

LARGEST RADIO CIRCULATION IN THE WORLD

# Popular Wireless

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3d.

No. 495. Vol. XX.

INCORPORATING "WIRELESS"

November 28th, 1931.



*In this issue* - "S.Q."  
STAR

*Also This Week :*

FURNACES  
FOR FILAMENTS

THE B.B.C.'s  
UNKNOWN  
STUDIOS

THIS "CLAUQUE"  
BUSINESS

THE BOGEY VAN

MAKING YOUR  
OWN RECORDS

THE SCOTTISH  
EXHIBITION



THE "FULL  
RANGE"  
TWO

CAPT. P.P.  
ECKERSLEY M.I.E.E.  
ON

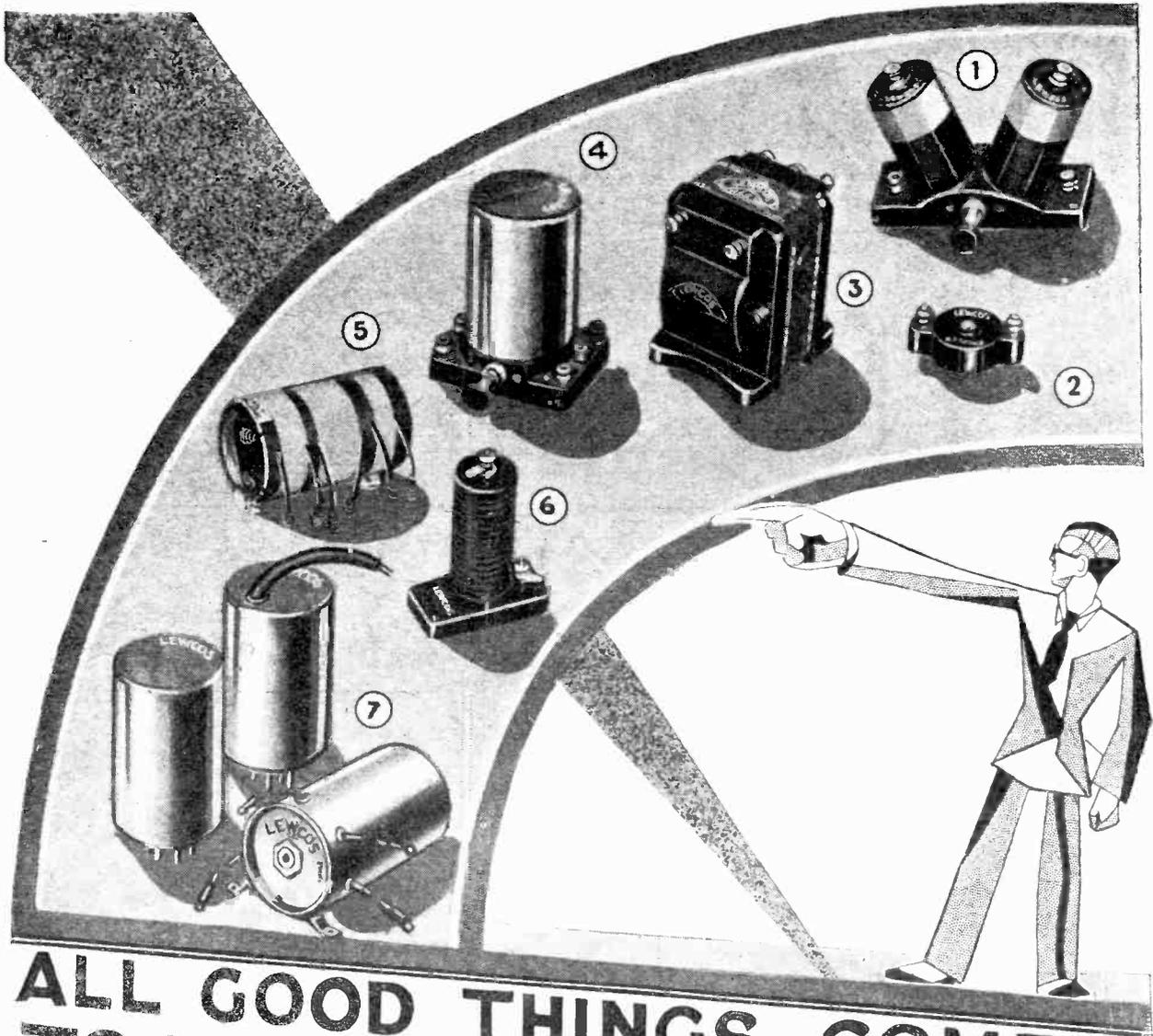
*More About*  
MY NEW  
TUNER

When Building  
your set—use a

**Ready Radio**

TESTED  
KIT

See page  
745.



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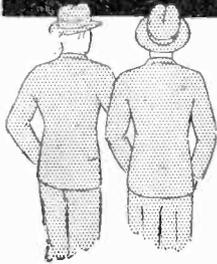
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Hutchinson



