your version of it we have arranged special broadcasts next month from Nairobi, Kenya Colony. Why not listen for them on a "KiloTrap" of your own?

By
G. T. KELSEY.

SUPPOSING you were asked your principal objection (if you have one) to participating in the thrills of ether-roaming on short waves, what would be your answer?

Would you reply that as a complete novice you felt incapable of handling a short-waver successfully, or would you give as your reason the uncertainty of transmissions from some of the really distant stations, and the consequent necessity for hours of "groping in the dark" on the chance of finding a transmission.

Listen for Nairobi, Kenya Colony, on the "KiloTrap." The "Wireless Constructor" has arranged for a special series of broadcasts from this station in order that readers may test their "KiloTraps." The schedule of tests will be published next month.

If it is because of doubts of your ability to handle a short-waver that you have so far left this fascinating band alone, then read on, for the set about which you are to hear is one of the most simply-operated sets that has ever been designed for short-wave reception—a set, in fact, that makes the reception of continents as far away as Australia, Africa, and America a matter little more difficult than the tuning-in of some of the more elusive "Continental" on the ordinary broadcast waves.

And if your diffidence is because you just don't happen to fancy the idea of "groping in the dark"—with, alas, as is often the case, completely negative

results—well, that also need not be your objection so far as the "KiloTrap" is concerned.

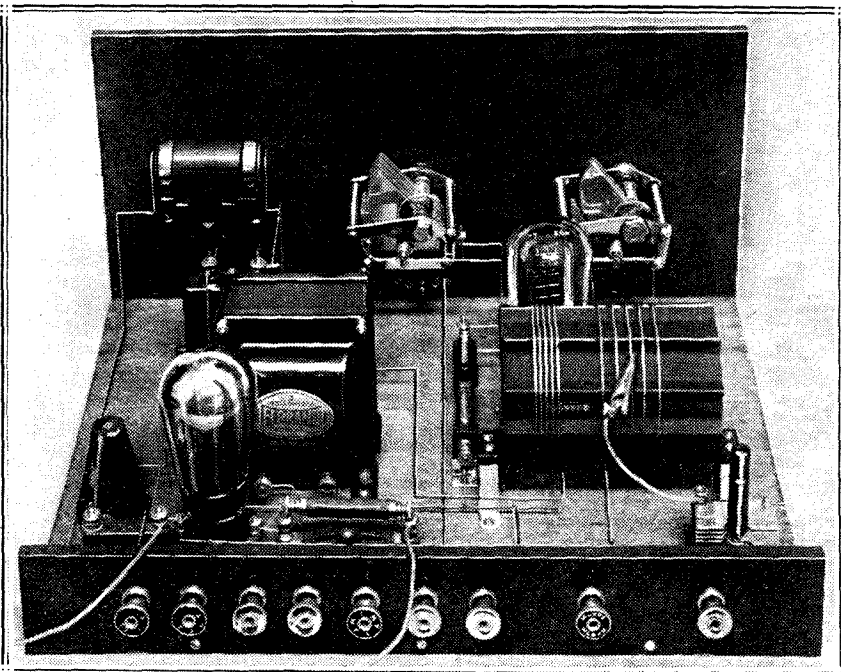
Arranged Specially For You

You see, for the first time in the whole history of broadcasting I am able to announce that, solely for the benefit of all WIRELESS CONSTRUCTOR readers who build the "KiloTrap,"

one of the world's most famous short-wave broadcasters—namely, Nairobi, Kenya Colony, East Africa—is to do special transmissions just as soon as you have all had ample time in which to build your sets.

Full details of these special schedules, which will include times, wave-lengths, powers, etc., will be published exclusively in the next issue

WIDE RANGE—EASY TUNING



The variable condensers on the panel are for wave-length range setting (in the case of the '0003) and for actual progressive tuning in the case of the '0001. This enables a wide band of frequencies to be covered with one coil, and really easy tuning to be obtained.

The "Kilotrap"—continued

of this journal, and will be an announcement of interest, not only to those who decide to build a "Kilotrap," but to all readers of the WIRELESS CONSTRUCTOR who have any interest at all in short-wave reception over great distances.

Meanwhile, I'm going to say a few things about the circuit employed for this new set, because in many ways the "Kilotrap" sets a new fashion in short-wave receiver design.

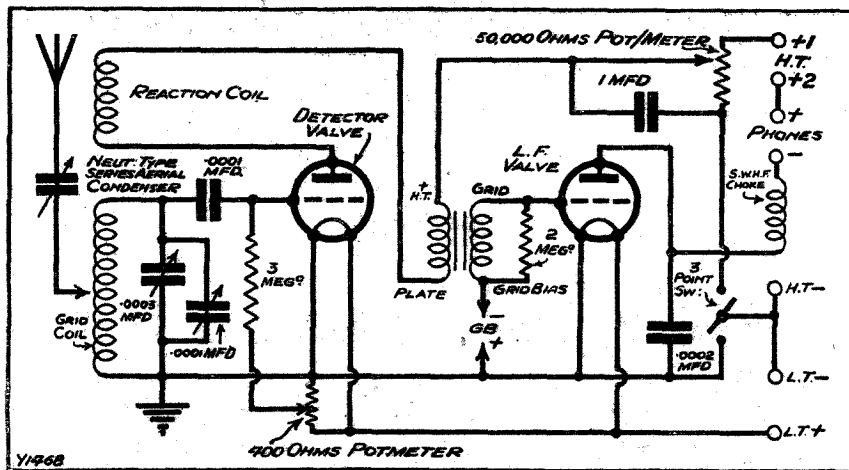
I daresay, for instance, that more than a few of you are wondering what the two-condenser-tuning idea is all about, when normally with only one tuning control short-wave stations are difficult enough to find.

Tuning Simplified

Well, you may be a little surprised to learn that the parallel condenser scheme, contrary to making things more difficult, renders the finding of distant short-waves a matter little more difficult than the reception of weak continentals on the ordinary broadcast waves!

I don't want to sound more technical than I can help, but I feel so confident that his double idea is ultimately going to be the solution to our present sharp-tuning difficulties on short waves that I simply cannot refrain from telling you sufficient about it to enable you clearly to understand the great advantages of two condensers.

A REVELATION IN REACTION CONTROL



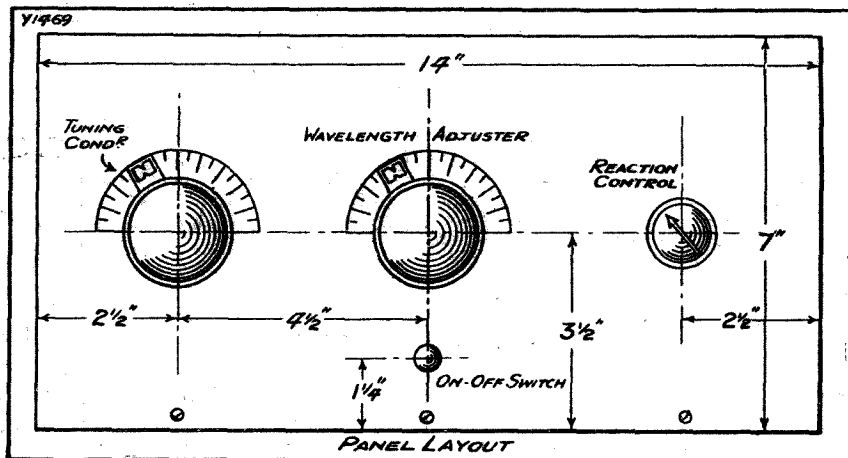
Note the resistance reaction control which gives superbly silky variation, and allows the very last ounce to be got out of the set.

First of all, you all know that the wave-range of a set is largely governed by the capacity range of the variable condenser across the tuning coil,

assuming one coil of given size to be used. Therefore, owing to our dislike of coil changing, this makes it desirable that we should use the largest tuning condenser technically permissible, so

that we find that on account of the exceedingly fine tuning on short waves the covering of a band of 40 metres for a movement of 180 degrees of the tuning dial renders it the most

SIMPLE STATION SELECTION



The centre control is more for wave-band adjusting than for tuning purposes, hence the unusual name given to it in the diagram.

as to cover the widest possible wave-range with one coil.

Easy Dialling

That is all very nice, and is, in fact, the usual procedure on normal broadcast waves, but short waves, alas, are quite another story. If we use, say, a .0005-mfd. variable condenser in conjunction with a normal short-wave coil, it might be possible, providing the condenser has a low

difficult job in the world even to find stations, so sharp is the tuning.

The only way to make short-wave tuning easy, then, is to use a small tuning condenser so that the wave-range is limited to 5 or 10 metres for a 180-degree dial movement.

The stations then become "spread out," and much more easy to tune; in fact, as I have previously told you, precious little more difficult than finding continentals on the waves with which we are all familiar.

The Two Condensers

But if we do this, and decide that our condenser is only to cover a matter of 10 metres, think of the number of coil changes that we should have to make before the band from 20 to 100 metres is completely covered!

That is where the double condenser idea comes into its own. With the two in parallel as in the "Kilotrap," the larger one, which I have called the wave-length adjuster, moved, say, 20 degrees at a time, will alter the range of the set by approximately 5 metres for each movement, until maximum is reached.

It is with the smaller (left-hand) one that we do the actual tuning, and throughout its range of 100 or 180 degrees it will only effect a change in wave-length of about 10 metres, and stations will be "spread out" as much as is possible.

minimum capacity, to tune from 20 to 70 metres with the one coil. That sounds very nice in theory, doesn't it?

It is only when we try it practically

The "Kilotrap"—continued

You see the great idea? If we start tuning at 20 metres, the small condenser takes us up to 30, or thereabouts, then we advance our wave-

YOUR "KILOTRAP" SHOPPING LIST

- 1 Panel, 14 × 7 × $\frac{3}{8}$ or $\frac{1}{2}$ in. (Peto-Scott, or Lissen, Goltone, Permeol, etc.).
- 1 Cabinet for the above panel, with baseboard 10 in. deep. (Cameo, or Pickett, Lock, Osborn, Kay, etc.).
- 1 .0003-mfd. variable condenser, vernier type, or with slow-motion dial (Jackson "Tiny," or other type with a low minimum value).
- 1 .0001 variable condenser, vernier type, or with slow-motion dial (Jackson "Tiny," or Polar, etc.).
- 1 50,000-ohm wire-wound potentiometer, panel-mounting type (Varley).
- 1 Three-point on-off switch (Wearite, or Ready Radio, W.B., Keystone, Bulgin, Magnum, Red Diamond, etc.).
- 2 Sprung-type valve holders (Lotus, or Bulgin, Igranic, W.B., Benjamin, Lissen, Formo, Clix, Magnum, Wearite, etc.).
- 1 .0001-mfd. fixed condenser (Lissen, or Telsen, Dubilier, T.C.C., Ready Radio, Mullard, Igranic, Formo, Watmel, etc.).
- 1 .0002-mfd. fixed condenser (T.C.C., etc.).
- 1 3-meg. grid leak and holder (Dubilier, or Lissen, Igranic, Telsen, Ferranti, Mullard, Graham Farish, Ediswan, etc.).
- 1 12-meg. grid leak and holder (Graham Farish, etc.).
- 1 400-ohm potentiometer, baseboard-mounting type (Ready Radio, or Lissen, Igranic, Wearite, etc.).
- 1 L.F. transformer, 7-1 ratio (Ferranti, or Telsen, etc.).
- 1 Neutralising type condenser (Bulgin, or Magnum, Igranic, J.B., Keystone, etc.).
- 1 Short-wave-type H.F. choke (Magnum, or Igranic, Wearite, Polar, Watmel, etc.).
- 1 1-mfd. Mansbridge-type condenser (T.C.C., or Lissen, Hydra, Dubilier, Formo, Mullard, etc.).
- 9 Engraved terminals (Ealex, or Igranic, Belling & Lee, Clix, etc.).
- Strip of ebonite for terminal strip, 14 × 2 in.
- Wire, flex, alligator clip, screws, wander plugs, etc.

THE COIL MATERIALS.

- 2 oz. No. 20 tinned copper wire.
- 2 4-in. lengths of ribbed ebonite former, $2\frac{1}{2}$ in. diameter to outside of ribs (Becol, or similar material).
- Strip of ebonite, 5 in. × $\frac{3}{4}$ in.
- 4 Valve sockets, and 8 valve pins.
- Wood, screws, etc., for fixing.

length adjuster to 30 and proceed to tune from 30 to 40, and so on until the whole coil range is covered. Simple, isn't it? I'll warrant that you

will think so, too, when first you handle this new set!

As there are so many other things I want to talk about, I must make only the briefest possible reference to the other outstanding features of the set. And I cannot do better than to start off with the method of reaction control employed.

Velvety Reaction

What is the idea of using a resistance, or, to be more accurate, a potentiometer, in place of the normal condenser control? You've heard of that bogey we call hand-capacity, which is another way of saying that the stations "fade out" when we remove our hands from the tuning controls? Well, the resistance control scheme is about the most effective method I have found to minimise the trouble. In addition, it helps no end to obtain wonderfully smooth reaction control, which is so vitally important on short waves.

The combination of the easier tuning scheme and the special reaction arrangements—with, as an additional refinement, from the point of view of obtaining "velvety" reaction, a potentiometer for the grid leak—result in a detector circuit which for

the successful reception of distant short-wavers it would be difficult to surpass. Nor is that all.

To do full justice to the high-efficiency detector stage, and to obtain the highest degree of amplification possible with only one stage of L.F., the intervalve transformer used in the "Kilotrap" has a much higher ratio than is normally employed in broadcast receivers.

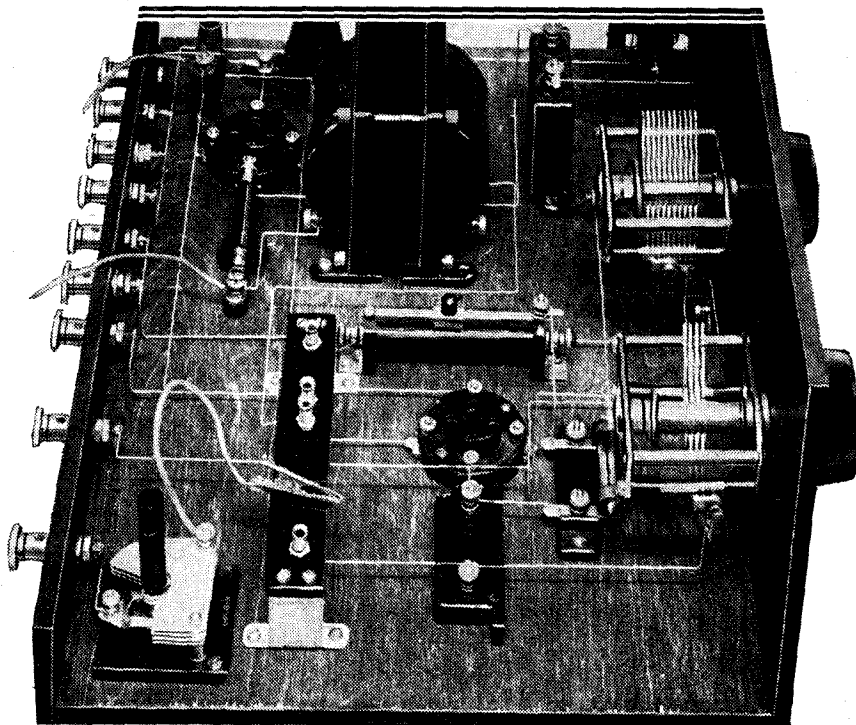
It has, as a matter of fact, a seven to one ratio, so that, all told, the "Kilotrap" is very much a "two-and-then-some" receiver!

To turn from technical to practical considerations, the first thing that I want to emphasise is that the "Kilotrap" is by no means difficult to construct; you have only to glance at the wiring diagram for confirmation of that fact.

Home-Made Coils

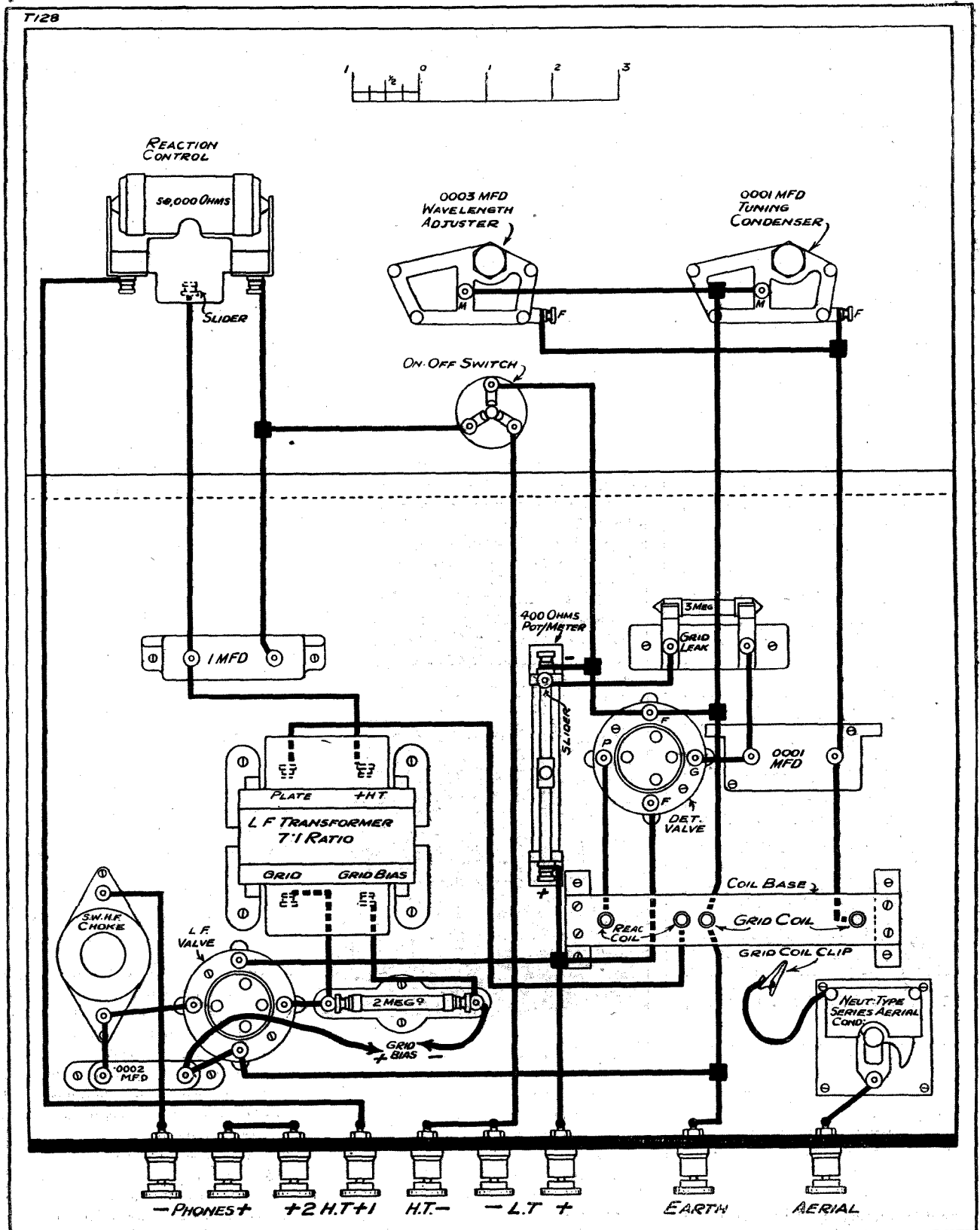
True, there are the coils to be considered, but even this part of the constructional work is not difficult, especially if you follow carefully the coil-making instructions given on another page by the Research Department, who, by the way, are standardising them for use in future short-wave designs.

WELL-SPACED WIRING IS ESSENTIAL



In building the "Kilotrap," as in the case of other short-wavers, it is essential that the wiring be well-spaced, or inefficiency is bound to follow.

The "Kilotrap"—continued



Copy this spacing as closely as you possibly can, for the closer to the original you get your model the more likely are you to obtain the absolute best out of the set. Bad wiring and deviation from the original layout and specification can only too easily mean disappointment.

The "Kilotrap"—continued

Perhaps before going into details regarding construction I had better just say a word or two concerning the all-important question of components. The list given elsewhere in this article will give you all the information you require concerning values, but *do* make a point of choosing only from among those of reliable manufacture.

When you have gathered all your parts together, commence the constructional work with the drilling of the panel—not a very difficult matter if you first mark it out in accordance with the dimensioned drawing provided.

Some Practical Hints

When the panel is drilled, it is rather important to fix it to the base-

The fixing of the rest of the components and the wiring to follow is straightforward enough, and if you follow carefully the details given in the back-of-panel diagram you will not be likely to go very far wrong. There is just one point which perhaps calls for elucidation, and that concerns the fixing of the coil base to the baseboard.

You can do this either by screws passing from the underside of the baseboard into the wooden supports, or, as was done in the original, by means of small metal strips screwed first to the undersides of the wooden supports, and then to the baseboard.

Now we come to the most exciting part of all, the job of giving the set a preliminary try-out. First of all, plug the smaller of the two coil units

satisfactorily, but for best results the detector should have an impedance of ten or twelve thousand ohms. The impedance of the second or, if you like, output valve is not nearly so critical, but you will probably find it best to use a valve with an impedance of from seven to twelve or fifteen thousand ohms.

When all is connected up, pull out the switch immediately below the centre condenser, and note whether when you turn the reaction control knob the set will oscillate. If you are in any doubt as to whether the set is oscillating, you will easily be able to make sure simply by tapping with a moistened finger the fixed plates of the variable condensers.

How to Tell

You should hear a *double* click if the set is oscillating.

This oscillation test should be carried out at every five or ten degrees of the wave-length adjuster, to make quite certain that the set will oscillate over the whole of the range. Do not be unduly alarmed if you find small bands (five degrees or so) here and there over which the set will not oscillate, because these are what are known as "dead spots." You can, as a rule, shift these dead spots by suitable adjustment of the series aerial condenser.

If the set shows the slightest tendency towards "ploppiness" when you advance the reaction control to the point of oscillation, try adjusting the potentiometer slider, and vary the tapping position on the grid coil.