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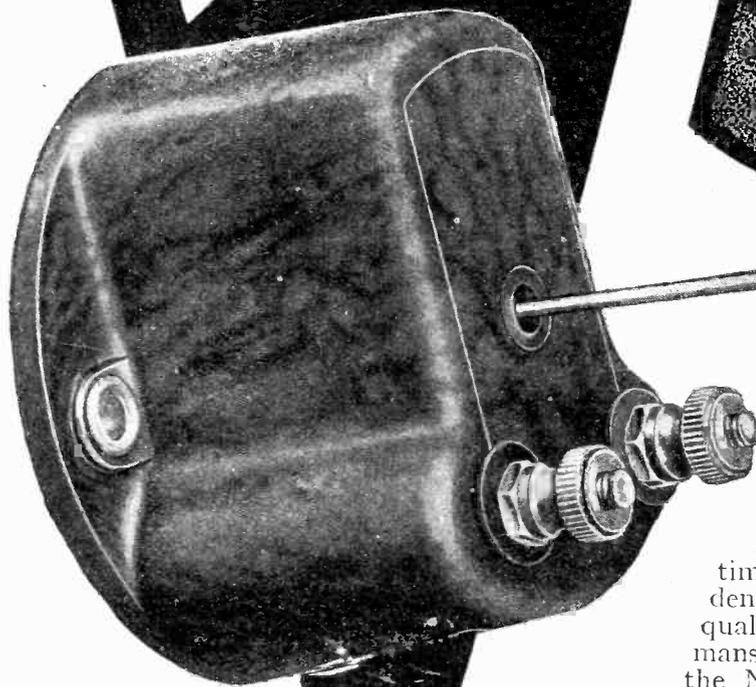
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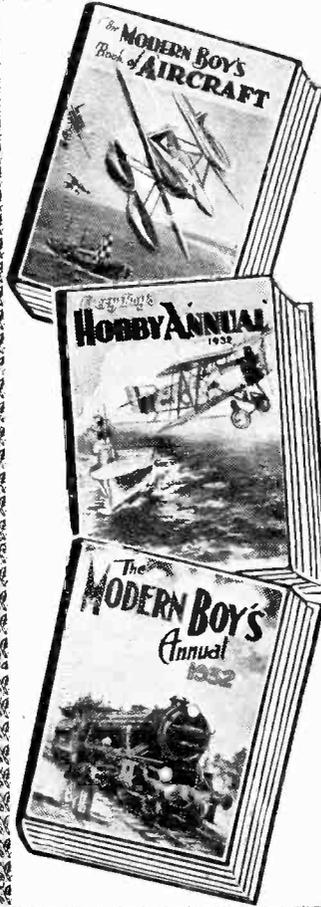
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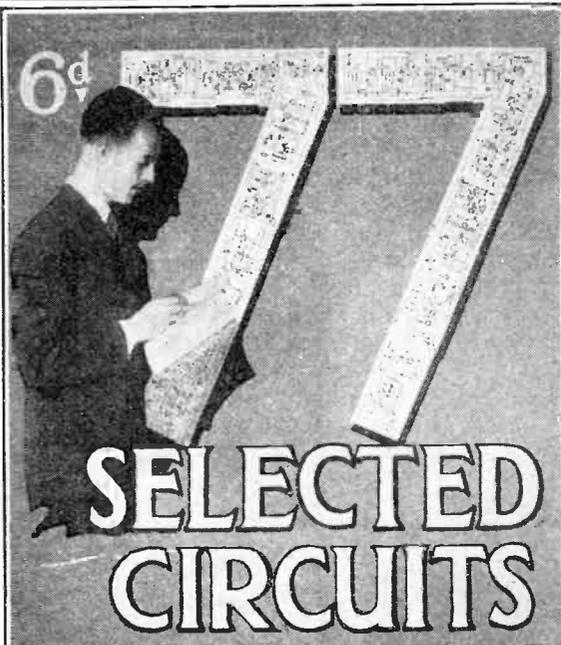
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## The Wireless Constructor

December

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good news for constructors



*New LOTUS anti-microphonic valveholder at amazingly low price!*

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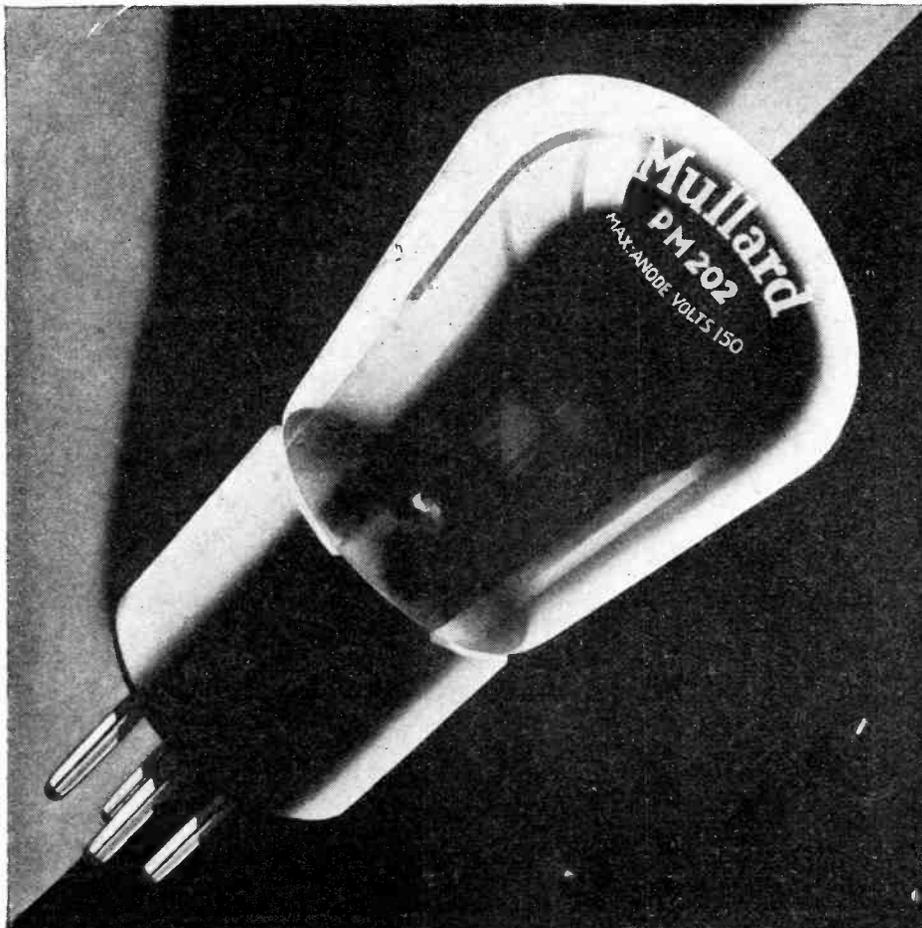
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**Overlap**\*

★ Selectivity is  
to-day's great  
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**C**RISP, clear-cut programmes—free from irritating background noises and overlapping transmissions from other stations—are what everyone wants to-day. But you can't expect your Set to be selective if its Screened Grid Valve (or Valves) is inefficient. The Screened Grid Valve has a very great influence upon selectivity.

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SCREENED GRID  
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A copy of the 72-page Cossor Wireless Book B11 will be sent you free on application to A. C. Cossor Ltd., Melody Dept., Highbury Grove, London, N. 5.

THE VALVES WITH THE MICA BRIDGE CONSTRUCTION

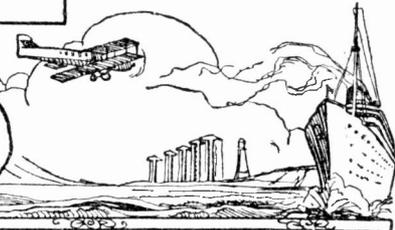
# Popular Wireless

**LARGEST NET SALES**



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Sir OLIVER LODGE, F.R.S.  
Chief Radio Consultant:  
CAPT. P. P. ECKERSLEY, M.I.E.E.  
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Assistant Technical Editors:  
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**CHRISTMAS IN SIGHT**  
**DALLYING**  
**TIP ON TONE**  
**EMPIRE SERVICE**

## RADIO NOTES & NEWS

**SOCIETY PAR**  
**"ALF-SENIOR"**  
**"P.W." ANSWERS**  
**THE NICK OF TIME**

### Christmas in Sight.

WITH November on the point of expiring one realises with a jolt that one is within spending distance of Christmas. Ah, now I see!—Oh, fool and blind!—why, that boy of mine has been asking questions about amateur transmitting apparatus for weeks past, and "showing willing" by trying to make one out of a buzzer. I explained how hard it would be for him to get a licence, but if, as I now fear, we are thinking of a Christmas present, why, it'll be a clever P.M.G. who will stop that lad with excuses about a mere bit of paper!

### Dallying at the Desk.

UNDER the pretence of listening to Fat Stock Prices and other market reports, American men are conspiring, with the aid of makers of radio sets, to have receivers installed in their office desks—in the lower right-hand drawer. The loudspeaker is put at the front of the drawer, so that Hiram has only to open the drawer very little in order to hear it. Think of all the 100 per cent "sugar daddies" lapping up jazz whilst pretending to work out mergers! This new idea will be a Blow at Big Business and a Menace to Much Money!

### Standardised Car Radio.

BEFORE we leave the U.S.A., let us notice the threat of American car manufacturers to make radio equipment on most oddermodels within the next two years. Already the sets are being designed, and special sparking-plugs are being developed. Golly, what a country! But will the notion "pan out" profitably? I myself should deem it just plain heck to have a loudspeaker shouting in any car I might occupy. But then, I don't have to live in America!

### Another Prophecy Comes True.

A REPORT from Indiana, U.S.A., tells of a demonstration of ploughing a field by means of a tractor operated by wireless. The wireless apparatus was in a car thirty feet away from the tractor.

In Kipling's story, "As Easy as A B C" written in 1912, he says: "There was a rattle and a rush, and a five-plough cultivator, blades in air like so many teeth, trundled itself at us round the edge of the timber, fuming and sparkling furiously." This plough was operated by a girl from a house half a mile away. That is as good as any of Wells' forecasts.

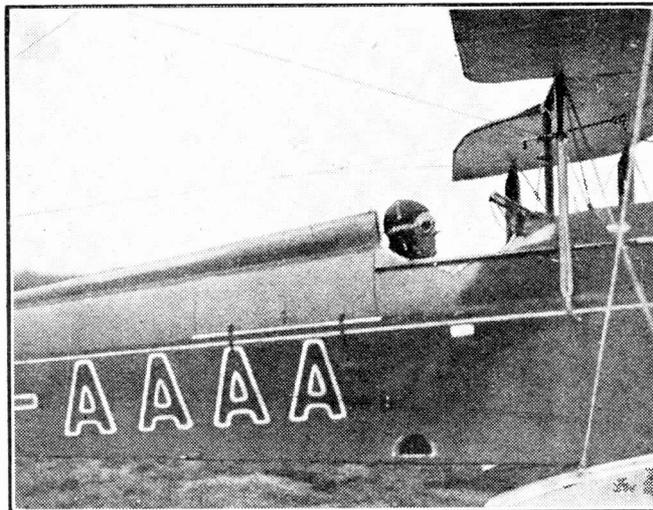
### A "Tip" About Tone.

AN old reader, G. W. (Kensington), tells us that with his set, a "straight" three, det. and 2 L.F. (transformer-

### Note for Exporters and Radio Clubs.

MR. J. ASHER, 28a, Waverley Road, Bloemfontein, S. Africa, wants to get into touch with a Radio Club, though he doesn't say where the club is to be situated. I expect he will receive replies from most parts of the world. Further, he asserts that he cannot find in South Africa a British-built set, at a reasonable price, which will give L.S. results on "most of the high-powered overseas broadcasting stations." He uses an American six-valve A.C. mains set which, with aerial and licence fee (£1 5s.) cost him £25. Now, British exporters, what about it?

### THE A.A. TAKES TO THE AIR!



The Automobile Association has established an Air Service Station at Heston Aerodrome, from which light aircraft can receive weather reports and other helpful information by radio. Apparently this machine, equipped for the service, succeeded in getting very appropriate registration letters!

coupled), and a "Blue Spot" 66 K., he found speech and music a little too "bright and crisp," which he altered by connecting a .001-mfd. fixed condenser between the grid of the first L.F. valve and "earth." This, he says, rounded the tone and gave a "better introduction of bass notes." Our technical people, in passing on his letter, point out that he merely cuts down the amplification of the high notes; they would prefer to leave 'em alone and increase the bass, if possible. Many thanks to G. W.

### Radio Society Note.

MR. G. RATCLIFF, Secretary of the Hackney and District Radio Society, who is domiciled at 10, Balfour Road, Highbury New Park, N 5, has sent me the society's programme for the coming season, and it is a top-notch. S.W. super-hets, home recorders, interference, club supper, valves, wave-lengths and frequencies, the "mike," anode-bend detection, wave-meters, debates, ten-minute lectures, gramophones, sales of spare parts—a real all-round, general utility layout of a syllabus. All welcome. Ten bob per annum.