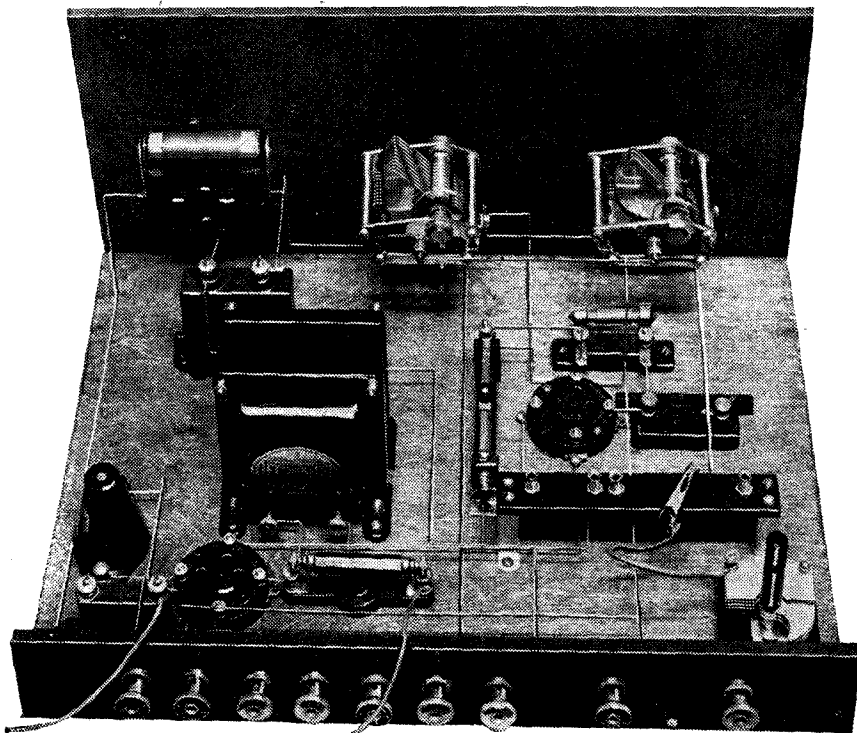
The Special Transmissions

This latter, by the way, should be used as near to the right-hand end (viewing the set from the back) as possible. But you will find a position where, in all probability, if you move it any nearer the set will refuse to oscillate, in which case you will have to move it back slightly.

A similar sort of thing takes place with the series aerial condenser. This should be used at maximum capacity, providing with it so adjusted you get proper reaction effects.

As stated, the set is very easy to handle, and next month we shall give all the necessary operating details, as well as full particulars of the special long-distance transmissions arranged for the benefit of our readers.

"HELLO, CONSTRUCTORS! KENYA CALLING"



Nairobi, which is in Kenya Colony, East Africa, is going to broadcast specially for constructors of the "Kilotrap." Get your set ready in time for these special programmes next month.

board as rigidly as possible, because if it is at all "wobbly" you will find it will produce all manner of unpleasant effects when the set is in use.

When making the original set I found it possible to obtain ample rigidity merely by using screws along the base of the panel, but if you feel inclined to make doubly sure of it use small panel brackets for the job.

in place, and attach the flexible clip from the series aerial condenser to a point about midway on the grid coil. Next join up the L.T. accumulator and the H.T. battery (100 or 120 volts for H.T. plus 2, and 80 or 90 volts for H.T. plus 1), a pair of phones, and the aerial and earth leads.

With regard to valves, either two-, four-, or six-volters can be used quite



SAVOY HILL NEWS

Mr. Churchill, Broadcaster—Television Again—B.B.C. Dress Regulations—"November Woods"—The Mühlacker Situation—Post Office Speed-Up—Daytime Concerts—Those Auditions—B.B.C. Organisation—Summer School at Orford—Less Talk in Summer.

Mr. Churchill, Broadcaster

MR. WINSTON CHURCHILL is known to listeners chiefly through the success of his annual charity appeals at Christmas on behalf of wireless for the blind. These have been "thunderingly fruitful." But Mr. Churchill has also broadcast with conspicuous success on matters of political and general interest, and it appears that he is quite bitten with the new bug.

The other day he rather fancied himself giving a special disquisition on his Indian policy, and promptly put in for the right to use the microphone. It was not so long ago that he offered to pay a certain amount per minute for "broadcasting time" in order to expound his policies.

So you see, Mr. Churchill has his eye very definitely on the microphone. When he sees fit to retire from the strain of active political life, I would not be at all surprised if his contemporaries of those distant days insist on his being Chairman of the Broadcasting Corporation.

Television Again

And so the Marconi Company has been keeping a line of its own on television all the time, while giving the appearance of being delightfully unconscious about the whole thing.

It is now rumoured on the best authority that the research people at Marconi House are more than satisfied with the results of their two years' work, and that the famous "yacht" is taking an active interest in the proceedings.

There is no report as yet of a B.B.C. trial, but, of course, these are early days.

If the new system is as good as reputed the Baird system will not

stand a "look in" in comparison. Will Savoy Hill displace the Baird system if Marconi's is better, or run the two together?

A nice problem of equitable adjustment, especially when it is kept in mind that no less than four other new and apparently reputable systems of television are clamouring for admission to the experimental ether through B.B.C. etations.

Dress Regulations

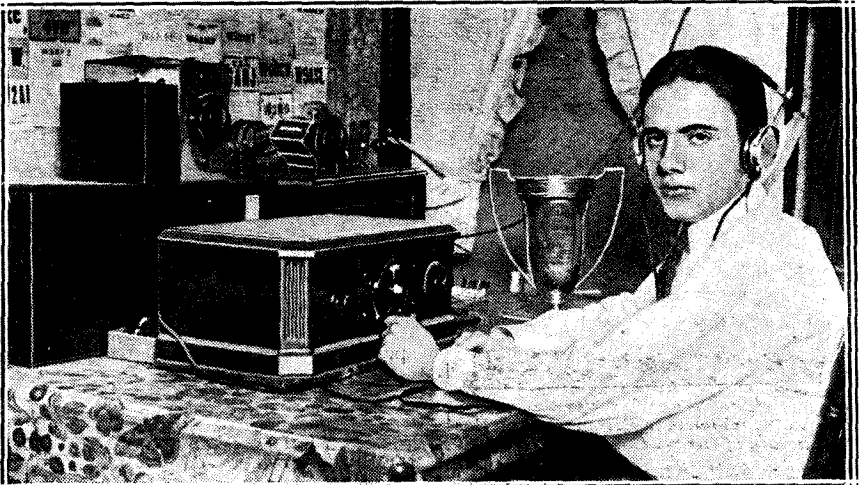
Savoy Hill has decided to make a distinction in the dress of musicians in the Promenade Concerts and in the

For Symphony Concerts the dress always will be tails, white tie, and white waistcoat. All B.B.C. officials in contact with the public are required to wear hard collars, with a preference for short, black coats and striped trousers. Announcers and other officials on duty at night, except the engineers, wear informal evening dress.

"November Woods"

Bax's "November Woods" was so successful as performed in Queen's Hall in February that it is to be repeated in Dr. Boulton's Sunday evening

HE HELPED THE POLAR EXPLORERS



This is Jesse L. Kiefer, a 13-year-old schoolboy of St. Louis, Mo., and beside him is the Cup presented for his outstanding radio service to the MacMillan Arctic Expedition. He made his own short-wave set, and then kept in touch with the Polar exploration ship, taking its messages and forwarding them to their destinations.

Symphony Concerts. In the Proms. the following will be the dress worn: Dinner jacket, black waistcoat and black tie; changing in very hot weather to black alpaca coat, with white silk tennis shirt and black tie.

programme on Easter Sunday, April 5th.

The Mühlacker Situation

The various modulation experiments attempted by the B.B.C. and

(Continued on page 366.)

AS WE FIND THEM



Testing Leads

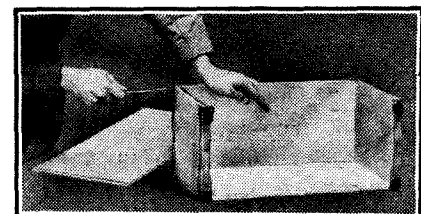
MESSRS. FERRANTI, LTD., of Hollinwood, Lancs, are marketing some neat radio testing leads which retail at 5s. a pair. Each lead consists of a length of high-quality flex, terminating at one end with a substantial spade connector and at the other with a sharp-pointed prong fitted with a bakelite moulded handle. One lead is black and the other is red.

These testing leads should prove very valuable to experimenters and dealers, and can be recommended.

The "Byldurone" Cabinet

Messrs. J. J. Eastick & Sons, Ltd., of Eelex House, 118, Bunhill Row, London, E.C.1, are the originators of an interesting scheme which enables the amateur to construct an inexpensive and easily assembled cabinet of good appearance.

The necessary wood is provided in standard lengths, and sets of four angle-pieces are obtainable in colours



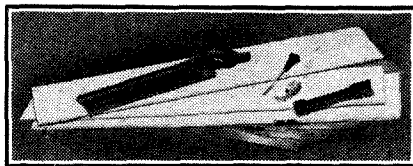
Special angle-pieces make the assembly of a "Byldurone" cabinet an extremely simple matter.

to match the cabinet finishing materials in oxy-copper, oxy-silver, and nickel-plate. The finishing materials include crocodile, lizard, leather, and wood veneer.

Full details of the scheme can be obtained from the firm in question. The only tools needed are a saw and a screwdriver.

Watmel Resistances

Messrs. Watmel Wireless Co., Ltd., of High Street, Edgware, Middlesex, have sent us one of their new wire-wound resistances.



A saw and a screwdriver are the only tools required for the cabinet kits received on this page.

The component has been designed for use in circuits requiring a non-inductive winding, and the resistance value is clearly marked on the top of the former.

The makers guarantee all these resistances to be within 5 per cent of their rated values. The particular specimen submitted had a rated value of 600 ohms, which we found to be correct upon measurement.

The values obtainable range from 100 ohms to 100,000 ohms, and the current-carrying capacities from 50 m.a. to 6 m.a. respectively.

Mains Units for Portables

Messrs. Radio Instruments, Madrigal Works, Purley Way, Croydon, recently sent us two of their H.T. mains units, designed for use in portable receivers. These units, of course, are equally suitable for receivers of conventional type.

In size they are a little larger than a standard 100-volt dry battery, and the current output is 20 m.a.

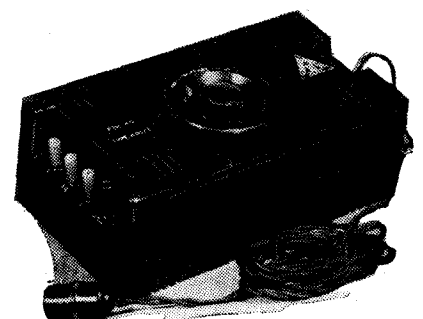
The internals are completely enclosed in a highly-polished brown bakelite case, and the tapping sockets are cunningly recessed so that there is no risk of shocks through touching any part of the unit.

The question of ventilation has received attention, and louvres are provided to maintain an even working temperature.

The units are made in two models. The A.C. version retails at £4 15s., and is designed for an output of 200-250 volts 40-100 cycles. There is a 60-80-volt tapping for the screening grids of S.G. valves, a variable tapping for the detector, and a power tapping of 140 volts up to 20 m.a. for the output stage. A Westinghouse metal rectifier is used.

The D.C. model is priced at £2 12s. 6d., and is suitable for D.C. mains rated at 200-250 volts. The H.T. voltage tapplings are identical with those of the A.C. model.

The units are soundly designed and can be recommended.



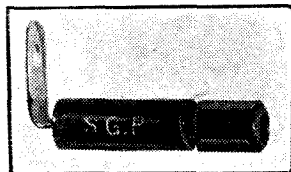
It is impossible to get a shock from the R.I. portable set H.T. mains unit.

AS WE FIND THEM

—continued

Messrs. R.I. have also produced an L.F. choke having an inductance of 25 henries, and able to carry up to 30-60 m.a., the price being extremely moderate, namely, 12s. 6d.

The core is of nickel-iron, and in consequence the component is compact and takes up very little space



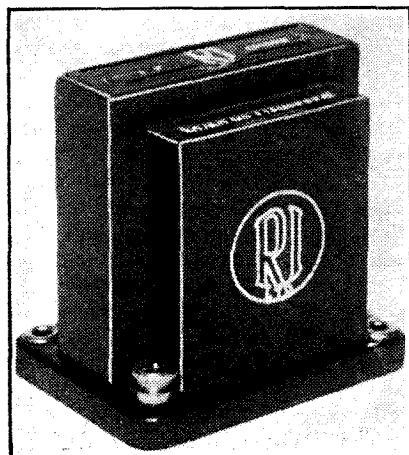
A neat Clix plug connector, for S.G. terminals. It retails at 3d.

on the baseboard. This choke can be employed either in mains units for smoothing purposes, or as an output filter choke.

We have had one of these chokes in use, and find it to be very good indeed.

Wates Double Cone

The Standard Battery Company, of 184-188, Shaftesbury Avenue, London, W.C.2, have sent us one of the new Double Cone Chassis, Model



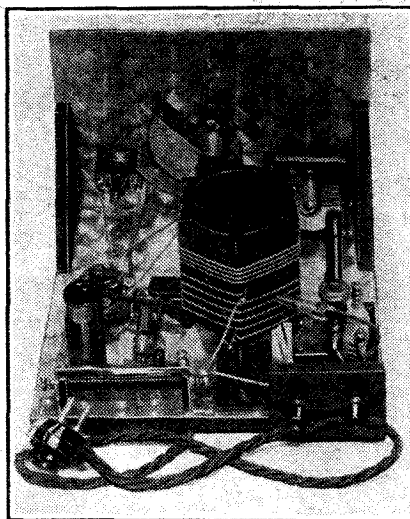
The makers of this nickel-iron-cored choke are already famous for their efficient nickel-iron-cored transformers.

31. We are informed that the paper for the larger cone is now made by a new process, and that the method of suspension employed ensures perfect freedom of movement, without in any way affecting the even tension obtained by the scroll cutting.

The prices of this new chassis are as follow: 12-in. model, 8s.; 14-in. model, 9s.; and the 22-in. model, 11s.

Clix Connectors

Messrs. Lectro Linx, 254, Vauxhall Bridge Road, London, S.E., have submitted a vertical type anode connector. The actual connecting tag is bent round at right-angles to the socket, which is designed to pass through a hole in the top of the valve screen in the case of S.G. valves which are completely enclosed.



Last month we gave a full report of the well-made Peto-Scott "Kelsey" Adaptor. And here is a photograph of the little unit which makes short-wave reception so easy.

Graham Farish "Kone Kap"

Messrs. Graham Farish, of Masons Hill, Bromley, Kent, have produced a cheap type of grid leak retailing at 1s.

The "Kone Kap" has conventional shaped ends, as distinct from the more expensive Graham Farish Megite type, which has terminals. On



A new low-priced grid leak.

measurement we found that the specimen submitted had an actual value of 2 megohms.

"Cony" Terminal Cleaner

Messrs. F. Langdon & Co., of 4, Dollis Road, London, N.W.3, have submitted a handy little "gadget" for cleaning terminals. It is made of silver steel, and should give a clean, bright surface to the dirtiest terminal in a few seconds.

This terminal cleaner retails at 7½d.

The "Kelsey" Adaptor

The Peto-Scott Co., Ltd., point out that the above-named unit is priced at 37s. 6d., C.O.D., not 27s. 6d., as stated last month.

THOSE PANELS

How to make the edges look neat, and how to drill short holes.

Finishing Panel Edges

IF you have occasion to cut an ebonite panel, you will find that the cut edge is very rough in appearance in comparison with the finish on the original edge. To impart a similar finish to the new edge you must first of all clamp the panel in the vice and remove the marks of the saw with a medium flat file.

Work the file diagonally across the edge, taking care not to cut too deeply at any one point. Next lay the file flat along the edge and push it straight along the edge with firm strokes, keeping the whole length of it pressed down on the work.

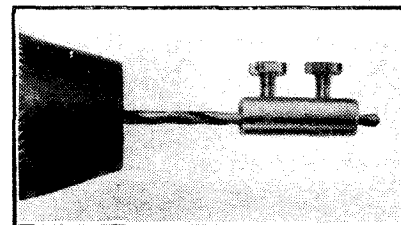
Now wrap a strip of emery cloth round the file and work with this in straight lines backwards and forwards till all the file marks have disappeared. Repeat with the finest emery paper.

Finally, moisten a piece of rag with turpentine, rub this into the edge and polish off with a clean, soft rag.

For Accurate Drilling

Quite often the constructor may require to drill a hole in ebonite or in a piece of metal for a pre-determined distance only. For instance, in order to attach small components to the back of a panel by means of small screws it may be desirable to drill the screw holes merely half-way into the panel in order to prevent them from showing on the panel face.

Here is a simple little method of effecting precision drilling of this



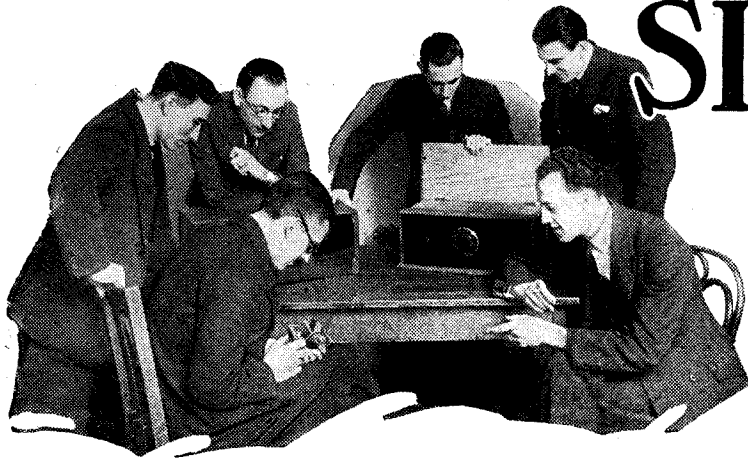
An ordinary wire connector makes a useful stop for small drills.

nature. Obtain a brass connector, and slide it on to the drill in the manner depicted in the accompanying illustration.

Allow a length of drill equal to the depth of the hole required to be drilled to protrude below the connector.

A drill used with the connector in position will only make a hole as deep as the length of drill projecting, so in this way there is no fear of drilling too deep.

SIMPLER RADIO



As was only to be expected, the Ideas Committee at their last meeting devoted most of its time to discussing the wonderful new Extenser condenser.

At the recent meeting of the WIRELESS CONSTRUCTOR Ideas Committee a separate Extenser, and a receiver fitted with Extensers instead of the usual variable condensers and wave-change switches, occupied positions of honour—at the head of the modest-sized table around which the members generally group themselves.

Not Reported

Following the normal procedure, Mr. Victor King set the ball rolling.

"I feel," he said, "that we owe readers some slight explanation, if not an actual apology. These meetings are presumed to be completely open in character, with nothing excluded from the published reports that is of any real significance. And yet we cannot honestly say the Extenser was not mentioned at our last meeting, can we? True, it only came up towards the end."

But Mr. Johnson Randall reminded Mr. King that the Extenser was still in the development stage at that juncture, and the deletion of the remarks made about it from the committee report that was published was thought desirable, for it was not then known that such complete success would be achieved as was the case.

"If you remember," remarked Mr. Randall, "we hardly realised its vital importance at that stage, and a premature announcement of a subject of such great importance might have prejudiced its future."

A Rare Event

Victor King admitted the truth of this, and observed that, in any case, the inception of an Extenser or anything of like magnitude was a rare event anywhere in the whole world of wireless, and for that reason the conditions were completely exceptional.

"By the way," he continued, "I have just been glancing through the hundreds of letters received from readers commenting on our 'How

The Ideas Committee comprises selected members of the Editorial, Contributing, Research and Queries Depts. Meeting once a month, these people informally discuss such interesting matters as may arise, more particularly in relation to the home-construction of radio sets. Readers' comments and suggestions regarding past and future meetings will be welcomed.

Many Stages' discussion. It is a decidedly interesting and helpful batch of correspondence, though I do not think we can engage in their analysis now.

"But I do notice that one or two of our remarks have been detached from their context and criticised rather keenly.

"For instance, one of us said something to the effect that in the design of receivers we should 'forget America.'

"That phrase appears to have

caused many correspondents to assume we are 'too insular,' while others assert that it implies a dogmatic attitude towards the science.

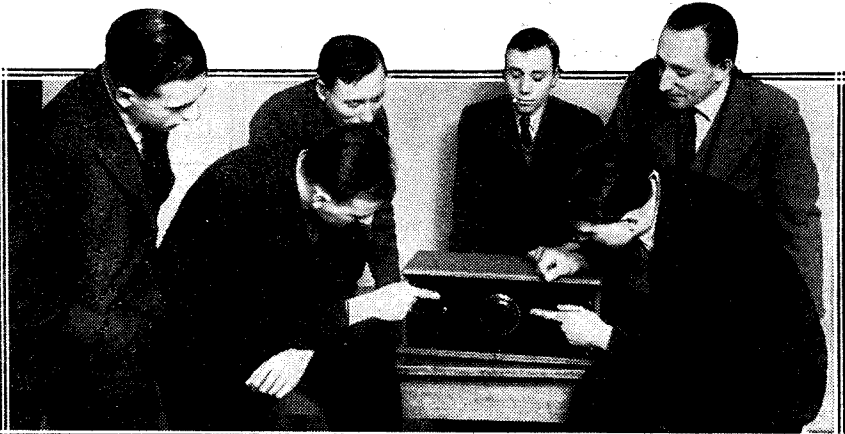
"On behalf of the committee, I think I can say that we do not adventure into these discussions with any set formula, and that we 'chat' rather than debate. And I would ask readers to endeavour to read the spirit of our little assemblies through the cold print in which they are recorded.

Heated Discussions

"Our discussions are apt to get quite heated at times, and, no doubt, many of you other chaps here, as with myself, often wish we could wash out what we have said and retire to our private rooms in order to write up our cases carefully—choosing our words with the greatest possible discrimination, and pausing to think every now and then.

"But that again would destroy the whole idea upon which the WIRELESS CONSTRUCTOR Ideas Committee is founded.

THE WORLD'S FIRST EXTENSER SET



Members of the "Wireless Constructor" staff examining the "Extenser" Two, the very first set officially to use an Extenser condenser. The receiver is described in detail in other pages of this issue.

Simpler Radio—continued

"And so I would urge readers not to examine isolated phrases in these reports with too great a concentration. 'Forget America' sounds horribly narrow when the phrase is interpreted in a general sense. But if, for instance, I had used the words to precede 'when you study the question of wave-changing, for all American broadcasting is compacted into the one wave-band,' they would become plain common-sense.

The Vane Design

"And talking of wave-changing brings me back to the Extenser. And I feel it my duty to pay special tributes to two of our members for the work they have done on it. I refer to Mr. A. S. Clark, who has been one of the

of pleasure, while our readers will, no doubt, appreciate it even more in the circumstances."

Mr. G. T. Kelsey was perfectly willing to accede to the request, and the following is, in substance, what he had to say.

"Owing to the peculiar nature of the problem of evolving divergent logarithmic actions extending through two 180° rotations from a common point, a considerable length of time had to be expended in planning a method of attack.

"It was difficult to apply a general mathematical treatment until at least the rough form of vane shape had been arrived at; and so, in the first instance, I went to work geometrically. It was really quite simple.

meshed to an extent corresponding to a 10° dial movement over the known half of the condenser, I calculated the area of overlap.