### "Notes From the North."

I LEARN from one of our regular correspondents that Mr. M. R. Kelsall, formerly of the Scottish National Theatre, has been appointed the Aberdeen representative of the B.B.C. vice Mr. Ian Whyte, who is now Scottish Musical Director. By the way, the latest information goes to show that the separation between the North Regional and Prague is to be increased to 11 kilocycles, and that between the North Regional and Langenberg to 10 kilocycles.

### An Empire Service at Last.

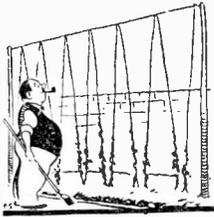
I REJOICE that the B.B.C. has decided to build a short-wave transmitter at Daventry to give an all-round-the-clock service to the Empire, various wave- (Continued on next page.)

# NEWS—VIEWS—AND INTERVIEWS (Continued)

lengths being used to suit the different territories. Better late than never! According to my information no less than £40,000 is to be spent on the maintenance of the station and the provision of its programmes. Well, there you are, you people all over the place! Don't forget to build the very best "P.W." short-wave receiver you can, and when in the sweet bye-and-bye you hear the new station—let us know how you get on with it. You will probably need the 20-30-metres band.

## "Good-bye to All That."

THIS book title exactly fits the case of the writer of a letter which was recently received at a certain suburban post office. The missive referred to a notice



about the renewal of a receiving licence and it continued: "In consequence of the installation of Brookmans Park, which renders my set useless, I discontinued using it in January, 1931, and converted the case into a workbox; took down my aerial and used it for *stringing runner beans*, and stowed the loudspeaker in the loft as the sole relic of an inglorious episode." I think he was right about those beans. They need a lot of care!

## Society Par.

THE Rochdale Radio and Television Society, which at a recent local Trades Exhibition gave thousands of people their first opportunity of "looking in," is now flourishing, but extends a hearty welcome to new members. The Society has a well-equipped workshop and a complete apparatus for television transmission (by line). For details apply to either of the Joint Hon. Secs., Mr. A. Kershaw, 2, Exeter Street, Rochdale, or Mr. A. E. Sutton, 53, George Street, Rochdale.

## Licence Figures.

BY the end of this year the number of licences will be biting well into five millions! At the end of October the total was more than 4,000,000! But it is stated that during September more than 180,000 licences lapsed, and I am curious to know the reason, because that is a mighty big figure, even for these hard times. The aerials, of course, may do service as clothes lines, but what happens to all the receivers which become unlicensed? Do they just stay "put"—objects of suspicion to the Post Office—or are they used illicitly?



## Radio Research.

RADIOISTS, not only those who pursue the light and genial path of harkening and home construction, but also those who have a bent for the more serious

study of radio and allied subjects, should beg, borrow, or buy the Report of the Radio Research Board for the period ended December 31st, 1930, price 2s. at the Stationery Office. Therein are recorded the results of the labours of a veritable galaxy of scientific stars on such subjects as "Propagation of Waves," "Atmospherics," "Study of Aerials for Transmission and Reception," and so forth. All very learned, but tempered, in parts, to that shorn lamb—the ordinary reader.

## "Alf—Senior."

I THANK Mr. A. J. Mann (Middlesboro) for his letter in which he explains that his son, Alf Mann, o' Middlesboro', having been called to London for some time, is unable to reply to the shoal of letters asking him for copies of "International Short-Wave Radio News" (see "P.W.,"

## SHORT WAVES.

### POT AND KETTLE?

"Obvious ythe B.B.C. standard list of pronunciations is far from complete," says the "Glasgow News." Their own spelling doesn't seem to comply with dictionary standards, either!

### THE SOUL'S AWAKENING.

Mr. Dillwater: "I wonder if there is anything on the wireless worth listening to—Professor Yapp will give a talk on 'Kindness to Dumb Animals—'"

Mrs. D.: "Don't shut him off, dear—I'd love to hear him."

Mr. D.: "This sob stuff seems to appeal to you."

Mrs. D.: "I was just thinking, darling—perhaps I haven't always been as kind to you as I might have been."

### "Answers."

"The doom of the cat's-whisker is sealed, and two valve sets are now brought within the reach of a million-and-a-half crystal-set users."—Daily Paper.

Hardly enough to go round, surely?

According to the B.B.C.: "The best way to give the public what it wants is to reject the express policy of giving it what it wants. In other words, if you set out to give the public what it wants you will not do it."

Ses they!

An American professor declares that "the border of the earth's atmosphere is enclosed in a crystal globe, and that this globe is responsible for some of the queer things that happen."

That doesn't explain away some of the queer professors.

October 24th, page 406). Alf had time only to despatch the copies which he had in hand; the other applications have been sent by Pa Mann to the headquarters of the club at Southport. Pa Mann quotes several chunks from letters received, which show that Alf's efforts on behalf of short-wavers are greatly appreciated. I sincerely hope that Alf has "clicked" for a job.

## "P.W." Answers Up.

A GOOD friend of ours, G. W. D. (Dundee), in trying to convert two non-readers into readers, was asked whether we publish lists of old "P.W." sets. The reply is that we supply a sheet giving a

list of all our blue prints, on application. Secondly, there is a complaint that we do not continually give details of how our back numbers can be obtained. Such numbers should be applied for from Back Number Dept., POPULAR WIRELESS, Amalgamated Press, Ltd., Bear Alley, Farringdon Street, London, E.C.4; post free, 4d. each. (This information is repeated from time to time under "Radiatorial.")

## In the Nick of Time.

WHO says that there isn't a wee cherub wot sits up aloft to watch over the poor struggling penny-a-liner?

Why, bless me soul, this very week, as ever was, after me climbing into a brand new kit of winter "undies," down I goes, as you might say, into the werry deevile of a *code id der doze*, plus a coff wot 'ud be worth a forchin artside of a theater. (And I've still got it! Wittles, drink and baccy arn't no manner o' good to pore ole Hariel at the moment!)



## Still in the Nick.

LO! Behold Ariel, recumbent on a bed shaken by sneezes and coughs, sucking a tasteless pipe, when, *tut-tut*, comes the postman, bearing a small parcel containing *one lemon* and the best wishes of C. S. P. (Wembley) in answer to some question which, so I gather, I propounded in "Notes and News" aeons ago, in the days before I caught this cold. Did ever a lemon arrive so opportunely? For it seemed that all the world was telling me to "take hot lemon juice and sweat it out." Since I had malaria nothing has made me perspire except physical work in the sun. And that I avoid. (*A-chew!*)

## What We Are Spared.

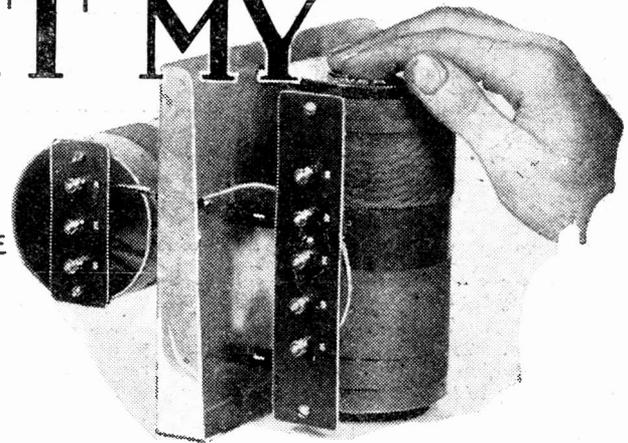
WHENEVER you feel annoyed at the "unco guid" attitude of Grandma B.B.C., just think of this and be thankful that men of good taste stand between the "mike" and broadcasters like Messrs. Fields and Hall of the U.S.A. These two appear to make a speciality of composing jingles about crime, the "eternal triangle," the wandering boy "mush," and so forth, but their crowning achievement is the song which they made about the hanging of Mrs. Eva Dugan, the first woman to be executed in Arizona. As a chorus, they were kind enough to use a nine-line verse which the unfortunate woman left behind her. The "New York Sun" refers to this sort of thing as "sheer fun."



ARIEL.

# MORE ABOUT MY NEW TUNER

BY CAPT. P. P. ECKERSLEY M.I.E.E.



Our Radio Consultant-in-Chief discloses some further details concerning his new invention, and describes some interesting features found in its practical form. Readers should note that practically any Det.-L.F. or Det. 2 L.F. set can be modified to include this wonderful new component, so long as there is sufficient space for its accommodation—it is rather larger than most coil units.

**A** LITTLE more about the famous coil! Let's go over it again in some quick way to revise its advantages.

Thus: selectivity, in its general sense, is a paramount consideration in modern wireless technique. This is because the Prague plan imposes a 9-kilocycle separation and because the power of stations has been in the past few years greatly increased.

### Selectivity.

Selectivity is achieved in two ways: firstly by the design of the high-frequency circuits; secondly, by the design of the low-frequency circuits.

So far the ordinary technique has imposed a single-tuned circuit in front of a high-frequency valve and a single-tuned circuit after the high-frequency valve. The selectivity so obtained is not sufficient for modern needs.

It is proposed in the new technique, for which R. E. H. Carpenter and myself claim to be the pioneers, to have a "tuner" so that all selection or high-frequency filtering is done before the first valve. It is further proposed to interpose a low-frequency filter after the detector and before the loudspeaker.

The tuner which has been described is the very simplest form in which the new technique can be presented; price has been a primary consideration.

The filter to go after the detector has been designed to be simple and inexpensive. It is not a criticism of the underlying principle that in its simplest form it does not give perfection of quality.

No set gives perfection, anyhow; you will find that the quality given by this set is very pleasing. It lacks "top," but the Prague plan has denied us top. It's better to have too little top than mush, side-band jamming, and so on, mixed in.

### The Circuit.

I will now describe the diagram of connections which you will see on this page.

I gave you a diagram which was designed to illustrate the principle. Now I give you a further diagram to define the practice.

It is necessary with most tuners to arrange

that one inductance is tuned by a variable condenser. I am not sure that this is necessarily right, but it's convenient because component manufacturers have marketed for this new standard method of designing high-frequency tuners.

### Covers Both Bands.

Thus *force majeure* we use this principle. But one condenser would have to have a variation of 100 to 1 to "tune" a coil from 1,500 kilocycles per second to 150 kilocycles per second.

Thus it is usual to have two coils—a "long" wave and a "medium" wave. The user selects which coil he will have by a switch. In better, but slightly more expensive designs, notably the Extenser, the condenser dial timed through 180 degs. automatically changes the coils to give the long- or medium-wave range of tuning. In this design, always remembering price was

absorption effects, as in some designs.

The reaction windings are different for medium-wave and long-wave tuning. This is a very great advantage, since it is difficult, if not impossible, to arrange for one coil to have the same order of coupling either to the long- or medium-wave windings.

It is a further advantage of the design that these reaction windings, being at low potential, form a partial screen which minimises the strength of stray fields, and hence prevents serious electro-magnetic couplings between the aerial and the coupled circuit.

If it had been possible, I should have greatly preferred to arrange the whole of the screened circuit to be in a screening box.

### Stray Coupling.

It was proved, however, that the coupling between the coils, placed carefully at right angles, was slight, but it does exist. With very strong signals there is, in fact, direct pick-up by the coil, but in very strong signals there is no need for great selectivity. When other stations are picked up this effect is eliminated, thanks to the existence of the novel method of tuning.

The methods for wave-change, etc., are not particularly novel. The reaction connections with their screening effect and, of course, above all the resistance coupling, are the salient features of the device.

Let it be insisted that simplicity of design and construction are the keynotes of the tuner. Performance is really very extraordinary, one might be using a five-gang high-frequency "popopodyne," so far as selectivity is concerned!

And, with the simple Det. and 2 L.F., there is the added advantage over the super-set that you can only pick up what is worth picking. I never did enjoy noise as such, and mush is more succinctly described as muck. So highbrows beware, if you start drawing curves they will shock you, but if you start listening to a clean signal you will realise that curves are meant to be bent if signals overlap!