"I then drew the moving plate in a position corresponding exactly to a 10° dial movement in the other direction, and as I already knew the area of overlap required to give me a true square-law effect one way, it was simply necessary to shape the plates in such a way that I obtained an exactly similar overlap area in the other direction.

Marvellous Results

"I followed this procedure for every 10° of the dial until the whole range had been covered, so that with a bit of mathematical 'polishing off' (not to mention the taking of several curves during the process!) I finally arrived at the shape which is employed in the first Extenser."

"And the results are truly marvellous," commented Victor King.

"But I mustn't spend any more time talking about the Extenser, because the report of this meeting will appear in the very same number of the WIRELESS CONSTRUCTOR as a long article by me about this new component. But I would like Mr. Clark to say a few words if he is willing to do so."

In response to this invitation, Mr. A. S. Clark said:

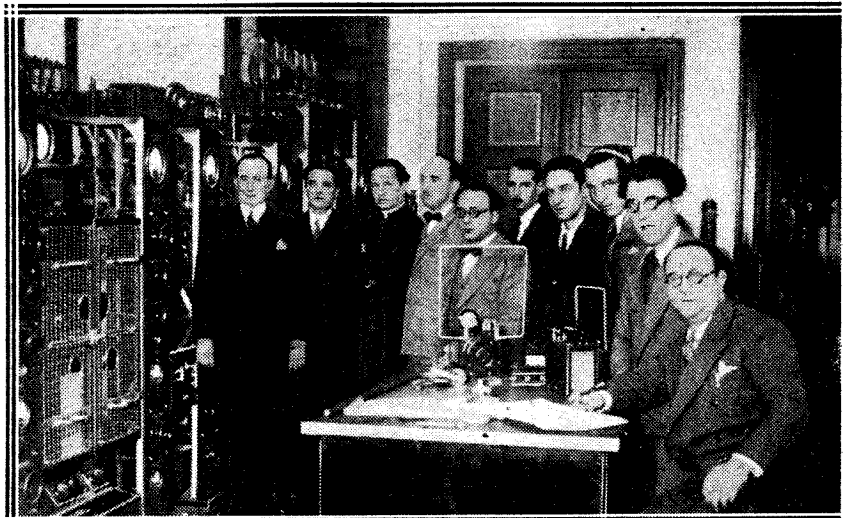
"I regard the WIRELESS CONSTRUCTOR Extenser Condenser as a perfectly logical development. The kind of thing that is inevitable. It constitutes an improvement in radio set design that has everything in its favour and nothing against it. But I believe that it will be accepted by both home constructors and traders calmly and complacently

Steady, Sure Progress

"I do not think there will be that wild enthusiasm that runs riot when spectacular, often impracticable, inventions are publicised. I imagine the public's reaction to the Extenser will be, 'Oh, yes, of course! Wonder why no one thought of that before! We must certainly have Extenser tuning in our sets!'

"And so the Extenser system will progress steadily and surely, and eventually, without any shadow of doubt, the time will arrive when sets without Extenser tuning will become as obsolete as the slider and solenoid type of tuning is to-day."

RADIO IN THE VATICAN



This is the broadcasting apparatus installed in the Vatican, and which enables the Pope to speak to the world. Marchese Marconi is to be seen on the extreme left of the photo.

most enthusiastic sponsors of the system, and whose cheery optimism contributed much to its ultimate success, and to Mr. G. T. Kelsey, who superintended all the vast amount of mechanical work that was necessary in the moulding of a structure sufficiently advanced in every detail to be worthy of immediate duplication on the part of both home-constructors and manufacturers.

"Now I am going to ask Mr. Kelsey if he will tell us exactly how he arrived at the particular vane design used in the original model. Five out of those of us present know, of course, but I think we could all listen to a nutshell lecture from Mr. Kelsey on this intriguing subject with the greatest

"My first aim was to obtain a shape of square-law vane which, when working through the normal range of 0 to 180°, gave to all intents and purposes an accurate square-law effect.

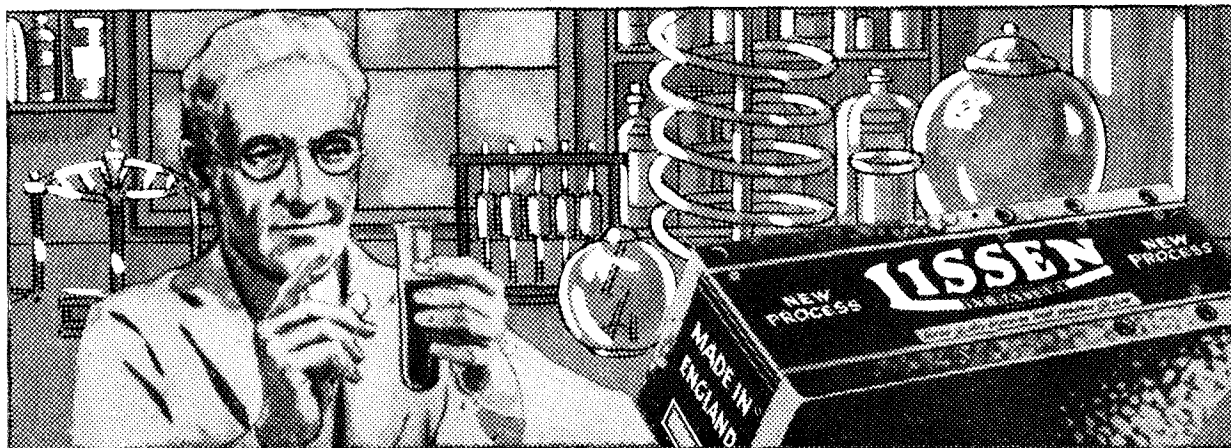
Ideal Shape

"The shape of vane I finally selected as being ideal for the job was determined by the taking of curves; which method, as I am sure you will agree, was the only really satisfactory way of getting down to it."

"And having obtained a plate-shape that gave a true square-law effect over what is our present normal tuning range, the rest was reasonably straightforward. Starting in a geometric fashion, with the plates en-

CHEMICAL MAGIC

**AS THE BASIS FOR A SECRET PROCESS
PRODUCING SUPER-NORMAL CURRENT-PER-CELL
FROM A LISSEN HIGH TENSION BATTERY**



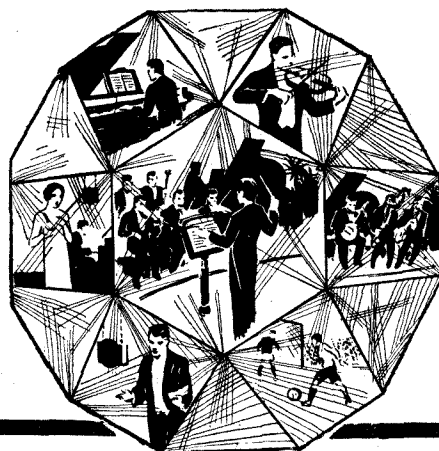
How to save money on your outlay for H.T. current and how to capture anew the thrill you enjoyed when first you heard radio!

The reason you get more power from a Lissen Battery is because more power is put into it by the exclusive process and chemical combination which you can only get in a Lissen Battery.

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Then for purity of power, for noiselessness of current flow, for smoothness, for the entire absence of any ripple or hum, the Lissen Battery has never been rivalled. Even after months of use the power of a Lissen Battery is so pure that your loud-speaker utterance is still natural and true.

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GIVES SPARKLE AND
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60 volt 7/11 100 volt 12/11 Also made in all sizes, all voltages, all capacities to suit your needs.

Inside Information About British Broadcasting

SAVOY HILL NEWS

—continued from page 363

the German engineers have effected a considerable improvement, and there are now far fewer complaints of interference from this cause. But anxiety about the general problem of the separation of high-power stations in the broadcast band is still acute.

Day-Time Concerts

The light classical concert on Mondays is to be stabilised to run from 12 noon to 1.15. Any other light classical concert that may be introduced during the day will be of the same length. Sunday recitals will be thirty minutes; instrumental

a prodigiously long list of "microphone possibles," some of which would have to wait five years if the ordinary system of "turn taking" were applied.

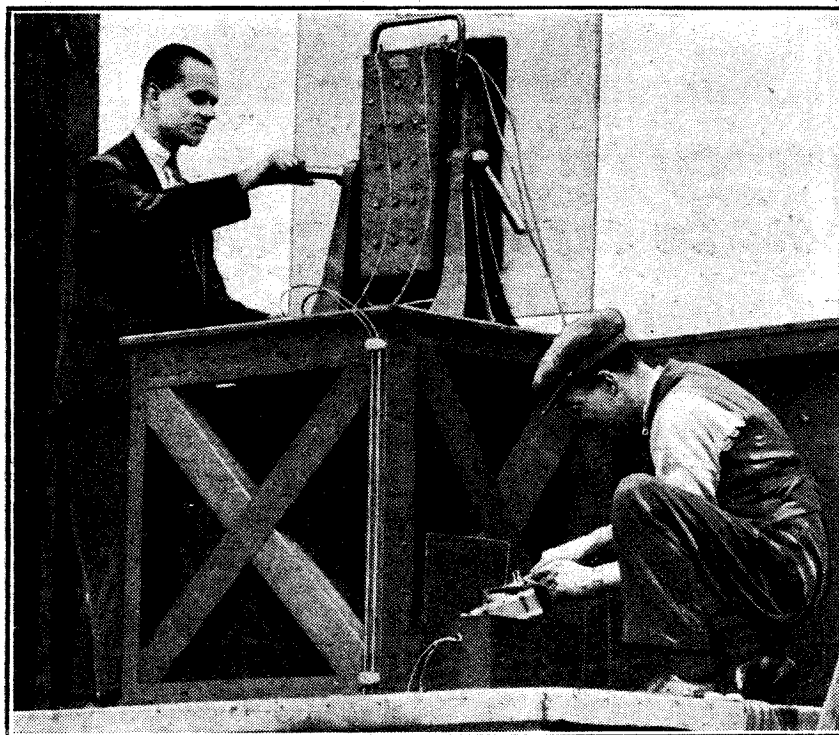
So auditions are being stopped for the time being, anyway. This problem has raised afresh the bigger problem of whether the B.B.C. should set its face definitely against the amateur.

It is felt by the professional musicians' organisations, and by most of the musical officials at Savoy Hill, that it is the duty of the B.B.C. always to give preference to those who make the whole of their living from their art. On the other hand, it might well be that a rigid application of such a policy would be disadvantageous to the programmes.

The recently appointed secret committee on railway amalgamation has been paying special attention to Savoy Hill as a possible model. There are also many experts who would reorganise the Post Office on B.B.C. lines. The main idea is to secure the flexibility, initiative, and energy of private enterprise without the restrictions and dead hand of State immediate control.

From this standpoint there is certainly much to be said for the B.B.C. as a model for public utilities. The public is protected through the charter and licence; Parliament has remote ultimate control, but not the right of interference in administration. The arrangement works very well.

A FOOTBALL BIG NOISE



This is an open-air loud speaker specially installed to entertain the football crowds at St. Andrew's, Birmingham.

programmes (two instrumentalists, one singer) will run for an hour; and a ballad concert with three singers will be allotted the same time, that is, one hour.

Those Auditions

The policy of the B.B.C. has always been to throw out a wide net for musical and vocal talent of all kinds.

The result is that there is now

B.B.C. Organisation

It is now generally agreed by those who know the facts that B.B.C. organisation is in the main successful and economical. In an era of "rationalising" and general examination it is not surprising that both private enterprise and departments of State are turning to the B.B.C. to see whether they can learn anything from it in this matter of organisation.

A Summer School at Oxford

On Saturday, June 27th, there will begin at New College, Oxford, an interesting new B.B.C. experiment. Sir John Reith will preside at the opening session at 8 p.m. on the Saturday, and among the principal speakers will be the Archbishop of York.

The main purpose of this summer school will be the training of students in group leadership for subsequent "follow-up" work throughout the country. There will be eighty students, divided up into eight groups, meeting separately once a day. The tutors will include Professor T. H. Searls, Mr. R. S. Lambert, Mr. C. James, Mr. J. H. Nicholson; and Mrs. Mary Adams.

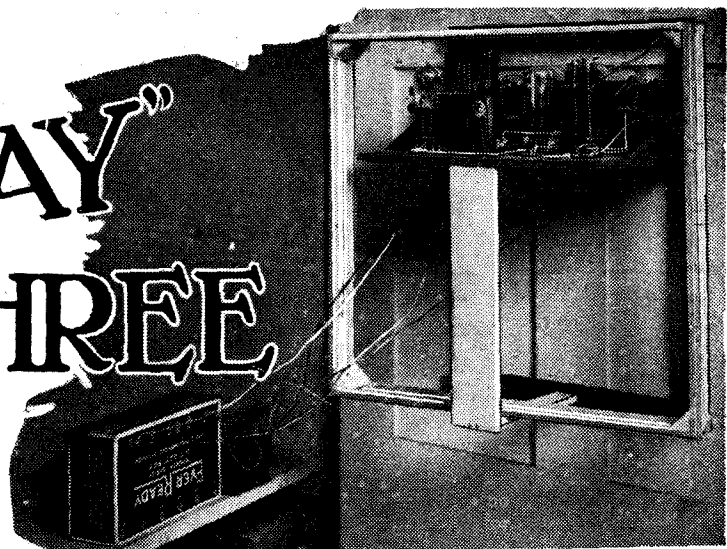
At the end of the summer school—that is, on July 4th—Mr. C. A. Siepmann will sum up the work of the week. It is, of course, due mainly to the great ability and indefatigable energy of Mr. Siepmann that the adult education side of the work of the B.B.C. has made such wonderful progress in the past two years.

Less Talk in Summer

The "entertainers" at Savoy Hill have scored a distinct tactical victory over the "uplifters." There is to be about a 30 per cent reduction in talks during the summer and a corresponding increase in "seasonable entertainment." This is a sensible decision, and one hopes it will be a real precedent. Perhaps, indeed, it may be found that next winter the slogan should be "fewer and better talks."

THE "STOWAWAY" THREE

Novelty in set designs is a strong feature of the "Wireless Constructor," as most readers will realise if they think back over a few numbers. Such sets as the "Pylon" Three, the "Pavane" Four, and now the set described hereunder, are completely new in conception. The "Stowaway" Three is an ingenious receiver. It is designed to be tucked away in a cupboard, or in some bookcase where it will be always ready to provide music whenever required.



By A. S. CLARK.

OUT of sight, out of mind, but not out of hearing." The old proverb, with this slight addition, is a very good introduction for the "Stowaway," a set designed along lines which are entirely new.

Those of you who use your receivers only for entertainment purposes, on the local transmissions, do not want to see more of them than necessary, but naturally first-class results are a *sine qua non*, as also is simplicity of operation. For you the "Stowaway" represents the ideal receiver.

Right Out of Sight

As the name implies, it hides right

away out of sight, and no one need know it is there until you choose. Then it comes forward with the real goods. Just a small movement of a switch gives you one of two pre-arranged programmes, perfectly tuned in, with perfect quality; it is a real station-change receiver.

The set can be stowed away behind any door, whether it be that of a cupboard or a room or a bookcase, and the door itself acts as an excellent baffle for the loud speaker.

All you see is the front of the loud speaker, namely, the fret, which can be artistically disguised, and just above it two small knobs. One for the switch that turns the receiver on and off, and enables the choice of station

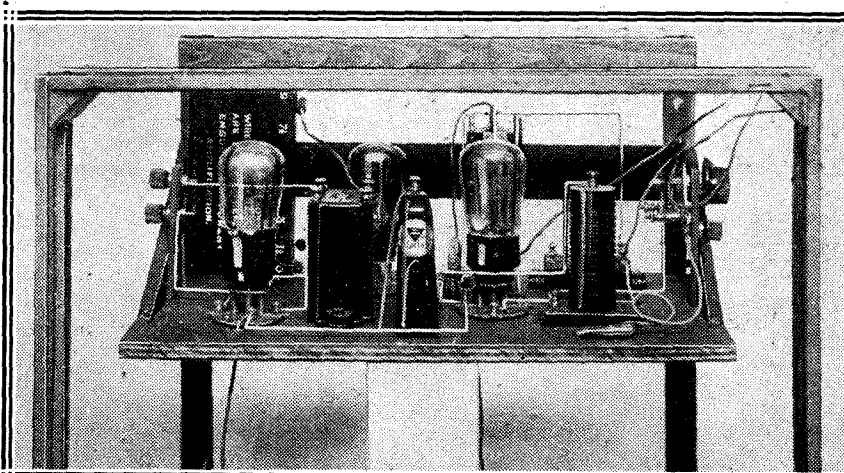
to be made; and the other for volume controlling.

But even if you do not want to tuck the set away out of sight, it still has many advantages. It is capable of working without any external aerial or earth, and, consequently, if the batteries are arranged with it in a neat box, it makes a fine transportable outfit.

Many Interesting Points

There are many interesting points in the set, with regard to both constructional and technical considerations. These make it worthy of consideration by those who are not desirous of actually making it up, but who are interested in matters of design from a general angle.

ALL THERE IS IN IT!



With its swivelling frame aerial the set makes a very neat little three-valver for local reception.

- 3 Sprung valve holders (Clix, or Telsen, Igranic, Lissen, Bulgin, Lotus, Benjamin, W.B., Wearite, Magnum, Formo, Dario, etc.).
- 1 .0001-mfd., or higher up to .0002-mfd., reaction condenser (Lotus, or J.B. Igranic, Polar, Ready Radio, Lissen, Igranic, Dubilier, Ormond, etc.).
- 1 .0003-mfd. compression type variable condenser (Formo, or Lissen, Lewcos, Polar, R.I., etc.).
- 1 .001-mfd. compression type variable condenser (Formo, etc.).
- 1 H.F. choke (Lewcos, or Lotus, R.I., Dubilier, Keystone, Wearite, Ready Radio, Lissen, Varley, Magnum, Parex, Watmel, etc.).
- 1 .0003-mfd. fixed condenser (Lissen, or Ready Radio, Ferranti, T.C.C., Edi-

- swan, Telsen, Dubilier, Igranic, Formo, Watmel, Sovereign, Ormond, etc.).
- 1 .01-mfd. fixed condenser (Mullard, etc.).
- 1 100,000-ohm fixed resistance and holder (Varley, or Lissen, Igranic,

R.I., Mullard, Dubilier, Ediswan, etc.).

- 2-megohm grid leak and holder (Graham Farish, etc.).
- 1 L.F. transformer (R.I. Hypermu, or Ferranti, Igranic, Lissen, Varley, Telsen, Lewcos, Mullard, Lotus, etc.).
- 1 .5- or 1-megohm volume control, 3-terminal type (Igranic, or Gambrell, Varley, Lissen, R.I., Magnum, Sovereign, Centralab, Wearite, etc.).

- 1 Double-pole change-over type switch (Wearite, with terminal connections, or similar type).

- 3 Terminals (Belling Lee cheap type, or Igranic, Clix, Eelex, etc.).
- Ebonite strip, 13 1/4 in. x 1 1/2 in.
- Wood for frame, battery plugs, ebonite, flex, screws, etc.

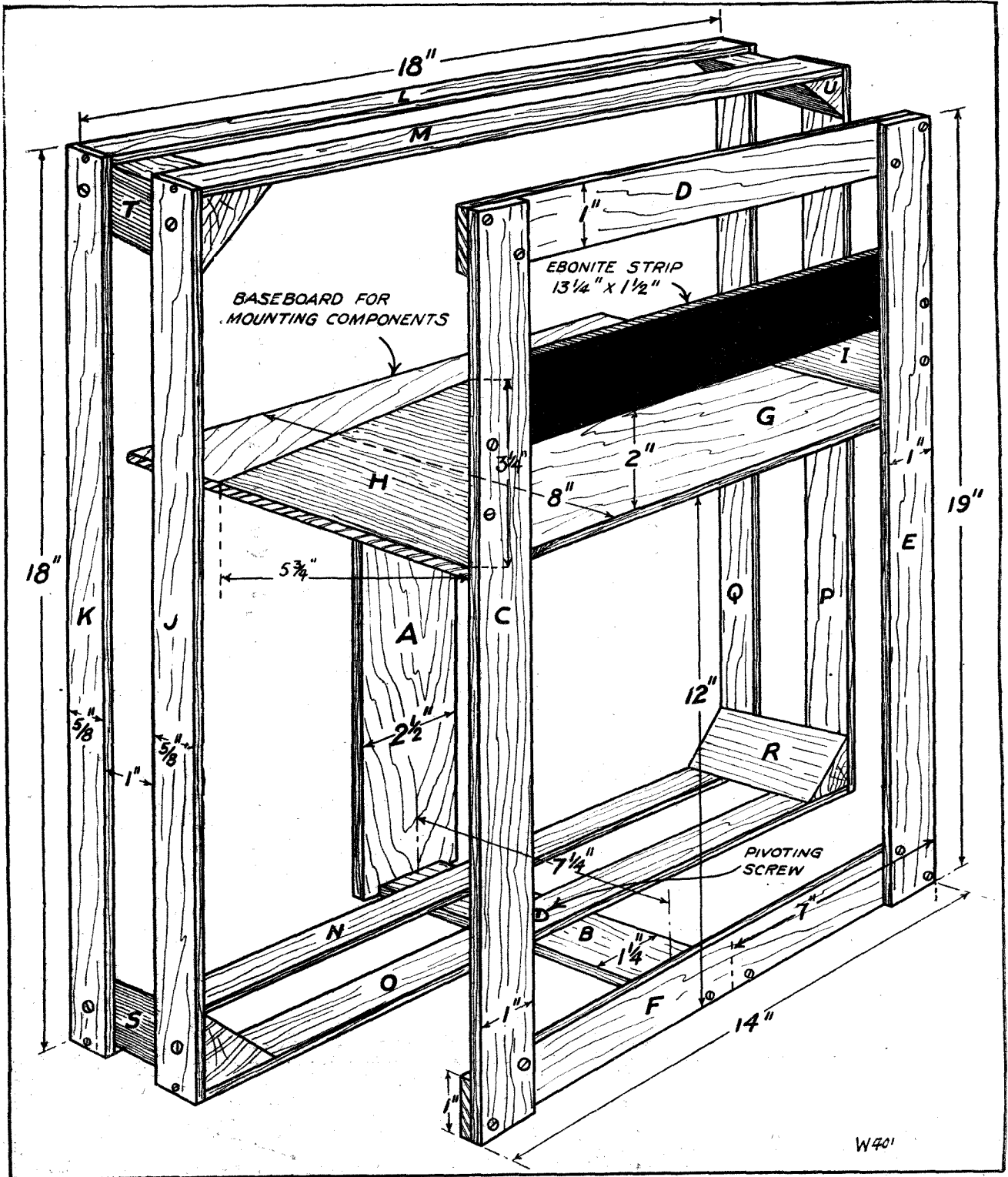
The "Stowaway" Three—continued

Having given you an idea of the type of set which the "Stowaway" is, we can now go more fully into the

details of its design. First of all, with regard to what we may term the general scheme.

Since the set is intended for mounting behind a door or in a similar position, the ordinary type of cabinet

ONLY VERY SIMPLE CARPENTRY IS NECESSARY TO MAKE IT



Here are shown all the necessary details for the construction of the wooden framework. The main baseboard (G) is fixed to the uprights (C) and (E) by means of the wooden corner-pieces (H) and (I).

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1 Polished ebonite panel, 14 in. x 7 in. x 7/8 in.	4	6	
1 Hand-polished cabinet, with 10-in. baseboard	1	2	6
1 J.B. '0003-mfd. slow-motion "Tiny" condenser	9	6	
1 J.B. '0001-mfd. slow-motion "Tiny" condenser	8	6	
1 Varley 50,000-ohm wire-wound potentiometer	10	6	
1 ReadiRad 3-point switch (on and off)	1	6	
2 Telsen 4-pin valve holders	2	0	
1 RadioRad '0001-mfd. fixed condenser	10		
1 ReadiRad '0002-mfd. fixed condenser	10		
1 ReadiRad 3-megohm grid leak and holder	1	4	
1 ReadiRad 2-megohm grid leak and holder	1	4	
1 ReadiRad 400-ohm baseboard-mounting potentiometer	2	9	
1 Telsen "Radiogrand" L.F. transformer, ratio 7-1	17	6	
1 Bulgin type N.7 neutralising condenser	4	9	
1 Igranite short-wave H.F. choke	2	0	
1 T.C.C. 1-mfd. Mansbridge fixed condenser	2	10	
3 Belling Lee "R" engraved terminals	2	3	
1 Ebonite strip, 14 in. x 2 in., drilled to specification	1	6	
1 Packet "Jiffilix" for wiring	2	6	
1 Set of 2 ReadiRad short-wave coils to specification, and 4-pin base	15	0	
2 Mullard valves, Det. and Power	19	0	
Wire, screws, flex, wander plugs, tapping clip, etc.	1	1	

£6 14 6

KIT A less valves and cabinet **£4: 13: 0**
or 12 monthly payments of 8/6

KIT B with valves less cabinet **£5: 12: 0**
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KIT C with valves and cabinet **£6: 14: 6**
or 12 monthly payments of 12/3

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1931 MULLARD "ORGOLA" FOUR

2 S.G. Valves, Power Grid, Detector and Pentode. Complete Kit of Parts with valves and cabinet, £13/12/6, or 12 monthly payments of 25/-

1931 MULLARD "ORGOLA" THREE

Screen Grid, Detector, Pentode. Complete Kit of Parts with valves and cabinet, £8/0/0, or 12 monthly payments of 14/8.

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"AMPLION" and "CELESTION," and other leading makes of loud speakers. Large stocks of all models for cash or monthly payments.

"STOWAWAY"

THREE

	£	s.	d.
3 Telsen 4-pin valve holders	3	0	
1 ReadiRad '0001-mfd. reaction condenser	2	6	
1 Formodensar, '0003-mfd. maximum capacity	1	6	
1 Formodensar, '001-mfd. maximum capacity	1	6	
1 ReadiRad "Hilo" H.F. choke	4	6	
1 ReadiRad '0003-mfd. fixed condenser	10		
1 T.C.C. '01-mfd. flat type fixed condenser	2	6	
1 Varley 100,000-ohm resistance and holder	7	0	
1 ReadiRad 2-megohm grid leak and holder	1	4	
1 Telsen "Radiogrand" L.F. transformer (ratio 5-1)	12	6	
1 Igranite megostat, 5 megohm	6	0	
1 Wearite double-pole change-over switch, with terminals	4	0	
3 Belling Lee "R" type terminals	9		
1 Ebonite terminal strip, 13 1/2 in. x 1 1/2 in. x 7/8 in.	1	0	
1 Packet "Jiffilix" for wiring	2	6	
3 Valves to specification, Det., L.F. and Power	1	7	6
Flex, wire, screws, plugs, etc.	1	1	

Total (including valves) **£4 0 0**

Or 12 monthly payments of 7/4

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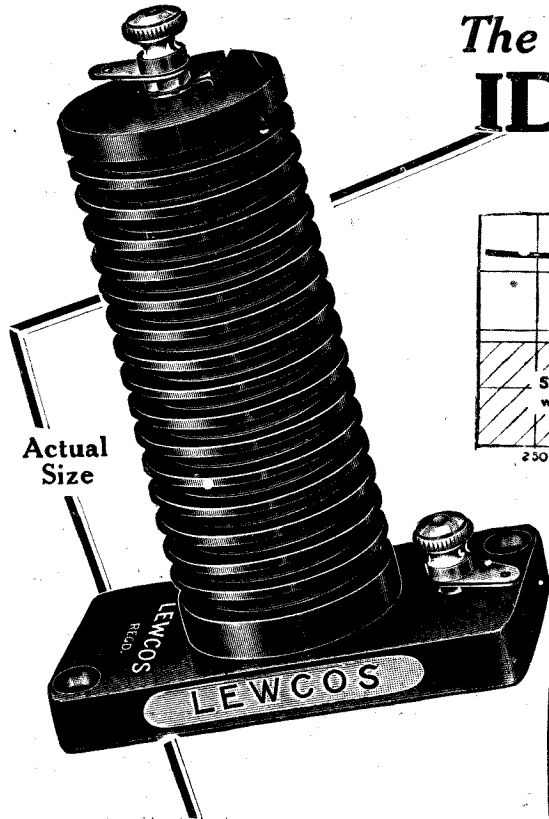
159, BOROUGH HIGH STREET, LONDON BRIDGE, S.E.1.

Telephone: Hop 5555 (Private Exchange) Telegrams: READIRAD, SEDIST.

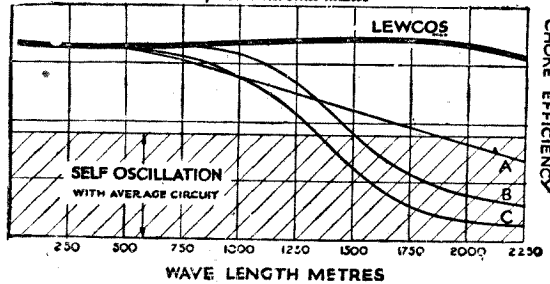
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showing the performance of the Lewcos H.F. Choke
compared with other makes



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Regd.
H.F. CHOKE
PRICE 7/9

Here is an ideal choke for all wireless enthusiasts who are not satisfied that their receivers are working to maximum efficiency.

The diagram printed above shows the percentage choking effect on all wave-lengths from 20/2250 m. of the Lewcos H.F. Choke as compared with three other popular makes, A, B, & C.

The shaded portion of the diagram indicates the danger zone wherein self-oscillation is liable to occur in a receiver and it will be noticed the Lewcos Choke is well above this.

Write for fully descriptive leaflet Ref. R.33.



The Lewcos H.F. Choke is specified for the "Stowaway" Three receiver described in this issue.

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MAGNAVOX

Moving Coil Speaker

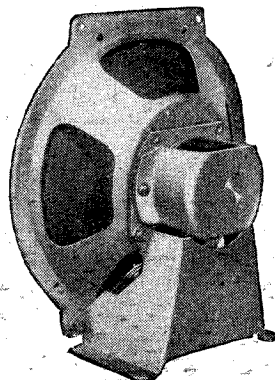
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Birthday of the
LITTLE GIANT

Now you can buy a genuine Magnavox moving coil speaker for 57'6. The new Little Giant embodies all the latest developments in moving coil speaker construction and gives the same perfect performance and response which can only be secured with a genuine Magnavox unit. Your dealer will demonstrate this wonderful new model and you will not be satisfied until you have one. Remember that Magnavox originated the moving coil speaker.

MODEL 230.	6-12 volts D.C.	£2 17 6
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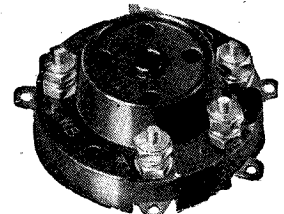
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WHY YOU SHOULD USE

This compact W.B. Valveholder takes either 4- or 5-pin valves. Special one-piece nickel-silver spring sockets, recessed for safety, ensure perfect contact. Screw terminals make soldering optional. The special design of the W.B. Valveholder and the high insulation between its sockets will get the best out of modern valves. Your dealer stocks it. Price 1/-

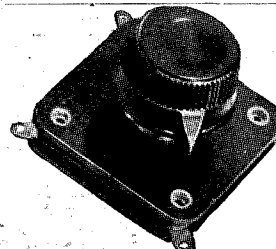


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REACTION
in small sets
requires the
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A very compact condenser with perfect reaction control. Insulated spindle. One-hole fixing. Supplied with strong terminals for connections. Also suited for trimming ganged condensers.

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The "Stowaway" Three—continued

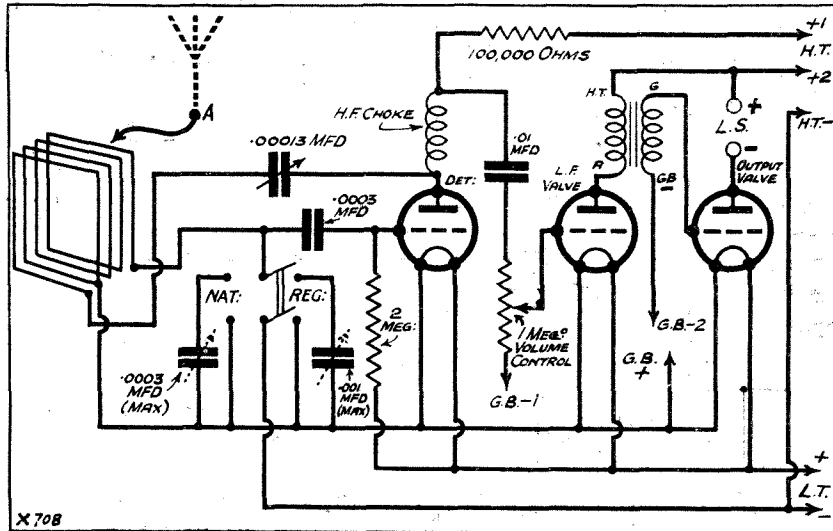
with vertical ebonite panel and baseboard is not used. It is replaced by a simple framework. This framework consists of a main square frame, at right-angles to which the baseboard

and the baseboard are the same the thickness of the wood and the method of assembly is immaterial.

The dimensions of everything are given for those who wish to make an

transformer. No output filter is incorporated, but there is no reason why one should not be used if desired. The L.F. choke and condenser could quite conveniently be screwed to the underside of the baseboard. The frame winding forms the grid and reaction coils. It is really the same as one winding with a tap which is connected direct to the filaments.

SIMPLE BUT EFFECTIVE CIRCUIT



The circuit is ideally suitable for a "domestic" type of set on account of the ease with which it can be operated. To change over from the Regional to the National station it is only necessary to alter the switch shown on the left.

is attached, and across which is a small strip of ebonite on which the two controls are placed. Two pieces of wood, marked A and B in the diagram of the framework, serve as a mounting for the frame aerial.

Comprehensive Details

This frame is pivoted at the bottom, and is enabled to move through a fairly large arc. It is not necessary for the frame to be pointed absolutely directly towards the local station, because the field from the latter will be very much stronger than that from a distant station. Also, a small extra aerial will be used if the local is at all weak. Further details about this are given later.

The space below the baseboard is utilised by a cone speaker of the normal chassis type, screwed to the front frame. In order to fit the speaker, extra pieces of wood across the front frame may be necessary. These are not shown because their actual position will depend on the particular speaker chosen.

Complete dimensions and comprehensive details of the framework are given in a special diagram on another page. Actually, however, so long as the size of the frame winding

exact copy. And now let's look at the circuit diagram.

A three-valve arrangement is employed, consisting of a detector valve followed by two L.F. stages, one resistance-capacity coupled and one

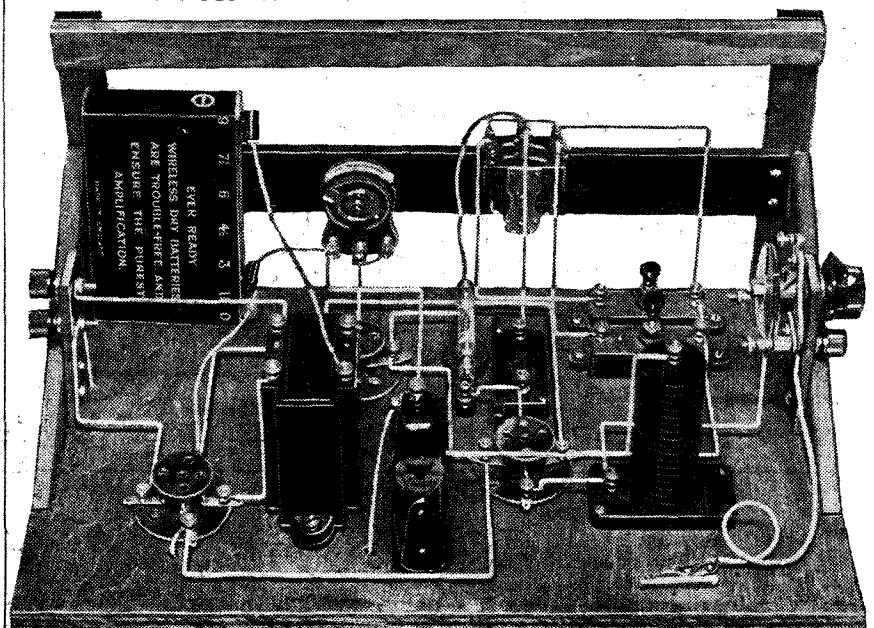
Station Switching

Tuning is carried out by the compression-type variable condensers, one being used to tune in one station and the other one for the other station. Either of the two can be connected across the grid winding by the double-pole change-over switch.

The condenser switching takes up three of the contacts, or one section of the switch; the other section being employed for switching the set on and off. It connects up the filaments when over to either side, the set being off when the switch is in the midway position. For this reason the switch must be one which has a definite centre position, otherwise the set might easily be left on by accident.

The reaction condenser is mounted at one end of the baseboard just above the terminal for the aerial. It is not intended for frequent use, the idea of it being rather simply to liven up the set if necessary.

YOUR SET SHOULD LOOK LIKE THIS



Although the cupboard shelves can be used to accommodate the H.T. and L.T. batteries, there is room for the grid-bias battery on the set baseboard.

The "Stowaway" Three—continued

Perhaps on first consideration the provision of a volume control may appear quite unnecessary, but it must be remembered that one station may come in much stronger than the other. The result is that when reaction is made just right for the weaker of the two, the stronger can easily be much too loud.

Even when no reaction is in use the volume control will be needed in some cases, for seldom will two

stations come in at just the right volume, or both at exactly the same volume. Really close to a regional station the National programme or lower wave can be expected to be the louder. Farther away the effect is usually just the opposite.

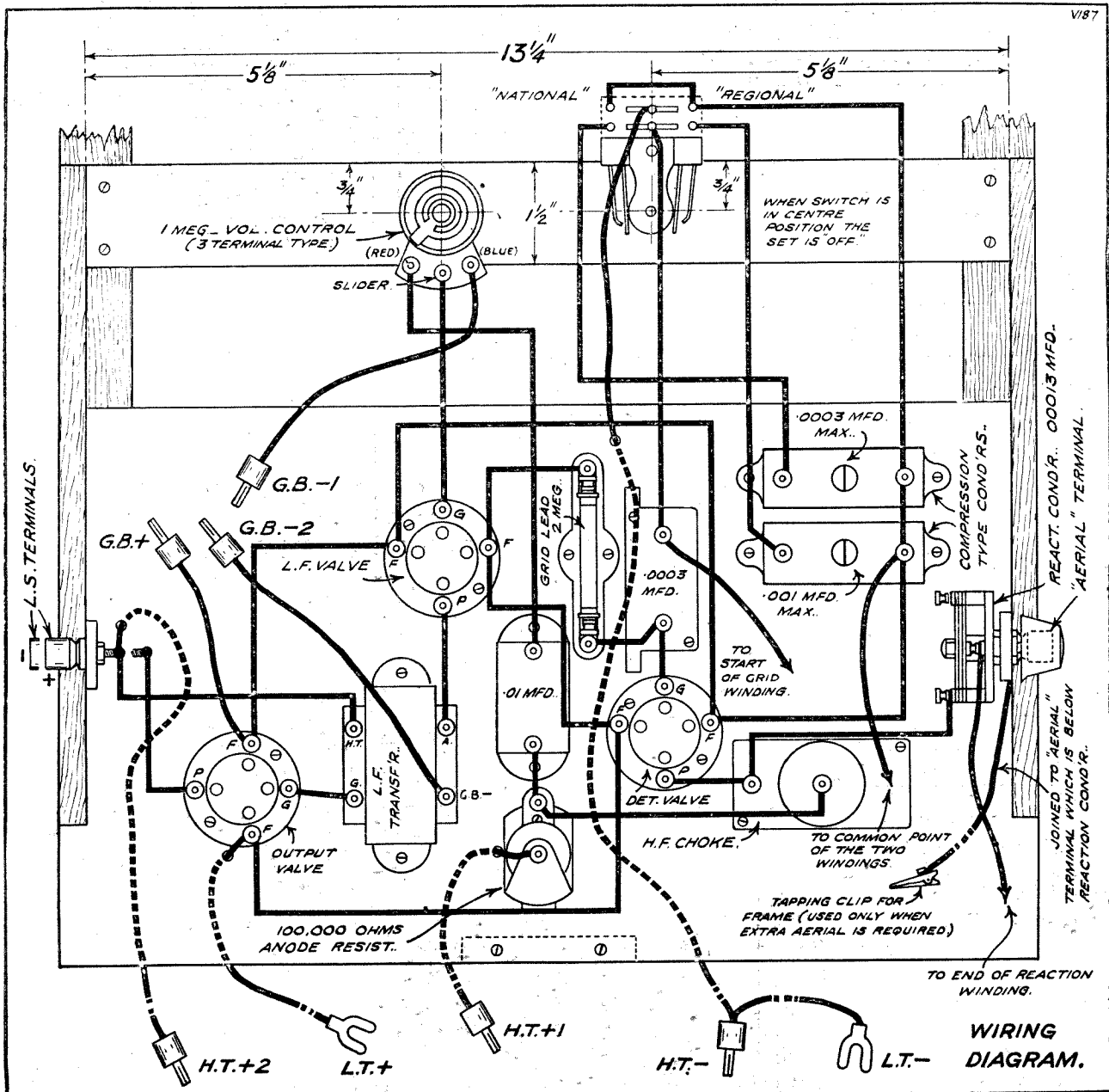
The Woodwork

So far as the constructional work is concerned it is best to tackle the woodwork first. The wood can con-

veniently be $\frac{3}{8}$ in. thick, and can be plywood or ordinary plain wood. The latter is much easier to work, but the former is stronger and less likely to warp.

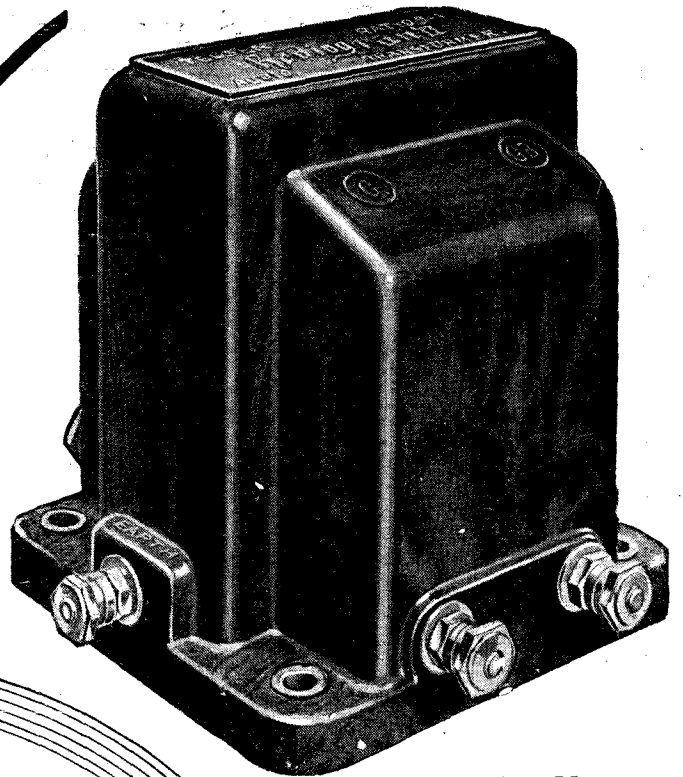
You will note that two screws are used for the joints of the main framework on which the baseboard is mounted. The aerial frame is quite straightforward, the corners being joined together by means of triangular pieces of wood.

HOW TO CONNECT UP THE COMPONENTS

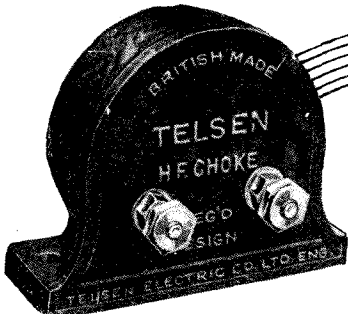


Carry out your wiring exactly in accordance with this diagram before you fix the frame in position. There is no need for soldered connections if you prefer to wire up from point to point as shown above.

for every MODERN CIRCUIT



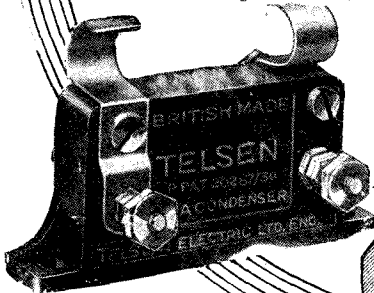
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 "ACE" . . . Ratios 3-1 & 5-1 8/6
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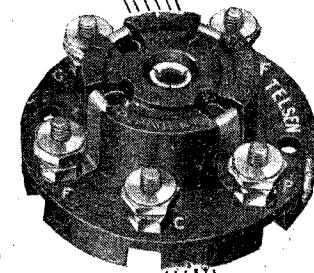
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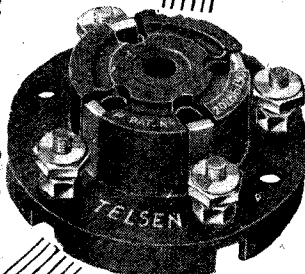
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 Price 1/- each.

TELSEN COMPONENTS

Advt. of Telsens Electric Co., Ltd., Birmingham.

The "Stowaway" Three—continued

The sides of the triangle which form a right-angle can be about 1 in., although the actual dimension is not important. There is a special small sketch of one of the corners of the frame, which shows a small piece of ebonite that has to be fitted.

The four corners are all similar, a piece of ebonite being required at each one. The winding is best held in place by small nicks in the ebonite, one long one being used for the reaction winding.