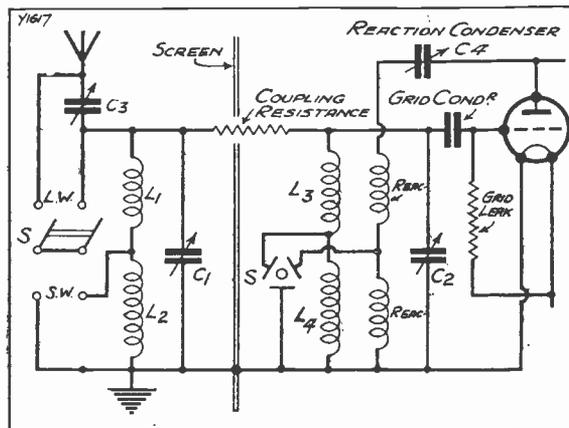
I wish all of you who go in for this tuner a most interesting time, and I can confidently do so because I know you'll have it, and I know the device is an advance on existing technique.

**MAKE SURE OF YOUR XMAS "P.W."**

**ON SALE DEC. 3RD.**

**PRICE 3d. ORDER NOW!**

### CONNECTED TO A DETECTOR



This diagram shows, in theoretical form, how the Eckersley Tuner can be connected up to an ordinary detector valve. The tuner itself includes six coil windings, the coupling resistance, and the screen. The condenser C3 is shorted out on the long waves by the double-pole switch.

a prime consideration, we use a switch.

Thus S, S, are the switches. It will be seen that these switches besides cutting out or in the long-wave coil (by short-circuiting it) also cut out or in the aerial series tuning condenser. This condenser is not required for long waves.

L<sub>1</sub> and L<sub>2</sub> are the medium-wave, and L<sub>3</sub> and L<sub>4</sub> the long-wave windings. They are wound on the same former. The shorting of the long-wave coil does not produce

# THE SCOTTISH RADIO EXHIBITION

DESCRIBED BY OUR NORTHERN CORRESPONDENT.

Who gives you his impressions of this "Northern Olympia," gained during his recent visit.

SCOTLAND is soon to receive a big shock. The Scottish National Radio Exhibition at Edinburgh gave me an opportunity to have a chat with a number of Scottish radio business men, and almost unanimously they told me that the public does not realise the full significance of the new Scottish Regional high-power station at Falkirk.

## The Opening Speeches

In opening the exhibition on November 11th, Sir Gordon Nairne, a Governor of the B.B.C. (and himself a Scot) mentioned the new station, and so did Mr. Cleghorn Thomson, the Scottish Regional Director, but their references were as studiously vague as we have come to expect of the B.B.C. at such times.

"However," said an exhibitor, "the speeches to-day will perhaps waken the Scottish public up to what is going to happen." Alas! the opening of the exhibition was all but ignored by the Edinburgh evening newspapers that day.

Evidently the Press in Scotland is also unaware that the biggest broadcasting event since broadcasting first started in Scotland is drawing near. In fact, Falkirk will be in full swing long before the next Scottish Radio Exhibition takes place.

Most certainly there will be a next. They are talking about it in Edinburgh already. In 1930 the first was held; there were 43 stands. In 1931 the Radio Manufacturers' Association gave the show its support and there were over 70 more stands.

In 1932, with Falkirk working and Scotland awake to what high-power and alternative programmes mean, the Scottish Exhibition will undoubtedly be larger still.

## Plenty of Business

Don't imagine that enthusiasm for radio is lacking in Scotland. Forty thousand people attended last year's exhibition, and on the opening day of this year's show several exhibitors told me that they were already doing splendid business.

But as I mingled with the exhibition visitors I noted that their inquiries most rarely referred to this forthcoming event and to the new demands it will make of receiving sets—(1) high selectivity, (2) ability to handle powerful signals.

The Scottish show was smaller than Olympia and Manchester, but it was no hole-in-the-corner affair. Held in the Waverley Market, a spacious hall below street level, it had a cheerful and go-ahead appearance.

The organiser, Mr. T. Percy Bentley (to whose foresight and energy the exhibition owes its existence), believes in uniform stands, and so each exhibitor had a cream-and-blue stand similar to his neighbour's.

## GIVING IT A GOOD SEND-OFF!



On November 11th the biggest Radio Exhibition Scotland has ever known was declared open by Sir Gordon Nairne, a Governor of the B.B.C. It should give a tremendous boost to the Scottish Radio trade, and is a fitting preliminary to the opening of the Falkirk station next year.

A great attraction to the public was the B.B.C.'s model studio. Concerts were broadcast from this studio every day.

The Edison Swan Company had a second microphone in the studio, alongside the B.B.C. "mike," and the concerts were relayed to the loudspeakers in the exhibition by this company, who were responsible for feeding all loudspeakers in the hall. When no concert was available gramophone records were used.

A bank of nine 20-watt amplifiers was used, nine to feed the 180 loudspeakers on exhibitors' stands, and one to supply the

four R.K. permanent-magnet loudspeakers flooding the hall with music.

Glass windows in the model studio permitted exhibition-goers to see broadcasters in the flesh. A more human and attractive effort, this, than the B.B.C.'s highly statistical show of maps and graphs at Olympia and Manchester—but the studio sadly needed a coat of paint.

## All "At Sea"!

On the opening day, too, there were no numbers on the exhibition stands, and the public roamed about like lost sheep. I understand this was rectified later.

Many of the chief radio manufacturers were exhibiting. Most of them had sets stripped of their cabinets and other attention-catching stunts—such as G.E.C.'s 100-kilowatt transmitting valve, Mullard's 1½-kilowatt ship's transmitter (loaned by the liner "Cameronia"), and Ekco's huge model of the ingenious tuning dial calibrated with the names of stations, which are tuned in by moving a pointer to the name of the station required.

It has been objected that such arrangements will be upset by future wave-length shuffles. I was told however, that new calibration discs will be published when that happens.

Scottish traders had taken a large number of stands and some of them made a jolly good show. On the whole, however, the manufacturers had the best of it as far as showmanship was concerned.