Winding the Frame

As soon as this frame is completed the windings may be put on. The grid winding consists of 10 turns of 24 D.C.C. wire slightly spaced.

When you have completed this winding make a tap by finishing off and starting again on the reaction winding. The latter consists of 4 turns wound in the same direction as the grid winding. When you have made the tap, carry on with the reaction as though it were part of the grid winding.

It will be easier to mount the components on the baseboard and wire them up with the baseboard removed from the framework. Follow the layout of the parts as shown in the wiring diagram.

Two small strips of ebonite are attached to the triangular end-pieces, which are fixed to the baseboard for the purpose of securing it to the front frame. The loud-speaker terminals are mounted on one of these, and the aerial terminal and reaction condenser on the other.

The positions of the holes for the two components on the front ebonite strip are also shown on the wiring diagram. The connections to these two can be left until the remainder of the wiring is done and the baseboard has been fixed to the frame again.

The Switch Wiring

With regard to the switch, the connections to this have been made by means of special screw connectors provided by the makers. These obviate the necessity for soldering to the switch, and with their aid the set can be made without any soldering at all. Naturally, those who desire can make soldered connections instead of terminal or nut connections.

To show the wiring for the switch clearly the contacts have been shown

in plan form instead of elevation. The wires shown dotted are beneath the baseboard, being taken to the underside through suitably placed holes.

You will note that no terminals are provided for battery connections; flex leads are employed which are connected direct to suitable points on the components. One lead only is employed for H.T. negative and L.T. negative; the high-tension negative connection, in fact, is a battery plug connected at a suitable point in the low-tension negative lead.

The grid-bias battery stands on the corner of the baseboard, where the three plugs for it are shown in the wiring diagram. That concludes all the remarks necessary so far as

construction is concerned, and we can now consider the accessories and the operation.

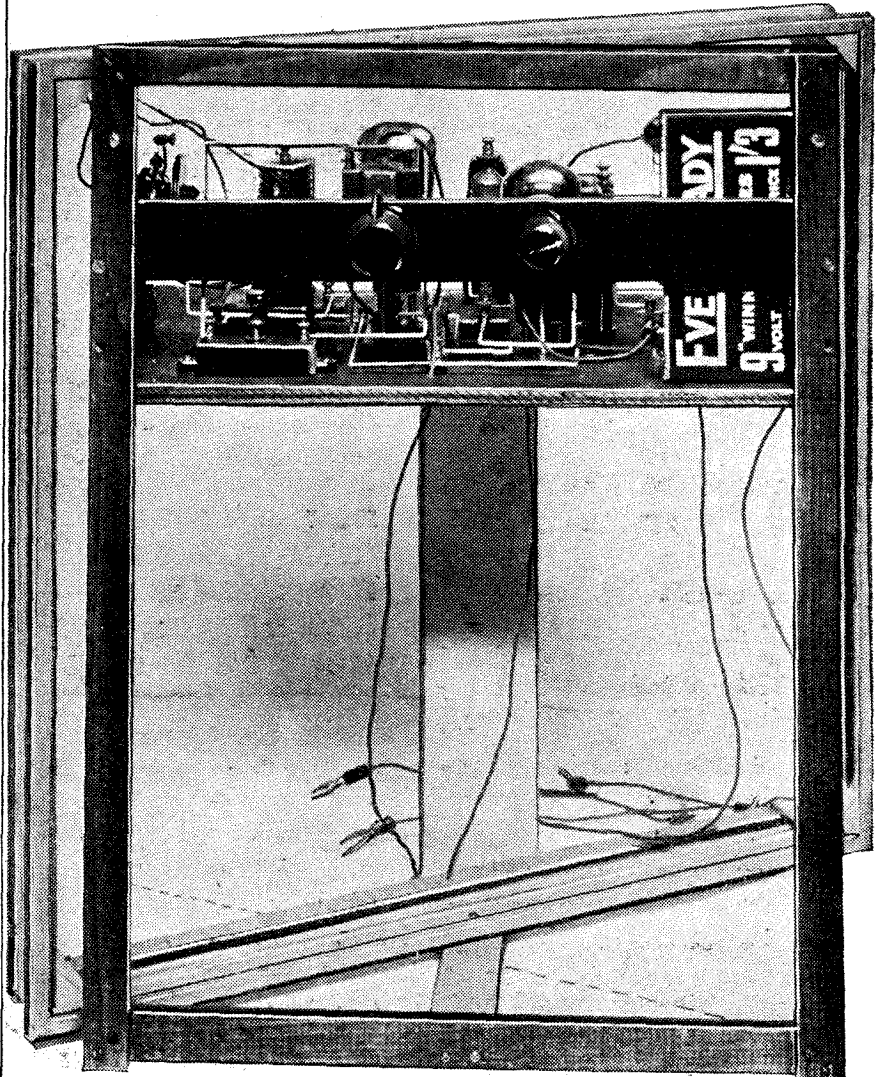
Valves and Batteries

Two-, four- or six-volt valves can be used, the first one being of the H.F. or special detector type. The second valve should be of the L.F. type and the output valve a small power valve, or a super-power valve if you use a mains unit.

In the latter case it will be necessary to run a flex lead into the cupboard or to wherever the set is situated, and it will be necessary to switch the mains on and off as well as the filaments.

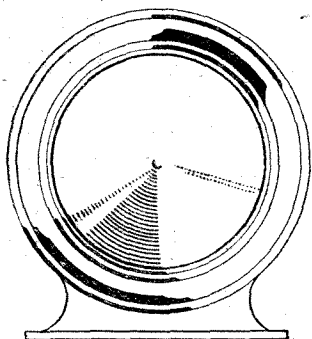
(The final details of this interesting and unique little set will be found on page 396).

READY TO BE STOWED AWAY



The front of the set is fixed behind the cupboard door and a small vignette can be cut in this to allow access to the two panel controls.

"SOUNDS GOOD
TO ME!"



ETA VALVES

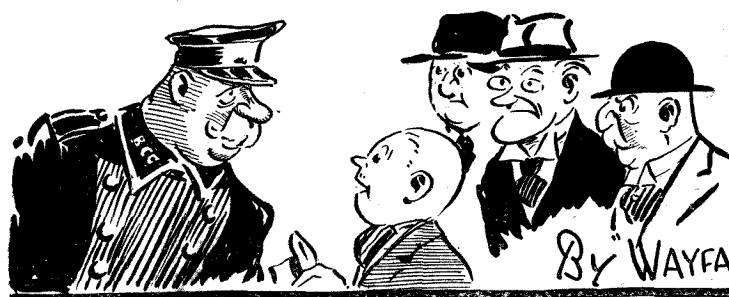
BEST BETWEEN AERIAL AND EARTH

With the Eta Valve, purity of tone is only one of many good qualities. Above all, it is dependable. It is a quality valve—but a quality valve at the right price. Meticulous care in manufacture, both in choice of materials, design and workmanship ensures a superlative performance in operation, low current consumption, and long life.

*Ask your radio dealer for particulars of the Eta Valve to suit your set—
there is a wide range for every requirement.*

THE ELECTRICAL TRADING ASSOCIATION LTD.,
Aldwych House, Aldwych, London, W.C.2

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IN LIGHTER VEIN, PROF GOOP'S BROADCAST LECTURE

By "WAYFARER"

PROFESSOR GOOP was looking about a head and a half taller when I dropped in to see him, and his manner was distinctly haughty. It was clear that something had happened to puff him up with pride, but being, of course, the least inquisitive person in the world, I made no attempt to find out.

Not Exactly "Pumping"

I mean to say, of course, I did put a few questions, though not what you could call pumping a man or anything like that. I just put a query here and there and by the end of half an hour or so the professor was quite unable to keep up his policy of secrecy any longer.

"Well," he said, "you may as well have it and be done with it. A great honour has been conferred upon Mudbury Wallow by a request that has been made to its leading citizen."

"Meaning Sir K. N. Pepper?" I asked.

"No, you idiot!"

"Tootle?"

"No!"

WITHOUT DOUBT!



"I'm the leading citizen!"

"Captain Buckett?"

"No!"

"Primpleson?"

"No!"

"Me?"

"No! It's about time you knew," roared the professor, "that I am the leading citizen of Mudbury Wallow; I have been asked by the B.B.C. to give a lecture. I am going to lecture on 'My New Nine-Electrode Valve.' I am being honoured, and Mudbury Wallow is being honoured through me."

"Splendid!" I said. "I expect

you will be rather nervous. I tell you what. I'll get all the other fellows in the wireless club to come along with you up to London. We will troop into Savelay Hill to form an enthusiastic audience in the studio, and then you are sure to feel quite at home, and everything will go splendidly."

The others, when I sounded them, thought that this was an excellent idea, particularly as having found a wad of boodle in the pocket of the

There is a slight misunderstanding at Savoy Hill when Professor Goop, accompanied by many Mudbury Wallow supporters, arrives at Savoy Hill to deliver his great radio lecture.

coat that the professor had given me to hold whilst he was doing a job on his aerial, I announced that I would be paying all expenses.

When the great morning arrived all of the *élite* of Mudbury Wallow were assembled on the station platform wearing their best (or, in my case, anyhow, somebody else's best) clothes. I was immediately elected leader of the party; and, by the way, if you don't know how to win an election of that kind I may be able to give a useful hint or two. Here was my method.

Everyone Agreed!

I arrived at the station carrying a particularly knobbly Irish blackthorn.

"Just as well," I said to the assembly, "that we should appoint one of the party as leader. Now—er—who shall it be?" Here I glared fiercely round and twiddled the stick.

"Primp—oo! I mean Wayfarer," cried Tootle, rubbing his shin.

"Tootle has proposed," I remarked, "that I should be leader. If those against this will kindly hold up their hands—"

Goshburton Crump's hand started going up, but it got such a father and mother of a whack that it soon went down again and so did all the rest.

"No one against?" I asked. "Then Mr. Tootle's motion is carried unanimously, and I will endeavour to do my best."

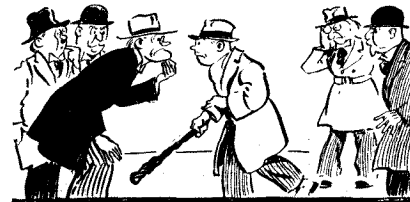
You see the idea?

Though we travelled first-class there was still quite a lot of the professor's wad left when we got to London, so as leader of the party I asked them all to lunch with me. And a very good lunch it was, too. The only slight contretemps that occurred was due to the periodic absent-mindedness of the professor, who would keep drinking his next-door neighbour's beer.

At the Studio

Captain Buckett happened to be the victim, and he could not for some time make out how it was that though his glass had been filled nineteen times he was still thirsty. We had intended to spend the afternoon in sight-seeing, but the lunch took so long that as soon as we had finished it was tea-time, and there seemed to

CARRIED UNANIMOUSLY!



"No one against?" I asked.

be practically not a moment to spare between the end of tea and the beginning of dinner, for the wad was holding out well.

About half an hour before the appointed time we strolled round to Savelay Hill. As the elected leader of the party I led the way up the steps and prepared to ask the commissionaire at the door where we should go. I have a little disability which occasionally manifests itself in moments of excitement.

"Wwwwwwwwwww—" I began. Sir K. N. Pepper brushed me aside and opened his mouth.

"Cccccc—"

Primpleson edged his way forward and switched on.

FINISH WITH BATTERIES FOR EVER

Big cut in prices of two most popular "EKCO" H.T. UNITS

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I.V. 20**

**A.C. MODEL
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NOW ONLY

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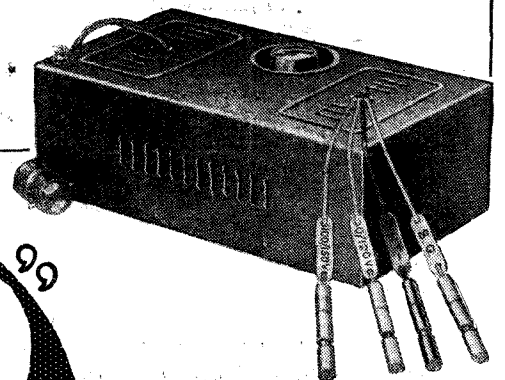
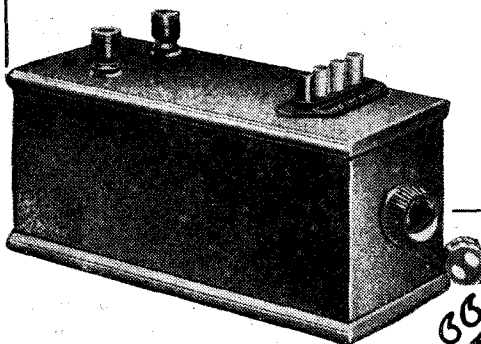
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The huge demand for these two models and extended manufacturing facilities have made these big price reductions possible. At £3-19-6 for the A.C. model and £1-17-6 for the D.C. model there is no finer value obtainable.

In three minutes you can put an end to H.T. battery worries for ever and enjoy permanently perfect radio. Just connect the "Ekco" H.T. Unit in place of your H.T. battery, plug the Adaptor on the Unit into the nearest electric-light or power socket, and switch on—that's all. You get ample current and high voltage constantly and permanently at a cost of less than 3/- a year.

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NAME.....
ADDRESS.....

In Lighter Vein—continued

"Hhhhhhhhh—"

Man after man came to the fore, but the complaint seemed to be catching, and no one could get a word out. The professor tried to write down his query, but as he was under the impression that his cigar was a fountain-pen, that got us no forrader.

The commissioner smiled benevolently upon us.

"Don't get flustered, gents," he said. "We know all about it here—sees so many of them!"

He went to the telephone and murmured a name, whilst we all stood round in a body, still making heroic efforts to put the necessary question.

The Official Soother

A light footfall was heard behind us.

"Now you will be all right," said the commissioner.

We turned and beheld an urbane and smiling person who was clearly determined to put us completely at our ease.

"This is the party you was expecting, sir," remarked the commissioner. "'Orrid nervous they is, too, but you'll soon put 'em all right."

QUITE IMPROMPTU!



"I was in full blast."

Our tongues were by this time fairly twisted into knots, and none of us could do more than gasp and gurgle as the Official Soother of Jangled Nerves shook us warmly by the hand.

"Don't worry," he said; "such speechlessness is quite usual amongst those who are about to broadcast for the first time. Microphone fright, we call it. Of course, we have lots of experience, and I can tell you at once that you will be quite all right when you sing."

"Bbbbbb-but!" we stammered in chorus.

The Soother held up his hand.

"Don't even try it," he cooed; "you'll only make yourselves worse. Now, just come along with me. What delightful weather we are having for the time of year, are we not?"

That isn't really a question, by the way," he observed, as a chorus of "Yyyyyyy—" burst out. "I don't want you to attempt to answer it."

Things Become Stranger

He led us to a largish room containing some quite comfortable chairs and a grand piano. Making us sit down, he kept up a ceaseless flow of talk, holding up a silencing hand as soon as any of us attempted to start a reply. Presently the door opened and another jolly chappie came in.

"Stout fellow!" cried the Soother. "You're absolutely on time. Here they are all waiting for you. And now, if you'll excuse me, gentlemen, I'll leave you in charge of my colleague, who will very soon put you completely at your ease."

The newcomer sat down at the piano, placing in front of him a quantity of music that he had been carrying. He struck a rousing chord.

"We will take the first number sitting down," he said. "I will just play it through first."

Tee-tum, tee-tum, tee-tumpty-tum.

"Now, then, all together."

The tune happened to be "John Peel," which we all knew, and it is a curious fact that even if your tongue is twisted up for speaking you can always sing. We let ourselves go with enthusiasm, though we couldn't understand quite why we should be asked to do that sort of thing.

Directly we got to the end everybody started to ask what it was all about, and we found ourselves tied up worse than ever.

I Sing a Solo

"Don't try to talk," said the pianist. "We will just have another good rousing number."

This time it was "Tipperary," and we fairly raised the roof.

"Who's your leader, by the way?" he inquired. "Now, don't try to answer; just hold up your hand."

I did so.

"I think we might take your solo now," he murmured. "Let me see—yes, 'Sailor Beware,' isn't it?"

The others pushed me to my feet as he played through the piece.

"Now, then," he cried, and before I knew what I was doing I was in full blast.

The pianist seemed very much surprised that I did not know the

words, but filled up most of the gaps with la's.

I la'd lustily through the thing until I came to the last chorus, and then an inspiration came to me. Why should I not sing the questions that we were all burning to put?

"What is the meaning of this, may I ask? (I bellowed).

Why are you giving to us this queer task?

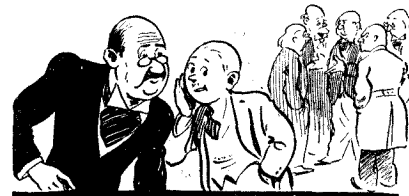
Though I can't speak a word,

I can sing like a bird.

Many stout tongues are all twisted in knots.

You have erred, you have erred, you have erred."

THE ONLY WAY



"What is it?" he inquired breathlessly

The accompanist paused.

"What's all this about?" he asked.

To the tune of "Drink to me only with thine eyes," I sang:

"Pro-fessor Goop is lecturing he-ere, Up-on his ni-ine grid tube.

What the he-ck do you think you are doing with us,

You fat-headed, cross-eyed boob?"

His eyebrows rose higher.

"But aren't you the Shoreditch Glee Singers?" he asked.

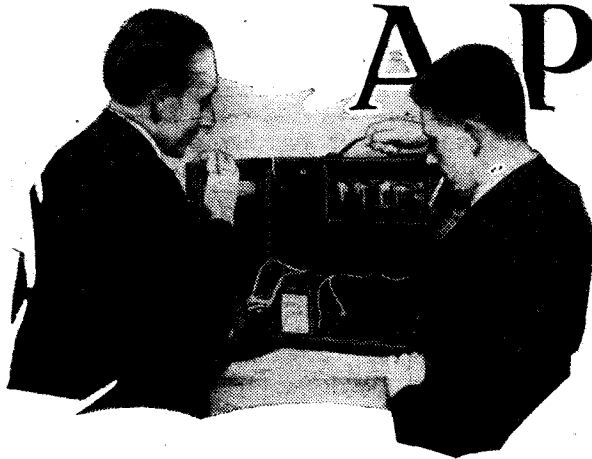
This remark unloosened our vocal cords and detangled our twisted tongues. We found that we could speak again, and, having made this discovery, we all spoke. The accompanist 'phoned for a superior official, to whom we explained our plight. He was, of course, full of apologies, but regretted that the time for the lecture was now gone past.

The Way Out

"There's only one graceful way out of it for the B.B.C.," I said, "a way which will, I am sure, completely smooth the professor's ruffled feathers."

"What is that?" he inquired.

"Well, I said, "it is a good hour since we finished dinner. Don't you think that the B.B.C. might stand us supper?"



A PRACTICAL MAN'S CORNER

An invaluable section for the home-constructor.

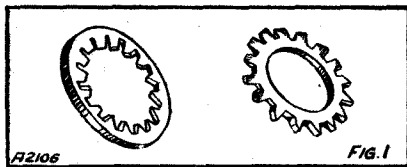
By R. W. HALLOWS, M.A.

THE problem of finding a satisfactory means of putting on nuts so that they will not work loose by themselves, but yet can be removed when required, is not an easy one. It has always been a mystery to me how nuts in a set which never suffers any jarring or jolting can loosen themselves on their threads until they are almost dropping off.

That such things do happen every wireless man knows only too well. Here is a simple tip that I have been trying for some little time, and it seems to be quite satisfactory. Put on your nut as tightly as you can with a box spanner, and then give both the top of the nut and the protruding shank of the screw a coat of shellac varnish. The varnish sets hard in a minute or two, and the nut will not shift by itself.

When, though, you need to remove it you can do so without any great difficulty by using a box spanner again. Shellac is much better than stove enamel for the purpose, for you can apply a very thin coat. I have seen stove enamel recommended, but I

CAN'T COME OFF



Two examples of locking washers that are very useful for ensuring that nuts will grip firmly.

don't find it good, since it clogs up the threads too much and occasionally makes movement of the nut very difficult.

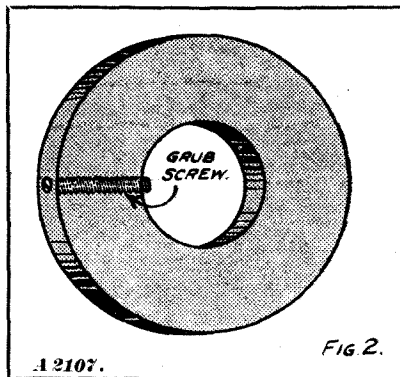
Locking Washers

There are, by the way, one or two good types of locking washer on the market now. One type is illustrated in Fig. 1. It will be seen that when the nut is tightened down these washers

bite themselves in and obtain a grip which prevents them from turning.

The nut binds hard on the washer, and the result is a firm job that stays fixed even under the effects of jolting and jarring. Small spring washers are also quite effective for certain purposes.

FACILITATES TUNING



A large knob for your vernier dial control—a valuable aid to fine tuning.

You can buy these from any shop which deals in engineers' supplies, and it is useful to add a few of the 2 B.A. and 4 B.A. sizes to your workshop stock.

An Aid to Tuning

If you are the possessor of a lathe you can easily make for yourself a pair of big knobs which greatly facilitate tuning with the short-wave set, or, indeed, with any other where fine adjustments have to be made.

I have had a pair in use in my short-wave set for a long time now, and I would not be without them for anything. Fig. 2 illustrates the way in which they are made. From $\frac{3}{4}$ -in. ebonite turn out a circle 3 in. in diameter, and in the middle of this cut a hole of the same diameter as the existing small knob of the slow-motion dial.

It is important that the small knob should be a good tight fit into the hole.

Drill a No. 34 hole from the edge of the dial, as shown in Fig. 2, tap it 4 B.A., and provide it with a grub screw made from a piece of 4 B.A. studding.

In case you don't know about grub screws, what is required is illustrated in Fig. 3. Now slip the disc over the small knob and fix it firmly by tightening down the grub screw.

A Big Advantage

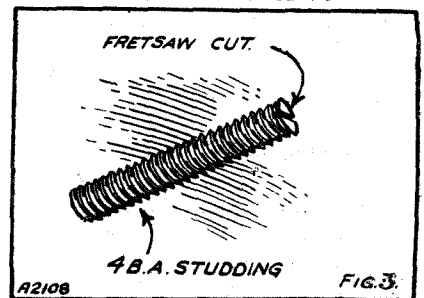
The great advantage of enlarging your knobs in this way you will realise if you think about it for a moment. With a small knob the distance through which the fingers grasping the rim move in order to turn the dial one degree is quite small.

With a big knob it is far greater. You thus have no difficulty in making tiny variations in the tuning which may be found almost impossible with the little fellows. If you don't possess a lathe you can easily get these knobs made for you at quite small cost. A good garage fitter will probably do the work for you.

Mercury Contacts

The experimenter wants to be able to make and unmake certain contacts, particularly those running to batteries, as quickly as possible. One of the easiest and neatest ways of doing this is to make use of mercury.

TO FIX THE KNOB



How the grub screw shown in Fig. 2 is made from a length of studding.

A Practical Man's Corner—continued

Mercury is a fairly good conductor of electricity, and owing to its fluid nature you can make a contact by simply dipping wires into it. Fig. 4 shows a useful mercury contact.

Easily Arranged

Take a piece of flex, bare about $\frac{3}{4}$ in. at one end, twist the wires tightly together, and thread them into the nozzle of the filler. If they will not all go in you must remove a few.

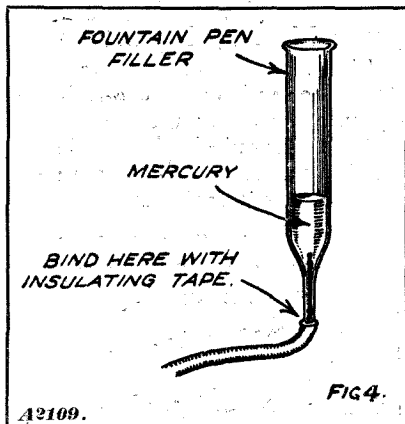
Then take a piece of insulating tape and bind round both the insulated part of the flex and the nozzle so as to make a good tight joint. You can arrange the fountain-pen filler to stand upright by making a little support for it from No. 18 or No. 20 copper wire.

In the filler place a drop or two of mercury. If the other end of the flex attached to it is connected to one pole of a battery all that you have to do in order to make a good connection is to dip the bared end of any other wire into the mercury in the filler. Owing to the covering of the wire and the glass of the filler which surrounds the mercury there is ample protection against a short-circuit—which is not otherwise always the case when batteries are in use on the experimental bench.

Switches, Too

Those who can do simple shaping and sealing work with glass tubes (and if you cannot already any school-

A SIMPLE CONTACT



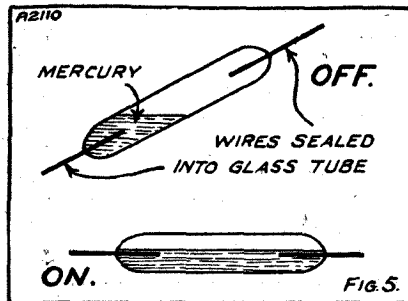
A mercury L.T. control that is both simple and effective.

boy who is doing science will explain the methods), you can amuse yourself by making a mercury switch as shown in Fig. 5.

A short piece of tube is cut off and the ends rounded off. A wire is sealed into one end, a little mercury is placed in the tube, and the other end is treated in the same way.

Fig. 5 shows how tilting the tube towards a vertical position switches off, whilst laying it horizontally makes connection through the mercury between two wire contacts.

CUTE, ISN'T IT?



A more elaborate form of mercury control which is often used in the electrical trade.

Easily-Made Cabinets

I am very taken with the metal corner-pieces available for facilitating the home construction of wireless cabinets. Curiously enough, though, I don't quite agree with the way in which the makers recommend that their own product should be used! They suggest that you should use four of these corner-pieces for each cabinet.

One pair fixes the back and sides together, whilst the second pair must be used, according to this method, to fix the panel to the side-pieces of the cabinet. Now the only slight drawback that I can see to doing this is that there is no way of removing the set from the cabinet.

You cannot slide it out, because the metal corner-pieces embrace the front part of the panel. Nor if you remove the bolts going through the panel can you lift it out, since the terminal strip behind will prevent this. Here is the method which I myself prefer.

Only Two Pieces

For each cabinet use only a single pair of corner-pieces and employ these for fixing together the back and sides, as seen in Fig. 6. Secure the side-pieces firmly to the base-piece by means of screws. So far so good, but there must be some other means of supporting the side-pieces or they will tend to warp farther apart or

closer together at their top front corners.

The necessary support is provided by means of the batten seen in Fig. 6.

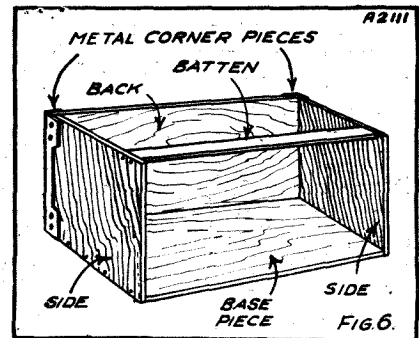
This is simply a piece of $\frac{3}{8}$ -in. white wood of exactly the same length as the base-piece. From 1 in. to $1\frac{1}{2}$ in. is a convenient width. The batten now is flush with the tops of the side-pieces, but is set back the thickness of the panel.

Thus when the set is pushed like a drawer into the cabinet the inner edge of its panel comes up against the batten and the face of the panel itself is flush with the front edges of the side-pieces.

A Simple Job

To make a cabinet in this way is the simplest of simple jobs. You want nothing more than a pair of Ealex corner-pieces, two side-pieces $\frac{3}{8}$ in. longer than the width of the base-piece and 8 in. in height, a back-piece 8 in. in height by $\frac{3}{8}$ in. in thickness and of the same length as the base-piece.

FOR CABINET MAKERS



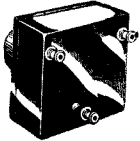
Metal corner-pieces greatly assist in cabinet-making.

The base-piece is of exactly the same dimensions as the baseboard of the set, except that its width is equal to that of the baseboard plus the thickness of the panel. One other piece is required for the lid. This may overlap a little at the sides and front and should therefore measure in length the length of the base-piece plus twice the thickness of the side-pieces plus, say, $\frac{3}{4}$ in. for overlap; its width should be equal to that of the side-pieces from back to front plus, say, $\frac{3}{8}$ in. for overlap.

You can obtain suitable wood already cut into pieces for making cabinets of various useful sizes, or you can get the wood cut out for you by any carpenter.



Notice the clean appearance of the A.E.D. Log-Law Volume Control. One-hole fixing, of course.

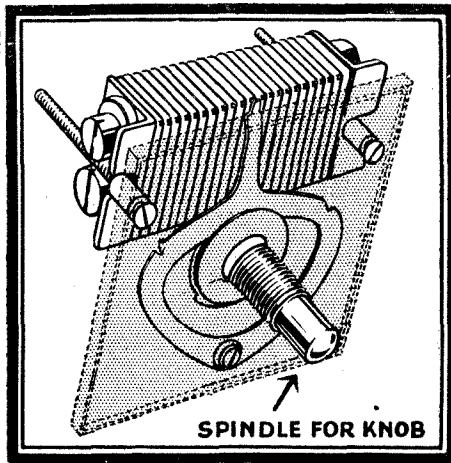


Accessible terminals for easy connection. The black moulded bakelite case keeps out dust and dirt.

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Supplied in the following values:

- Model P. 100 100,000 ohms
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G.25. Combined fixed '0001 fixed condenser and shorting switch.

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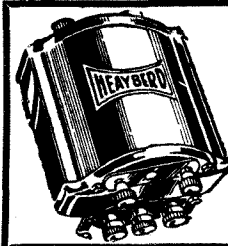
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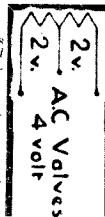
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Please send full Lists with details of all the latest Transformers and diagrams and hints on their usage. Enclose 3d. stamps.

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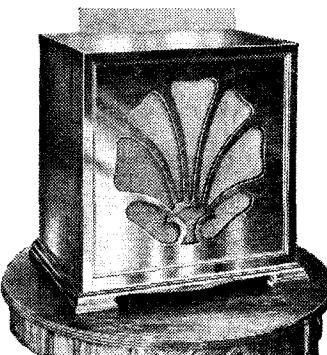


Other Heyberd models in this series are as follow:—
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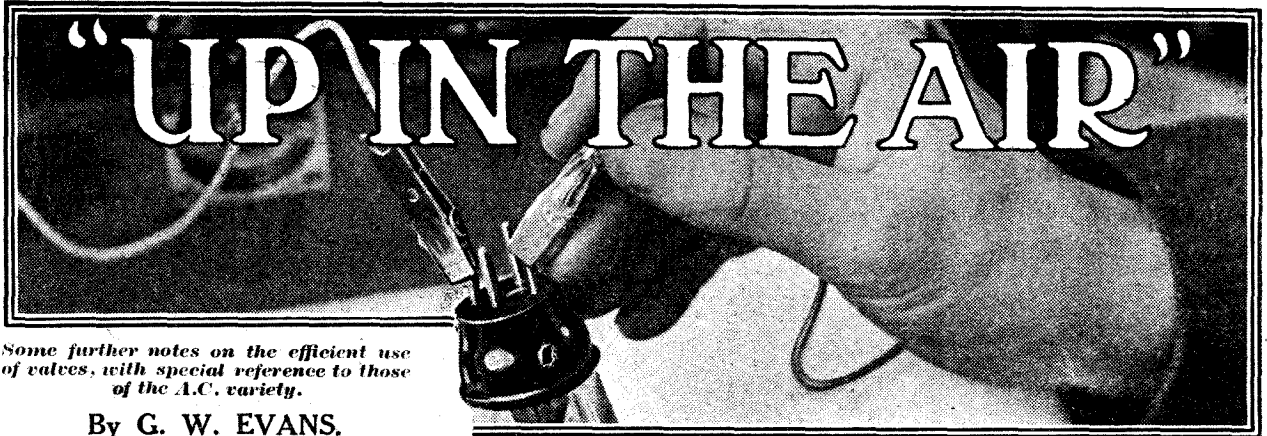


"Melodee" Cabinet

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Phone: Holborn 8202. Factory: S. Croydon.

W. Con. 1



Some further notes on the efficient use of valves, with special reference to those of the A.C. variety.

By G. W. EVANS.

THIS is not an article on the Schneider Trophy Race, nor is it an article on radio aerials. It is based on a somewhat slang phrase which has crept into radio, and which one may often hear during discussion on unstable sets. "Oh," someone will say, "the whole thing was 'up in the air.'"

Now, what does he mean? He means that the thing was more or less uncontrollable, wanted "holding down" as we say.

What Does It Mean?

Now it would be impossible in the short space at my disposal for me to go into this phrase very fully and to bring out all the various applications it can have. The "up-in-the-airness" that I want to deal with here is that more or less directly associated with the inefficient or wrong use of valves.

I expect you have heard a friend say, before now, that he has altered his set to include a screened-grid valve, but the whole thing "went right up in the air." What did he mean? Obviously, since he has been trying a screened-grid valve the set has been prone to burst into oscillation and to cause all sorts of instability. The cause of this, therefore, will probably be in the design of his H.F. stage. Perhaps the screening is poor, or the H.F. valve and its coils do not work well together, or other more obscure causes may be found at the root of the trouble.

With A.C. Valves

Especially is this up-in-the-air business likely to occur when mains valves are used in converted battery sets, because although these are said to be "interchangeable" with battery valves, the high magnification obtainable from A.C. indirectly-heated valves often causes trouble.

You may design a set having, say,

a screened-grid valve, a detector, and a couple of L.F. stages, and get it working apparently very well indeed with battery valves. There may be no signs that the screening of the S.G. valves is not really efficient, and no symptom that overloading in the L.F. section is almost imminent. But change over to A.C. valves and see what happens!

Suppose we start at the L.F. end. The output valve is usually the best place to start, provided one bears in mind certain facts.

Also, suppose that we put quite a small A.C. valve in the last stage (remembering the set is a four-valver and should be capable of delivering quite a big output). We will put in an A.C. valve which has no bigger characteristics than the ordinary

battery valve of the same class, and we now have three battery and one A.C. valve in operation.

Things work very well, we are not troubled with hum, and the output is very good, because this valve probably has a greater magnification factor than the battery valve we have taken out, and everything goes merrily for a time.

Stage by Stage

Right! We next put in the first L.F. valve. Things may begin to happen. We may get overloading of the output valve, or the set may go "up in the air," evidenced by motor-boating or howling, and due to the higher magnification of this valve and the fact that our circuits are not properly de-coupled.

So we must check over this de-coupling and add extra if required, using a choke of the L.F. variety, with a 4- or 2-mfd. condenser in preference to the resistance and condenser method.

Having cured this trouble, we can proceed to the detector valve. The change over to A.C. is made and up she goes again. Distortion is very evident, and we find we have to set the L.F. volume control back very considerably before we can stop it. What has happened?

Extra Volume

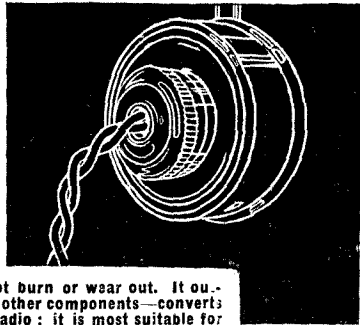
Obviously the higher mag. detector and the higher mag. L.F. valve have overloaded the output valve, and we need a larger one here. (We are assuming that we want to get the last ounce of volume out of our "new" set.) If we are going to be satisfied with the same maximum volume obtainable as with a battery set, then there is no need to go in for a very large output valve of the A.C. type; but this is a wasteful business, because although one can volume control down till we get no more volume than we had with the

STILL AT IT!



They are still hard at work on the new B.B.C. headquarters in the West End. It has twenty "isolated" studios built into a tower running from below the ground level, right through the centre of the building. Artificial lighting behind "windows" is employed to give a natural effect.

YOU CAN JUST PLUG IN!



Your mains provide better and more certain reception, with greater economy and considerably less trouble than any battery, however good it may be.

Most mains supply alternating current, which for radio purposes has to be converted to direct current; and for this a rectifier is necessary. Of the various types of rectifiers, the Westinghouse is acknowledged to be the most efficient. Unlike valve or chemical rectifiers, it does not burn or wear out. It out-lives your set! Its use—with certain other components—converts "battery-run" into "mains-run" radio; it is most suitable for fitting into amateur-built sets; while anyone who is buying a mains-set will do well to make sure the Westinghouse Rectifier is incorporated—it is found in most good makes.

Complete technical details are given in an interesting and lucid manner in our forty-page booklet, "The All Metal Way, 1931." The coupon will bring you a copy by return of post (please enclose 3d. to cover cost.)

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Please send your forty-page booklet, "The All-Metal Way, 1931," for which I enclose 3d. in stamps.
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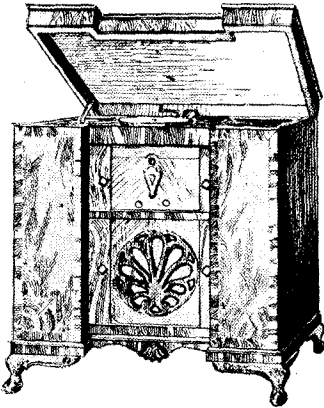
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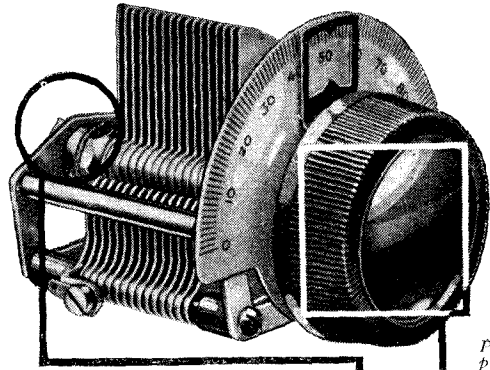
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Telephone: Central 6745 (5 lines), Irish Free State Distributors: Kelly and Shiel, Ltd., 47, Fleet Street, Dublin.



"TINY" CONDENSER



SMALL — COMPACT — SLOW MOTION TAKES NO EXTRA SPACE

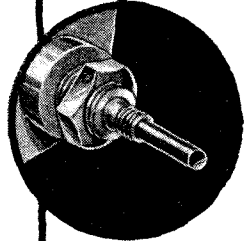
The J.B. "Tiny" Condenser is a typical example of J.B. precision and craftsmanship. Its extreme neatness, lightness and rigidity make it particularly useful for Portables, while its high all-round efficiency entitles it to a place in any set.

Though only about an inch in thickness and projecting only 2 1/2" behind the panel, the J.B. "Tiny" Condenser is fitted with an ingenious slow-motion movement, ratio 8-1, which is very smooth in action.

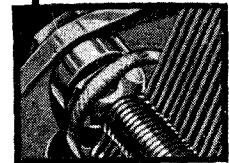
The end plates of extra hard brass ensure absolute rigidity and accuracy, and are nickel-plated. Hard aluminium vanes. See it at your dealers.

Prices, complete with knob, pointer and scale.

'0005	10/-
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One-hole fixing. Ball-bearing centre spindle.



The slow-motion mechanism is housed in the bottom bearing and occupies no extra space. Pigtail connection to rotor.

SPECIFIED FOR THE "KILOTRAP"

described in this issue

- 1 J.B. "TINY" '0003 10/-
- 1 J.B. "TINY" '0001 8/6



PRECISION INSTRUMENTS

Advertisement of Jackson Bros., 72, St. Thomas' St., London, S.E. 1. Telephone: Hop 1837.

"Up in the Air"—continued

battery set, we are wasting the properties of the A.C. valves, and might just as well cut out an L.F. stage or keep the battery set; that is, looking at the set as a local station set. The extra volume obtainable with the two A.C. stages on distant stations would, of course, be valuable.

The Last Stage

The overloading of the last stage of the A.C. set is nearly always bound to happen if we convert a large battery set to A.C. and do not use a large valve in the output circuit of the converted receiver. The increase in magnification of the detector and first L.F. stage is so large that the output valve cannot handle it unless it is of generous proportions, such as the L.S.6A. I am assuming now, of course, that we are tuning fully in to a local station which is quite close and we are attempting to get very much more volume than we used to get with the battery set.

Without this desire for better "DX," however, it would be rather a wasteful procedure.

The best thing to do in a case like that where distant reception is not required any stronger, and we do not want more power from the local, and yet you want your set working all from the mains, is to drop the intermediate L.F. stage and take the detector to an A.C.P. or A.C.P.1, or similar, output valve.

If, on the other hand, you want to get very much more power out of the set and make the full use of the magnification possible with four stages of A.C.—that is, screened grid, detector and two L.F.—then you must be prepared to use a very large output valve and to use something of the directly-heated type.

Overloading Troubles

There is no indirectly-heated valve on the market at the moment which will adequately deal with two A.C.

set having two stages of L.F. and expect success unless you use an L.F. volume control, or take steps to reduce the overall mag. a little.

Take the battery detector stage with an ordinary anode resistance of about 100,000 ohms, and put in it an A.C. valve, and you will probably find that in quite a number of cases that detector will overload the next stage.

Some Vital Precautions

In this event, obviously the thing to do is to decrease the value of the anode resistance, making it a 50,000- or even a 30,000-ohm, and thus cut down your mag., though you will probably still get more than you did when you had a battery detector.

The following A.C. valve, the first L.F., may or may not be transformer-coupled to the last valve, but if it is transformer-coupled you are again going to stand a very real chance of the whole thing going up in the air, owing to motor-boating (unless it is very well de-coupled), and also a risk of overloading the last stage. The remedy is to use resistance-coupling or a volume control—which brings us back to our first statement: that you cannot make a successful 2 L.F. A.C. set without a volume control.

The magnification available from an A.C. set is really tremendous, and will come as a great surprise to anyone changing over for the first time.

Consequently, in concluding this article, I would like to rub in one or two vital precautions which if neglected would in all probability result in the set going very badly up in the air.

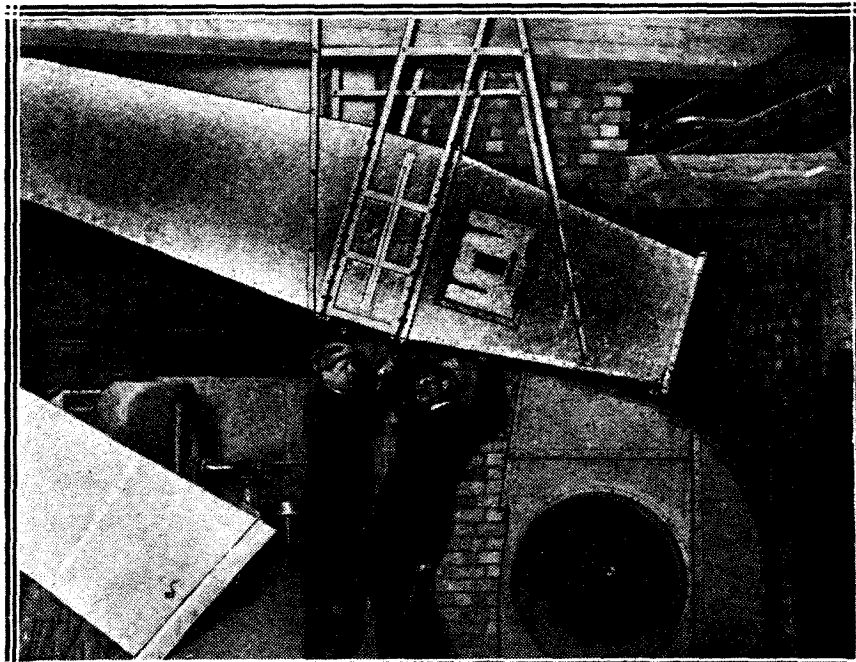
Screening and Bias

The first is that screening of the S.G. valves must be very carefully carried out, the second is that it must be properly biased if satisfactory results are to be obtained.

In these cases of conversion I should always go in for a shunt-fed anode for the screened grid, and the use of a valve which has an impedance likely to be somewhat higher than that of your tuned circuit, something of the order of 400,000 ohms or a bit more, in order that one shall not get too much magnification and consequent instability.

Another point is to watch the de-coupling, and if possible use choke de-coupling rather than resistance, because it is often more efficient.

KEEPING THEM COOL



Fitting one of the vast ventilator ducts in the centre tower of Broadcasting House. Elaborate air-circulating conduits have had to be designed in order to keep the twenty studios properly ventilated.

If, however, the maximum volume on the local is required to be only a little more than the battery set gave, and the conversion has been carried out merely for convenience of maintenance and to increase the sensitivity on distant programmes, well and good.

stages detector and one L.F., when fully tuned in to the local station only a few miles away.

So I must very strongly put it to you that without whacking up the H.T. to about 400 volts for a large output valve you cannot convert to A.C. a

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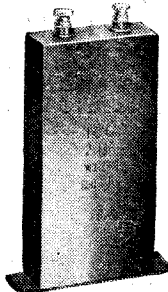
**"Listen—
The machine
is speaking!"**

Hearing the inventor's own voice from the weird machine before him, the startled company little realised they were witnessing a revolution in the pleasures of mankind. They could not see in Edison's phonograph the gramophone or the talking film which have come from it. Yet if its invenor had not dreamed of things greater than selling news-

papers and had not devoted his life to doing one thing and doing it well, these things would not have been given to the World.