Marconiphone had a particularly bright and spacious show, and Ferranti's stand, though not utilising the colour appeal (and even sex-appeal!) of some competitors, was one of the largest and most interesting.

## Mains Sets

I will not go into detail about exhibits. They have already been described in POPULAR WIRELESS'S full reports of the Olympia and Manchester Exhibitions. All-electric sets were again predominant, and the three or four-valve type of cabinet set was the vogue. Components

and constructors' kits were not featured so strongly as at Manchester.

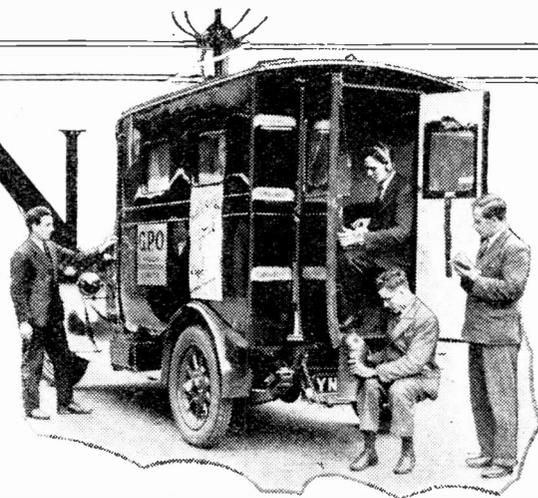
The enormous value of such an exhibition as this, is that it enables people in distant parts of Great Britain to examine the very latest apparatus, "direct from Olympia, London," as theatrical folk would say.

And, as Mr. Cleghorn Thomson pointed out at the opening ceremony, it is important that Scottish listeners should have the opportunity to see the new sets, for, he said, it is not much use the B.B.C. putting out good programmes unless the public has good apparatus to reproduce them.

# The BOGEY VAN

BY A SPECIAL CORRESPONDENT.

The Bogey Van is so spook-like that our contributor never managed to get on board it, but nevertheless he manages to make some surprising disclosures!



THROUGH half-lit streets glides a black, sinister-looking van in which two or three hooded figures crouch over a contraption of bulbs and knobs, muttering "It's 'The Laurels,'" or "It's No. 17 again! We've got them at last!"

Such is one of my visions of the special cars used by officialdom to drive a couple of wireless licence-dodgers to the police-court and a couple of thousand to the grille of the nearest post-office.

### Has Anyone Seen Them?

I ought to explain that I have never seen such a van, even though I once used a set for two months without a licence. And I have never met anyone who *has* seen such a van.

Perhaps there aren't any; they may be like the Russian army which landed in Scotland in 1914. I believe there have been pictures in the newspapers of them but that may be just G.P.O. playfulness.

I have to rely on my imagination for real details. Sometimes I think these vans (the plural is used in spite of a conviction that there can have been only one van for eight years for a population of 40,000,000) are cheery affairs with lots of visible wireless apparatus outside such as frame aerials and with blood-curdling warnings painted on the sides.

The driver simply cruises through the streets, stopping now and again to light a pipe. Inside, the engineers play cards—giving the wheel of the frame aerial a twiddle now and again with their elbows. The result—20,000 listeners in Aberdeen (or whatever the locality) suddenly take up wireless.

### On The Right Track.

After all, it's the moral effect that counts. Whether I am right or wrong in my idea of a "blood-hound" van, the Post Office are on the right track.

There is to be a new drive against wireless pirates. There are to be bigger and better vans and more of them. But they are "on the Secret List," say the Post Office.

They cannot be photographed, but it is suggested that they look like "luxurious limousines—the sort a millionaire would use." Leaving aside the propriety in these times of crisis of such lavishness, are such vehicles the best for the purpose?

### Some More Suitable Vehicles.

I doubt it. Unless the psychological element is to outweigh all technical considerations, surely a coal-cart or a hearse would be more useful. Slow movement to enable tests to be made would be seemly and natural in such vehicles.

In London a taxi might even be used. Personally, I am all for variety; there is room for a new technique in making the

find" the pirate, eagerly waiting for him to oscillate.

They wait without success. Meanwhile Bach has come on and the pirate has gone off. The whole job must be very trying for the engineers.

But suppose the pirate never oscillates? My suggestion is—*make* him. If the P.O. van had a special oscillator, the engineers could swish their condensers and the pirate might retaliate.

### Even When Not Working.

However, the P.O. seem to have thought of all this. The new and better vans have, they say, "equipment which can detect a set which is not even working" and "their instruments are so delicate that any piece of metal more than 6 in. long has a definite effect on them." A crow-bar, perhaps.

But does all this mean that to avoid the privacy of our homes being invaded we must have only wooden bedsteads, that we must reduce the length of our poker to five and a half inches.

Although I fear the Post Office engineers are going to discover a large number of drain-

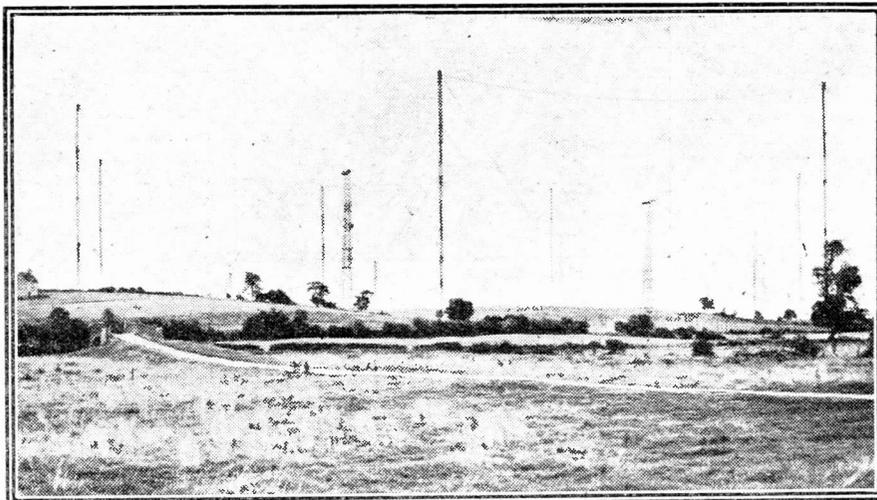
pipes, rain gutters, hospital beds, fire-irons and other domestic metalwork, I have not the slightest doubt but that licence figures will shoot up as pirates are tracked down.