It is this same spirit of "doing one thing and doing it well" which has, for years, been behind all T.C.C. endeavour. That is why T.C.C. have never made anything but Condensers, and why T.C.C. Condensers are unmatched — for accuracy and dependability.

One of the many types is shown here. It is the T.C.C. 2 mfd. type (for maximum working voltage of 800 D.C. peak value.) Price 10.-



TCC CONDENSERS

TELEGRAPH CONDENSER CO., LTD., N. ACTON, W.3.

♥ 8015



ROUND the DIALS

Some practical notes on what stations to look for and how to get the foreigners that are coming over well.

THE good reception which we have been having ever since just before Christmas seems to be no flash-in-the-pan, but a genuine and steady improvement in long-distance listening. On all the wave-length bands the report is the same—plenty of stations and reliable foreign programmes.

Plenty of Yanks

On the ordinary wave-lengths—that is, between 200 and 600 metres—the most outstanding fact is that some nights after midnight the American

stations can be heard after the Europeans have closed down. So all “night-owls” who are sometimes up late are reminded that ten minutes spent on a tour round the dials after midnight with any good little set may provide them with the thrill of hearing the U.S.A.

* * *

And it is a thrill! Not only old favourites like W E A F, New York, and W P G (World’s Playground), Atlantic City, have been heard at good strength here in Britain, but

inland stations like Chicago, and Southerners like Fort Worth, Texas, have been clearly identified.

The best way to capture W E A F is to set your tuning exactly half-way between Rome and Lyons La Doua. Then in the “wee sma’ hours” around 12.30 a.m. switch on, bring reaction up till the set is almost oscillating, and turn the tuning up and down slowly over about two or three degrees.

* * *

If you hear a chirp there, be patient with it, for reception over 3,000 miles is apt to be tricky and subject to sudden fading. But by knowing exactly where to search on the dial you are almost assured of ultimate success.

Relayed Programmes

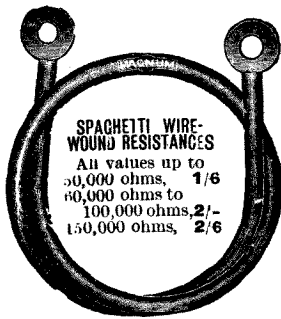
Sometimes certain Continental stations, like Stuttgart and Barcelona, relay America to their listeners, so you must be careful not to mistake one of these European relays for the real thing. Accurate “placing” on the dial between known settings of other stations is the best check, and is even more accurate than the average wave-meter.

* * *

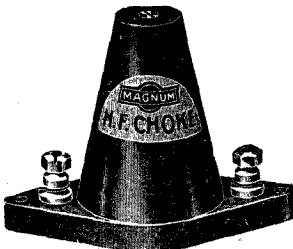
On long waves there have been some wonderfully steady programmes. (Continued on page 388.)

BUILD THE ‘KILOTRAP’

FOR £6 : 5 : 0



MAGNUM SHORT WAVE H.F. CHOKE.



Specified for the ‘Kilotrapp’ 7/6

	l	s.	d.
1 Oak Cabinet 14 in. x 7 in., with 10 in. baseboard	1	0	0
1 Ebonite panel 14 in. x 7 in., ready drilled		6	0
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1 Magnum 50,000-ohm wire-wound potentiometer		7	6
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1 Magnum short-wave choke (as used in set described)		7	6
1 Dubilier 1-mfd. condenser		2	6
9 Belling-Lee terminals as specified		3	5
1 Terminal strip, ready drilled, 14 in. x 2 in.		1	6
1 Special coil, complete with base and supports		10	6
Wire, flex, clips, screws, wander plugs, etc.		1	7
		£6 5 0	

Any of the above parts supplied separately as required.

1 Set of valves (1 detector and 1 output)	19	0
The “Kilotrapp,” ready wired and tested, including coils, valves, cabinet and Royalty paid	£8	8 0

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BURNE-JONES & CO. LTD.,

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Phone: HOP 6257 & 6258.

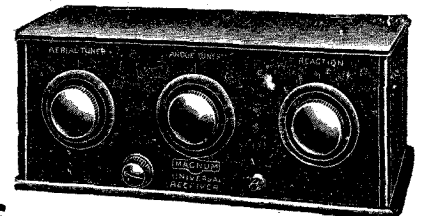
Scottish Agent: ROSS C. WALLACE, 54, GORDON STREET, GLASGOW, C.1.

MAGNUM UNIVERSAL THREE

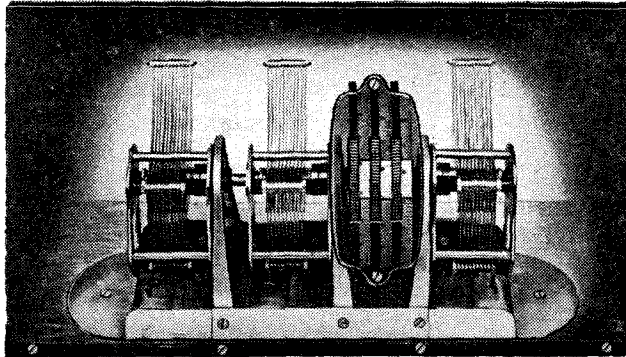
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Free from all amateurish frills, the Universal Three has proved itself so perfect and so efficient in performance that not a single improvement can be made on its original design. This receiver still stands alone, unique, and supreme in every detail.

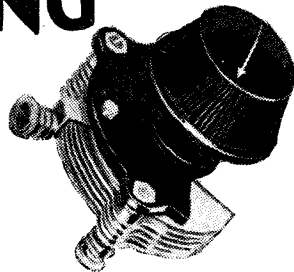
The most perfect receiver yet designed for Ultra Short Wave, Broadcast and Long Wave reception. Complete with valves and coils. Royalty paid. **£15**



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ASK your dealer to show you a Dubilier drum control condenser—handle it—note the robust construction of frame and blades—no possibility of capacity variation there.

Note the large drum dials—feel their smooth action and you will realise that it is the condenser for your job.

Dubilier drum control condensers are like other Dubilier products, built on a generous scale, ensuring a large factor of safety against breakdown both electrical and mechanical.

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Midget Condenser, as illustrated.
 .0005, .0001, .0002 - - - **4/-**

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Capacity of each Condenser:
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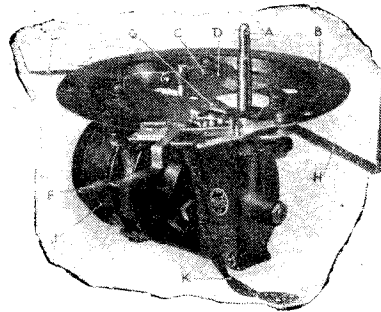
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The Price?—Remarkably Low—Only 84/- Complete!



AT LAST!—A NEW BRILLIANTLY "ORIGINAL" ELECTRIC GRAMOPHONE MOTOR THAT IS DISTINCTLY "BETTER." Produced by the DIEHL MFG. CO., Electrical Division of the World-Famous SINGER SEWING MACHINE CO. and distributed exclusively by "LYONS."

That we are behind this new motor is sufficient warranty that it marks a step forward in correct design; it is really superfluous to add that Singers' 46 years' experience in the World's largest Small Motor Plant is also backing and positively guaranteeing this proposition. **NEW FEATURES INCLUDE:** Bakelite Non-Rusting and Non-Warping Turn-able; Spring Suspension; One-Hole Fixing; Induction Motor; Guaranteed Humless; Non-Interfering; No Brushes; Worm-Driven with Single-Plate Cork Clutch; Speed Indicator; Automatic Stop and A.C. Snap Switch.—**IN FACT, DEFINITELY THE BEST MOTOR NOW AVAILABLE. AND WHAT A SURPRISINGLY LOW AND ATTRACTIVE PRICE . . . ONLY 84/- COMPLETE! THE DEMAND IS ENORMOUS.**

Special Folder Free on Request by Return. Large Stocks.

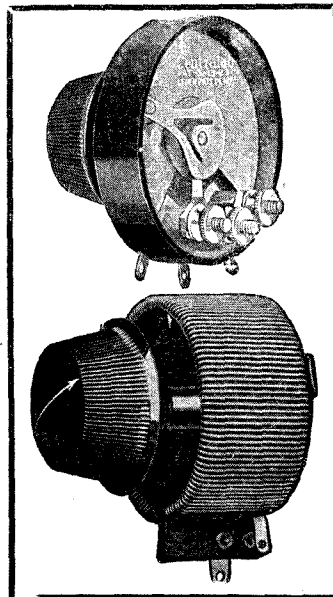
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ROUND THE DIALS

—continued from page 386

And at the time of writing even the rather shy stations, like Istanbul (1,200 metres), have been heard at great strength.

By the way, though Istanbul is supposed to be on 1,200 metres, as stated above, I make his present wave-length 1,238 metres. Probably he has "wobbled" to dodge Reykjavik, the new Iceland station, which is also working on 1,200.

"Big Wallahs"

Moscow Trades Union on 1,304 metres is a valuable long-wave guide these days, as he sometimes not only talks in English, but gives his name and his wave-length very plainly in that language. On Sundays at 9.30 p.m. you can often hear Esperanto and English from this station.

Heilsberg and Mühlacker (the new German Regionals), Katowice, and Milan seem to be my steadiest stations of late. The respective wave-lengths are 276.5, 360, 408, and 501 metres. London Regional listeners

will back me up as to Mühlacker's performance—he is often far too good for comfort!

I have been too busy with the other wave-bands to do much short-wave work, but I hear things are very lively there, too, and I hope to be able to say more about this wave-band next month.

As for that new Swiss station, I don't know how you have been receiving him, but the punch from my aerial was tremendous. Quality in the first tests was nothing to write home about, but it soon showed great improvement.

F.F.C.

POINTS FOR PURCHASERS
Some interesting details from manufacturers about their recent trade activities.

AMONG the radio firms to bring out a staff magazine, Ferranti's must now be numbered. Their effort is called "Lightning," and Explosion No. 1—as they call it—is a fine start.

Among the "poems" is a good two-liner that purchasers will appreciate. It reads: "For Uncle when you're short of cash. Ferranti when you want to splash!"

J. J. Eastick & Sons tell us that their stand at the British Industries Fair this year was smaller than they intended, owing to an error when booking the space.

But even so the Eelex plugs, switches, earth bowls, etc., attracted much attention; and they also did good business in lightning arresters, which they were exhibiting at the B.I.F. as long ago as 1924!

F. C. Heyberd & Co. have pointed out that their address is 10, Finsbury Street, E.C.2 (not Finsbury Pavement), and applications for their mains apparatus leaflets should be made to that address.

Some important new lines are featured in the new R.I. catalogue, including a general-purpose output choke, a general-purpose transformer at 10s. 6d., and, of course, the famous "P.W." and "M.W." dual-range coils. Applications for the catalogue should be made to Radio Instruments, Ltd., Purley Way, Croydon, Surrey.



POWER-
-running to waste!

Sensational disclosure follows research engineer's discovery.
 Low insulation of condensers is source of power running to waste.

It has been the aim of condenser engineers for years past to produce a condenser having a high test and working voltage, a high insulation value, and long life, at a low cost. The new Formo condensers have a high insulation value which makes leakage infinitesimal and are tested by the sudden application of the test voltage, and not, as is usual, through a non-inductive series resistance. The new Formo range is obtainable from all radio dealers—fit one and get clearer, better reception.

SETS A STANDARD OF PERFORMANCE NEVER BEFORE ACHIEVED.



ARTHUR PREEN & CO., LTD.
 (Dept. W.C.),
 GOLDEN SQUARE, PICCADILLY CIRCUS,
 LONDON, W.1
 Factory: C-own Works, Southampton.

MAINS CONDENSERS

PRICES.

Cap.	Height.	Width.	Length.	Price
1'0	2½"	1"	1"	2/6
2'0	2½"	1½"	1½"	3/3
4'0	2½"	1½"	3"	5/6

Full range of capacities.



“ON THE GRID”

The “plus” that was negative—Those hardy old filaments—Improving cone speakers—Still fewer knobs—Synthetic announcers.

WHAT “impossible” things do happen in radio! A remark provoked by an experience that I had the other day when using one of those H.T. batteries on which the makers kindly supply grid-bias tappings up to six volts by arranging the H.T. negative tap four cells from the end of the battery.

(Incidentally, it was labelled “60-volt H.T. battery,” but due to the six volts G.B., only 54 volts H.T. was obtainable)

The bias tap was in use on an ordinary L.F. valve, and as the latter’s plate current was rather high with three volts negative bias, I moved the plug to 4½. Do you know what happened? Why, the confounded needle went even higher!

Well, I knew this was all wrong without even referring to a text-book, so I straightway made certain investigations which showed the G.B. to be joined up the wrong way round. Grid-bias negative was connected to H.T. negative! *Verb sap.*

Hardy Filaments

MUCH praise is being poured forth at the moment on the heads of our valve manufacturers. Everyone is saying what fine fellows they are to turn out such efficient valves, so much better than the old ones.

I agree, but possibly only so far as their characteristics are concerned. What about the question of robust filaments and consequent long life? Some of the filaments of old valves were pretty hardy, too.

Three or four years ago I applied six volts (let me hide my blushes of shame while I write this!) to the filament of one of those jolly little 3-volt point-0-sixes. The emission on three volts was spoilt, but the filament did not blow, and the little chap has been working on and off as a six-volter ever since.

I wonder if this is a record.

HERE is a tip by which the owners of cones of not-too-recent “vintage” may improve their reproduction. “The components you will require” are one razor blade, a little bit of care and two or three minutes of that household commodity known as time. That’s all.

It is fully realised now (but, alas, not often enough put into practice) that the front edge of a cone must be freely suspended if the upper registers are to get their full share of approbation.

If, therefore, your cone is suspended all the way round its edge with some leathery or rubbery material, just

proceed to cut it all away (the material, not the cone) except for four or five small pieces.

The pieces which you leave behind should be roughly equally spaced around the cone and about half an inch wide. Take care not to bend or otherwise damage the actual cone.

* * *

IT really is time that the simpler operation of sets was tackled by manufacturers with a wider outlook. Surely the possible simplification of controls need not be confined entirely to tuning devices.

Why should they not combine the reaction and volume controls, for instance? Reaction is never necessary if you need to employ the volume control, and vice versa.

Therefore, what is simpler than to have the volume cut down to minimum at 0° and work to maximum at, say, 90°, and to go from minimum to maximum reaction between 90° and 180° while the volume control remains set as at 90°?

Synthetic Announcers

IT was with great interest that I read in the daily Press that it is now possible to produce spoken words without their having ever been spoken by human voice. The principle employed is, of course, based on that used in certain talkie apparatus.

It is considered that absolutely perfect enunciation and singing will eventually result from the scheme. When that time arrives I expect the B.B.C. will be the first to rush to make use of it.

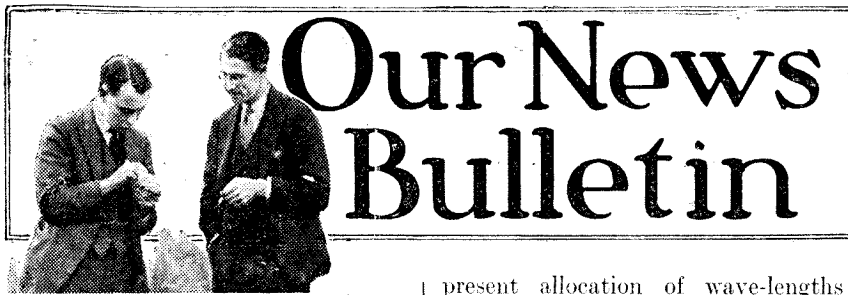
Synthetic words will result in the synthetic announcer! How the B.B.C. officials will revel in being able to get exactly the pronunciation they desire, in getting just the impersonal tone in which they take such a delight.

A.S.C.

WHAT WILL DADDY SAY?



Perhaps the stern parent will be just as surprised as this young rascal when he learns that all this came out of just one of his 2-mfd. fixed condensers.



Our News Bulletin

The "Plus-Stage" Two

It has been impossible to include in this issue all the good things that were intended, and for this reason the "Plus-Stage" Two—which gives details for adding an L.F. stage to the "Plus-Stage" One—has unavoidably had to be omitted this month.

The "Plus-Stage" Two article will therefore appear next month. But we feel that we must tell readers how remarkable a two-valver the "Plus-Stage" Two is. The loud-speaker results are excellent, and when, later, you add the third valve you will be astounded at the stations that will roll in.

Ether Muddle

Vice-Admiral Carpendale, the British delegate to the Semmering Conference, stated quite clearly that we can expect no revision of the

present allocation of wave-lengths before the Madrid Conference meets next year. This announcement is not so much of a surprise to those in touch with broadcasting politics as it is to the average amateur, because the Semmering Conference simply had no power to deal with the situation immediately.

This postponement will, of course, cause a good deal of annoyance, especially so if more high-power broadcasting stations go up before the Madrid meeting. However, red-tape must have its way, and, despite the seriousness of the situation, the net result is that the meeting has worked out various suggestions which will be more fully discussed at Madrid in 1932.

"Unorthodox Politics"

Sir Oswald Mosley seems to be very annoyed at the postponement of his debate with Lord Eustace Percy.

According to the B.B.C., the debate was postponed in order to allow for further consultation and preparation. This is rather ambiguous, but it is said that the B.B.C. really postponed the debate because it would have included "unorthodox politics"—whatever that may mean.

"Party Machinery"

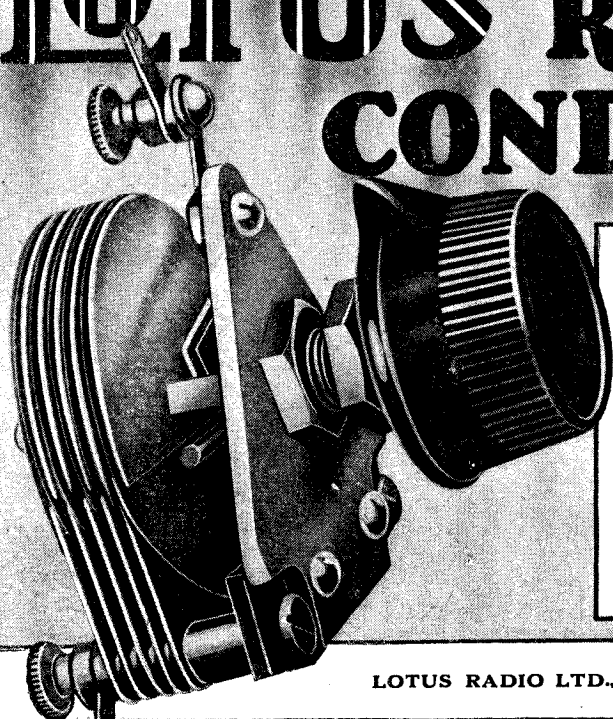
Sir Oswald Mosley, interviewed afterwards, said: "Six hours before the debate was due to take place I was informed that it must be postponed until the three political parties had been consulted, in view of the political nature of the discussion. . . . The question we have to ask is whether all political discussions on the wireless are to be in the hands of the party caucus; whether, in fact, any political opinion may be expressed without the permission of some party machinery."

The Wind-Up?

Well, it does seem silly, doesn't it? After all, if the B.B.C. is going to feed the public with silly milky debates without any real backbone it may as well stop broadcasting so-called controversial debates altogether. There's no doubt about the fact that the B.B.C. got the wind-up at the last minute and decided to postpone the

(Continued on page 392.)

LOTUS REACTION CONDENSERS



Specified in the "Stowaway" Three

Lotus Reaction Condensers are available in the following capacities:

•00007 4/9	•00013 5/-
•0002 5/3	•00027 5/3
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Other Lotus Components recommended for this set are the Anti-Microphonic Valve Holder, prices from 1/6; and the L.F. Transformer (Ratios 3-1 and 5-1), price 12/6

Lotus Components are obtainable from every Wireless Dealer.

Use them in the next set you build.

LOTUS RADIO LTD., LOTUS WORKS, MILL LANE, LIVERPOOL.

Fortnightly Parts 1/3 each

MANNERS & CUSTOMS OF MANKIND

A BOOK OF THE UNUSUAL



MANNERS AND CUSTOMS OF MANKIND is a work of enthralling interest, for it will describe and explain all the strange customs, superstitions and beliefs that survive in every corner of the globe to-day. It will be most generously illustrated with photographs, many thousands of which did not exist a few years ago and have never before appeared in a popular work of this kind. From Ireland to Iceland, from Australia to the Amazon, from the Congo to our own country this amazing work will take us, dealing with such varied subjects as Courtship and Marriage, Magic and Taboo, Religious Rites and Ceremonies, Racial Manners and Etiquette, until we realise that the most fascinating of all studies is that of mankind. Not only does **MANNERS AND CUSTOMS OF MANKIND** deal with the strange mysteries of uncivilised countries, but tells us, too, of strange customs which still survive in Europe, but are dying out. It is a work that once again proves the old adage that "truth is stranger than fiction." Part 1 contains a beautiful

ART PLATE

entitled "King of the Devils": Monster Siamese effigy; a supplement of **FOUR ART PAGES** in COLOUR, and 90 new photographic illustrations in duotone.

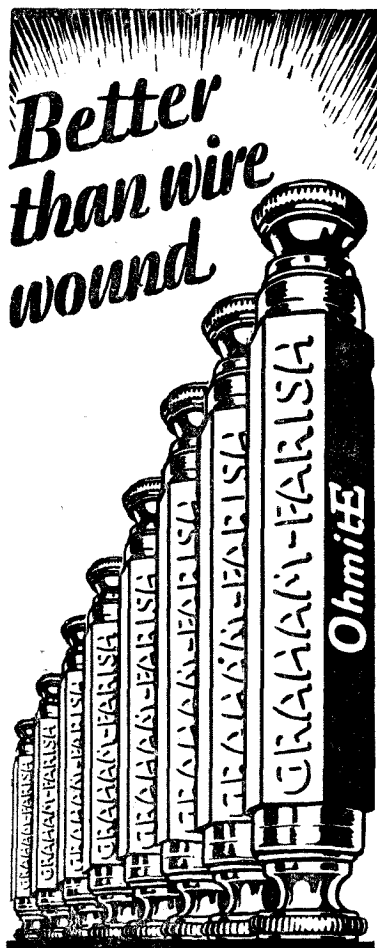
Do You Know—

- Where Kissing is Immoral and a Punishable Offence ?*
- Why We Touch Wood ?*
- Where in Britain Evil Spirits are Scared with Fires and Shotguns ?*
- Where Trial Marriage is a Regular Routine ?*
- Where the Dead are Buried in Trees ?*
- Where Blood is Shed to Make Rain ?*
- Why a person is "Sent to Coventry" ?*



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OUR NEWS BULLETIN

—continued from page 390

debate in order that the two speakers should consult the Whips of the three political parties. But why such a proceeding should be necessary just because of the political colouring to a debate, heaven only knows!

A Childish Squabble

Mr. Ramsay MacDonald had something to say about political broadcasts the other day in the House when, in a written reply to a Member, he stated that he could not provide facilities for discussion of an arrangement with the B.B.C. regarding the exclusion of political speakers from their programmes. The Prime Minister said that political broadcasting is in fact allowed under arrangements agreed by all parties.

Is it not possible for all three parties to get together and settle what looks like becoming a childish squabble over something which, to say the least of it, prevents the public from being mildly amused, even if not instructed?

Sunday Broadcasting Illegal?

A curious and rather amusing aspect of the controversy about whether cinemas shall keep open on Sundays is that the B.B.C. is also, in a strictly legal way, breaking the law. As one paper pointed out, Sir John Reith, as head of the B.B.C., continues despite the veto on public entertainment to defy the law by putting out all kinds of entertainment on Sundays.

Furthermore, if Sir John is really defying the law, the Government is aiding and abetting him—for, through the Post Office, it not only collects by way of licence fees the money which enables the B.B.C. to carry on, but also retains for its own purpose a part of the sum collected!

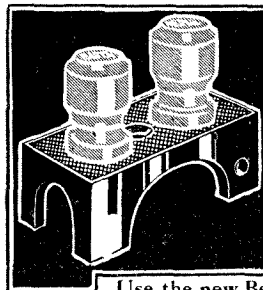
Here's another example of how red-tape can tie up everybody in a hopeless mess.

Italians Increase Power

Listeners may have noticed lately that the Italian national broadcasting station at Milan has been coming over much more satisfactorily at times. This satisfactory reception may continue for good shortly, for we understand that as well as building two new wireless stations at Florence and Bari the power of the stations at Milan and Genoa will be permanently increased.

(Continued on page 393.)

MOUNT YOUR TERMINALS ANYWHERE!



Patent Pending

8^d

Belling-Lee Terminal Mount

Use the new Belling-Lee Terminal Mount for your aerial lead-in, for loud-speaker extensions, for battery leads. It takes two terminals of any type and mounts them anywhere, vertically or horizontally—on your baseboard, window-ledge, wall, or skirting.

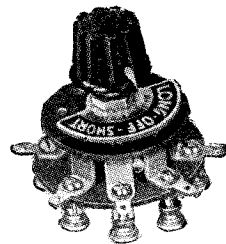
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Type "B," 6d. each
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BELLING-LEE FOR EVERY RADIO CONNECTION

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HEINZ!

There are 57 distinct parts in this Double Pole Rotary switch, and each is designed and finished with the engineering precision and thoroughness implied by the name Benjamin. Catalogue No. 1142 describes the switch fully and gives circuits in which it can be used. Have you had your copy?

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BENJAMIN

Make **The DAILY SKETCH** YOUR Picture Paper

OUR NEWS BULLETIN

—continued from page 392

Tests have been already made at Milan with higher power, and results have been very satisfactory.

Our Short-Wave Tests

As we go to press we learn that the WIRELESS CONSTRUCTOR special broadcast from Nairobi, on April 20th, is to have the true Empire atmosphere, including the roaring of lions in the African jungle!

The final arrangements are now being made, and no reader should miss this unique equatorial programme, full details of which will appear *exclusively* in the May WIRELESS CONSTRUCTOR.

DX Reception

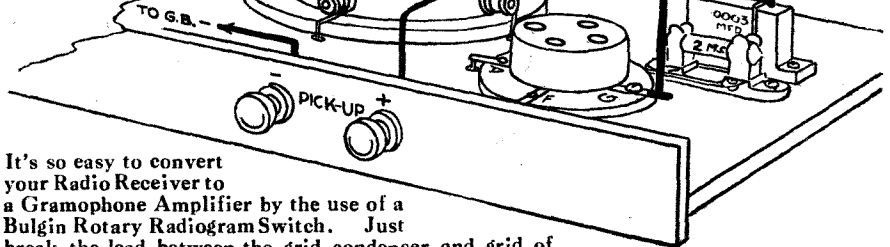
The Prince of Wales spoke on the telephone the other day from the British Embassy, Santiago, to the King at Buckingham Palace. The call was routed by land telephone line over the Andes to Buenos Aires, whence it passed over the commercial wireless telephone link direct to the Post Office receiving station at Baldock, and thence by way of the London trunk exchange to Buckingham Palace. The King's voice travelled back via the Post Office wireless station at Rugby to Buenos Aires, and thence by land line to Santiago.

6,000-mile Radio Link

The length of the wireless link from Rugby to Buenos Aires is about 6,000 miles, and the distance from Buenos Aires to Santiago is about 1,000 miles.

The normal time difference between London and Santiago is five hours, i.e. 7 a.m. in Santiago is noon in London. Chile is now, however, enjoying "summer" time, and the difference is, therefore, reduced to four hours; and as the King's call took place at 2.15 p.m. British time, the Prince was speaking at 10.15 a.m. local time.

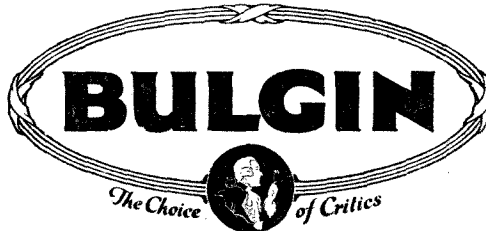
It's So Easy



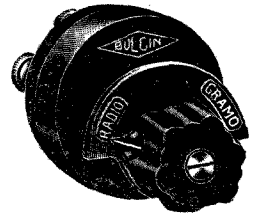
It's so easy to convert your Radio Receiver to a Gramophone Amplifier by the use of a Bulgin Rotary Radiogram Switch. Just break the lead between the grid condenser and grid of valve. Connect centre point of switch to grid connection of valveholder. Then connect one outer switch terminal to grid condenser and the other to the pick-up terminal. The —pick-up terminal goes to —1½ volts on the G.B. battery.

ROTARY RADIOGRAM SWITCH

Fully insulated snap action, enclosed in bakelite mouldings. Permits pick-up to be permanently connected. Complete with engraved indicating frame.



PRICE
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Send now for our 60-page Catalogue. Enclose 2d. postage. Contains 23 wiring diagrams.

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LONG LIFE : SILENT : ECONOMICAL

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THE POWER UNIT THAT SUPPLIES THOSE EXTRA VOLTS—SAY SIX-SIXTY FOR 200 VOLTS H.T. Automatic Grid Bias, too, safeguarding your valves. Replaces existing batteries in a moment—takes no more room. Price £6 : 6 : 0. An extra winding for L.T. enables you to use the unit at any time as a complete mains-drive for A.C. Valves.

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Totally wire-wound by the famous Varley Bi-duplex method. Varley resistances are guaranteed closely accurate, constant in value, absolutely silent in use and free from breakdown.

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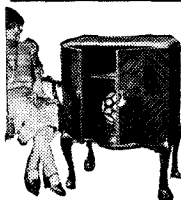
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Complete range from 5,000 ohms to 500,000 ohms.

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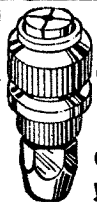
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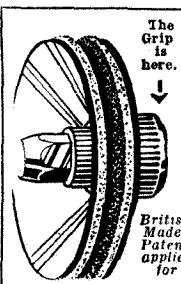
**clean reproduction from
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"TONAX"

—A new chuck with Patented Split End Taper and clamping device giving a firm grip **AT THE BACK** of the cone. All reed vibrations are passed along and equally distributed to the diaphragm. The result is vastly improved tonal quality with pure reproduction free from "chatter" and "buzz." **TONAX** fits the reed of any unit. Easily fitted.

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The Picture Paper with
the **MOST News**

SUNDAY GRAPHIC

**HOW TO MAKE THE "WIRELESS
CONSTRUCTOR" EXTENSER**

—continued from page 353

When the fixed plates have been assembled with soldering tag at the one end and with slightly more of the tapped brass securing rods protruding from one side than the other, so that they will accommodate an extra nut (see 3, in Fig. 3(A)), fasten the two brass spindle bushes to the end-plates, and pass an end-plate over each end of the moving vanes' spindle.

If you now interleave the fixed plates and the moving, you will find it quite a simple matter to carry out the rest of the assembly. Do not forget before you finally clamp the end-plates together by means of the tapped brass rods to put in the ball-bearings, a procedure best carried out by turning the condenser first up one way and then up the other, screwing down the spindle bushes in each case until the balls are prevented from falling out.

Condenser Completion

By this time your Extenser should be looking something like the one shown in the illustration, but do not be unduly alarmed if the plates touch. That is a matter easily remedied, because the position of the moving vanes in relation to the fixed can soon be adjusted by screwing the spindle bushes up or down.

By the way, those extra nuts on the spindles which hold the fixed vanes together should be tightened up against the ebonite insulators until the fixed vanes are perfectly rigid between the end-plates.

The actual condenser part of the Extenser is completed by fixing a terminal on the end-plate which has been slightly cut away at the centre, with a pigtail connection from this terminal to the tag on the moving vanes' spindle. Next, then, we can carry straight on with the construction of the Extenser switch which will ultimately be fitted to the condenser.

First of all, take a look at Fig. 4, from which you will be able to get a good idea of what is required to form the switch mechanism. You will want, for instance, a disc of $\frac{3}{16}$ -in. ebonite, $2\frac{1}{4}$ in. in diameter, with a $\frac{1}{16}$ -in. hole in the centre, and a similar disc of three-ply wood, both of which can be cut with the fretsaw.

When you have cut out the ebonite disc, mark a line right across the centre and file away one half to a depth just slightly greater than the

thickness of the brass sheet from which the condenser plates were cut. This filing operation requires to be done carefully, because the sunken portion is ultimately to accommodate the switch contacts, and it must therefore be dead level in order to ensure an even "travel path" for the plungers.

The Contact Strips

The three semi-circular contacts, which are best cut out with a fretsaw, can be made from some of the surplus brass left over from the condenser vanes. The radii of these strips (taking the measurement to the outer edge in each case) are $1\frac{1}{8}$ in., $\frac{3}{16}$ in., and $1\frac{1}{8}$ in., and each strip is $\frac{3}{16}$ in. wide.

The fixing of these strips to the ebonite disc is again a matter much more simple than it might at first appear, but, as in so many other parts of the assembly, there is a right and wrong way of tackling it. The best way, from the point of view of ease, even if not in keeping with general mechanical principles, is to stick the brass strips in their correct positions on the ebonite with Seccotine, and then to clamp the whole lot while the adhesive is still tacky, with the plywood disc underneath, to the drilling board.

You will then find it a simple matter, providing you work carefully, to drill and countersink the six holes (see H in Fig. 4(A)). The holes at H should be drilled right through the whole lot, but the three opposite should only go through the metal strips and the ebonite. Before you remove the clamp, secure the strips at these latter holes by means of tiny countersunk-head brass wood-screws, passing through the metal and the ebonite into the plywood disc underneath.

Fitting the Spring

With the clamp removed, the remaining ends of the brass strips are held in position by means of fine countersunk-head bolts, with nuts and soldering tags on the underside of the plywood disc. In order to ensure a dead smooth path of travel for the plungers, it is a good plan to run a file over the heads of the screws and bolts in case any of them are projecting above the level of the brass contact strips.

Next in the construction of the switch comes the fitting of the copper-foil spring, shown at C in Fig. 4. The exact shape and size of this piece of copper foil (which, by the way, should be thoroughly cleaned with emery cloth) can be obtained either from

(Continued on page 395.)

HOW TO MAKE THE "WIRELESS CONSTRUCTOR" EXTENSER

—continued from page 394

Fig. 4(A) or from that part of the switch that you have already made.

The Plunger Contacts

The only thing, therefore, to which we need call attention is the method of fixing it in position. This is done by means of small countersunk-head wood screws passing through clearance holes in the ebonite disc into the plywood below. The heads are soldered over and then filed flush.

Before you finally secure the copper foil, file a small V-shaped groove in the ebonite disc, so that the foil at the end at which it is secured can be bent into the groove.

Now we come to the last part of the switch construction, which is that of making the operating mechanism. For this you will require a brass collar, complete with grub-screw, with a hole in it exactly $\frac{3}{16}$ in. in diameter, and on to this collar should be soldered a fairly thick strip of brass, roughly $\frac{1}{4}$ in. wide and extending to the outer edge of the ebonite disc. The actual plungers, which are soldered on to this strip in the positions shown in Fig. 4 (B), are made from $\frac{3}{16}$ -in. diameter brass or copper tube. You will require three $\frac{1}{2}$ -in. lengths of the tube, and suitable springs and plungers (or ball-bearings) to go inside them.

Final Fixing

Having reached this stage, you can now fix the ebonite disc, etc., to the condenser, as shown at (B) in Fig. 3. It does not vary much matter in what position you fix this switch base so long as the projecting nuts on the underside (which are for connections) are clear of the cut-away end-plate.

We mentioned a moment or so ago that the actual position in which you fix the switch base was not of very great importance. That does certainly not apply to the plunger arm.

It must be fixed to the spindle in such a position that with the moving vanes of the condenser at zero the plunger contacts just—but only just—begin to press the copper foil spring down on to the ends of the brass strips near the fixed end of the foil.

You will, of course, require a special sort of dial for the Extenser, but if you remove one of the stops from an ordinary slow-motion dial so that it is free to travel over 360 degrees it will answer the purpose until special Extenser dials are available.

"Build a Pilot Kit to-day Listen to what the Short Waves say"

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You pay the Postman.
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Guaranteed.

"Wireless Constructor" Test
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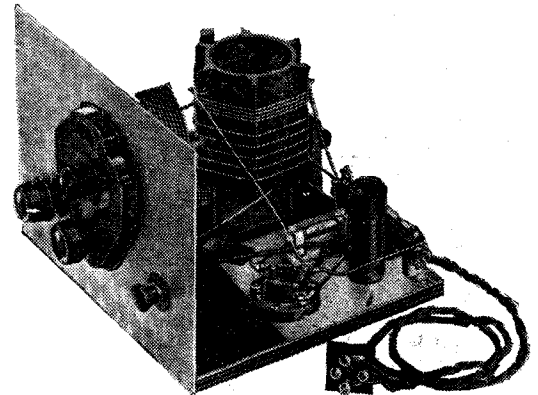
"We were impressed by the excellent
finish and careful workmanship of the
sample submitted. On test we found that
the coil covered a range of wave-lengths of
approximately 19-55 metres. It oscillated
beautifully over the whole wave-band, and
there was a complete absence of any
noticeable hand-capacity effects."

"The unit came fully up to the standard
of the original "Kelsey Adaptor", and
we can thoroughly recommend it, it is
exceedingly good value for money."

Send to London for Radio
Components not obtainable
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Described in "Wireless Constructor" (Feb., 1931),
now beautifully built by Peto-Scott.



Just plug in to your present set. No extra valves or batteries
required. Enables you to receive Ultra Short Waves
without interfering with the range of your set. Specially
Packed and sent C.O.D. You pay the Postman. **37/6**

Complete Kit as described above, ready for assembling.
Specially packed in the famous Pilot Carton and sent
C.O.D. You pay the Postman. We pay the charges. **31/-**

2 Specially prepared, tested and approved
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(Described in this issue.)

1 Panel, 14" x 7", drilled to specification, (PETO-SCOTT) ...	4	6
1 Baseboard, 10" deep ...	4	6
1 .0005-mfd. variable condenser, vernier type, or with slow-motion dial (Jackson "Tiny")	10	0
1 .0001 variable condenser, vernier type, or with slow-motion dial (Jackson "Tiny")	8	6
1 50,000-ohm wire-wound potentiometer, panel-mounting type (VARIABLE)	10	6
1 Three-point on-off switch (KEYSTONE) ...	1	6
2 Spring-type valve holders (TELSEN) ...	2	0
1 .0001-mfd. fixed condenser (SOVEREIGN) ...	10	0
1 .0002-mfd. fixed condenser (SOVEREIGN) ...	10	0
1 3-meg. grid leak and holder (GRAHAM FARISH) ...	1	6
1 2-meg. grid leak and holder (GRAHAM FARISH) ...	1	6
1 400-ohm potentiometer, baseboard-mounting type (READY RADIO) ...	2	9
1 L.F. transformer, 7:1 ratio (TELSEN) ...	17	6
1 Neutralising-type condenser (KEYSTONE) ...	15	0
1 Short-wave type H.F. choke (GRANITE) ...	2	0
1 1-mfd. Mansfield-type condenser (FRANKLIN) ...	2	2
9 Engraved terminals (BELLING-LEE) ...	2	3
1 Terminal strip, 14" x 2", ready drilled (PETO-SCOTT) ...	1	9
Wire, flex, alligator clip, screw, wander plug, etc. (PETO-SCOTT KONECTERKIT) ...	2	3
2 oz. No. 20 tinned copper wire ...	2	6
2 lengths of ribbed ebonite former, 2 1/2" diameter to outside ribs ...	3	0
1 Strip ebonite, 5" x 3/8" drilled ...	3	4
4 Valve sockets and 8 valve pins and two fixing brackets ...	2	0
Pilot Kit as above C.O.D. or Cash with Order ...	£4	3 8

Easy Way—12 monthly payments of 7/8.
2 Finished coils, ready wound and calibrated, with coil base ... 15 6
N.B.—If finished coils required in place of materials tabulated above, simply add 9s. 8d. to kit price, or 11d. to each monthly payment. 2 Mullard valves, 19s. Handsome polished oak cabinet, 14" x 7" x 10", 15s. Any parts supplied separately. If value over 10/-, sent C.O.D.

3

ACCESSORIES

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Balance in 11 monthly payments of 5/6	
REGENTONE W.5 COMBINED H.T. ELIMINATOR AND TRICKLE CHARGER , 1 S.G., 1 variable, and 1 fixed tapping for H.T. L.T. charging for 2, 4, and 6 volts. For A.C. mains. Cash Price £5 17 6	Send 10/9 Only
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4 **THE "STOWAWAY" THREE** (Described in this issue.)
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Name.....Address.....(T.W.C. 4191)

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THE "KILOTRAP" COIL

—continued from page 354

for incorporation in your present set if it is suitable, or for one of the circuits to appear in the future.

The Formers to Use

And now for the construction, which, with the aid of the detailed drawing given on page 354, is really very simple. First of all you will require some ribbed ebonite former—to be precise, two 4-in. lengths with a diameter of 2½ in. to the outside of the ribs.

In one "trough" (it does not matter in which one) of each of these formers mount four valve pins spaced according to the dimensions given in the diagram, and drill a hole against each of these pins through which to pass the wire. If you refer to the diagram you will notice that in the original the holes were drilled in the troughs on either side of the one in which the pins were mounted.

Winding on the Wire

Next pass one end of the wire through the hole on the extreme right (viewing the coil as in the diagram), solder it, or fix it very tightly with nuts, to the pin, and wind on five turns. The wire, by the way, should be No. 20 tinned copper, and you should not require more than 2 oz. for both coils.

At the fifth turn cut the wire, leaving a bit for connection purposes to spare, pass the end through the second hole along, and secure it to the second pin.

The reaction coil, consisting also of five turns, is wound in exactly the same way as the coil you have just completed, and it *must* be carried out in the same direction as the first winding—that is to say, as if it

were a continuation. Details regarding the spacing of these windings are all given in the diagram.

For the higher-wave coil the turn numbers should be ten for the grid coil and eight for reaction, and the windings (carried out with the same wire) should be spaced to fill the distances between the two sets of pins.

In view of the details given in the drawing it is hardly necessary to describe in detail the construction of the base. The panel on which the pins are mounted should, of course, be of ebonite or other suitable insulating material, but otherwise all the information you will be likely to require is shown in the diagram.

THE "STOWAWAY" THREE

—continued from page 374

The best place to accommodate the batteries or mains unit is on a shelf arranged just below the receiver. Of course, it must be remembered that a hole has to be cut in the door just in front of the loud speaker, and must be extended upwards to take in the two controls, or alternatively a separate hole can be made for the controls.

A fancy fret and coloured silk gauze can be used to cover the hole in front of the loud-speaker opening. A piece of fancy beading round the controls will finish things off.

Bias and H.T.

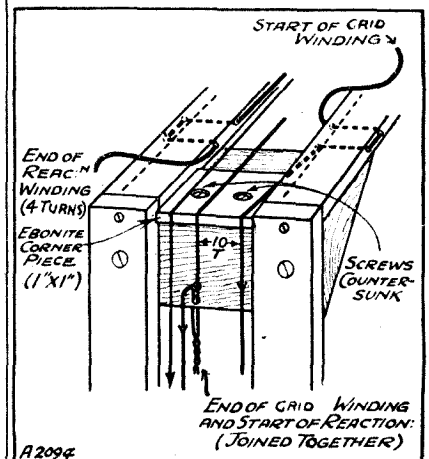
Grid bias -1 supplies the L.F. valve and -2 the power valve. The amount of negative bias to use will depend upon the valves employed, and the amount of H.T. available. Do not attempt to run the set with less than 100 volts on H.T.+2, the voltage on +1 may also be as high as this, but in some cases better results will be obtained with less when reaction is in use.

No earth is shown as one will not be necessary. If you do not obtain sufficient volume with the frame aerial, a small aerial can be run round the inside of the cupboard or brought out and taken along the picture rail. When using such an aerial try connecting the spring clip from the aerial terminal to different turns on the grid winding.

Setting the Set

To set the receiver proceed as follows. Turn the switch so that the .0003 compression condenser is brought into circuit, namely, turn it to the left, and tune in the lower-wave transmission with the .0003 compression condenser.

WINDING THE FRAME



How the windings are carried out on the frame aerial.

Then put the switch over to the right and tune in the higher-wave transmission with the other compression type condenser. Once the receiver is set you will merely have to turn the switch one way or the other to bring in the desired station, a slight adjustment of the volume control bringing the volume to the right level. What could be simpler?

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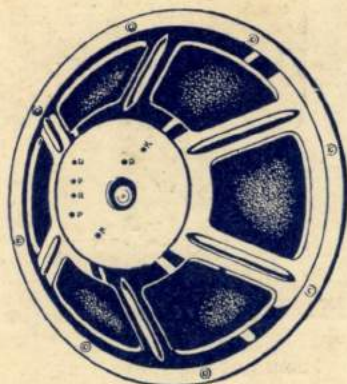
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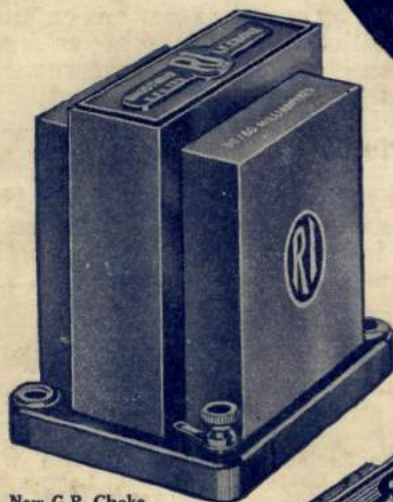
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