### Something Up Their Sleeve.

But there is no doubt that the Post Office have something up their sleeve. If you who read this are a pirate, trouble is certainly coming to you in a plain van, if you don't look out.

Personally, I should like to see the penalty for what, after all, is a very mean sort of evasion, raised to £1,000 or ten years' imprisonment—or both!

## ALSO IN THE VAN—OF RADIO PROGRESS!



This is a view of the Rugby radio station, which handles most of Europe's trans-Atlantic telephony. It is the largest wireless station in the world.

pirate walk the plank. Ex-Q-boat commanders could be called in to advise on camouflaging.

Technically-curious readers will want to know "how they do it." Judging by the frame-aerial on top of the van seen in pictures, apparently the P.O. engineers wait till the pirate oscillates and thereby sends out feeble wireless waves.

### A Very Trying Job.

The house is thus indicated (or the house behind or three houses behind). The van passes a few doors up the road, and again the process is repeated to get a cross-bearing.

The engineers again try to "direction-

THE MIRROR OF THE B.B.C.

By O.H.M.

## ULTRA-SHORT WAVES

THE B.B.C. BOARD—SEQUEL TO T.U.C. ATTACK—MORE  
XMAS PROGRAMME DETAILS.

I UNDERSTAND the B.B.C. is seriously concerning itself about the possibilities of ultra-short wave development.

Special research has been put in hand, and experiments extending over many months will be undertaken.

The B.B.C. engineers are naturally conservative, but I gather that they are not without definite hope that many of their problems will be solved by the use of the very short waves.

Chiefly, of course, it would put an end to the international muddle because then there would be enough and to spare of channels for all comers. But no definite working conclusions can be expected until 1933.

### The B.B.C. Board

Sir E. Grigg is the latest quotation for possible additions to the B.B.C. Board of Governors in January. He was one of those who stood aside in the General Election to avoid vote-splitting, and this taken in conjunction with his previous distinguished record of public service gives him a definite claim on the gratitude of the National Government. So he takes the place of Captain Ian Fraser in the lists.

### Sequel to T.U.C. Attack.

I hear that certain members of the B.B.C. staff share the views of the Trade Union Congress about the alleged partiality of the B.B.C. to the National Government in the General Election. There is some talk about resignations.

### More Christmas Programme Details.

Here are some further details about the Christmas programmes upon which I have written several paragraphs in previous issues.

There are still gaps which it is expected will be filled with interesting items not only for Christmas Day, but also in the week—upon the Friday of which we shall, I hope, all be as happy with our eats and drinks and radio as befits the jolliest day of the year—and of these I shall probably be in a better position to say more next week.

Meanwhile, it is good to learn there will be the usual relays of carols on Christmas Eve—first in the afternoon from King's College Chapel, Cambridge, and during the evening from St. Mary's Church, White-chapel, from where for some years we have become accustomed to hearing Mr. Stanford Robinson's well-trained Wireless Choir.

Canterbury Cathedral has again been chosen to supply the morning service on Christmas Day, which will be broadcast on the National wave-length.

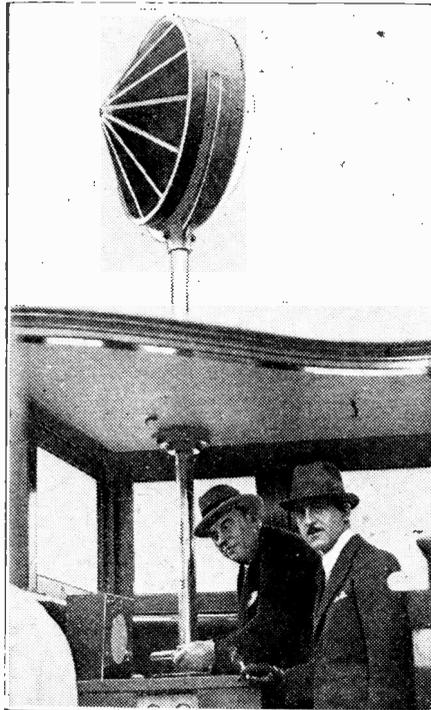
### Selections by Christopher Stone.

An hour's recital of seasonable gramophone records selected by Christopher Stone—who, although, as he admits himself, is somewhat inclined to be talkative, knows all that is worth while about such programmes and how to get them over—follows the Cathedral relay, after which

there is an hour of cinema organ music played by Reginald Foort which will carry us until after lunch at 2.30 p.m.

Ernest Longstaffe's pantomime, with which I have already dealt, is down to begin at 7.30 and this goes on until 9 p.m., when such news as we usually get on Christmas Day will be broadcast.

### IT'S FINE FOR FOG!



The assistant harbour-master of the Port of London (at the wheel) with a novel sound-indicator that enables ships to steer safely in fog. He got the idea from talkie technique.

The usual appeal on behalf of the Wireless for the Blind Fund has been given a quarter of an hour and twenty-five minutes is allocated to the singing of Christmas songs by John Coates (tenor).

The tit-bit of the evening, the special Christmas Day programme in which the B.B.C. will broadcast conversations between the studio and people throughout the British Isles and the Empire, to which I referred at some length last week, fills the remainder of the time until 10.30, when Dance Music from the Savoy Hotel will be relayed until midnight. Jack Payne and his "Boys" have heroically "offered" to carry on from midnight until 1 a.m.

The London Regional programme on Christmas Day includes many of the usual features, beginning at noon with three items each of an hour's duration—Organ Music from Lozells Picture House, Birmingham; Orchestral Music from the Trocadero Cinema at the Elephant and Castle, and a Feature Programme by the Orchestra at the Regal Cinema, Handsworth, Birmingham.

At 4 p.m. most stations will be linked up with the Dorchester Hotel for a programme by Moschetto and his Orchestra, and special Christmas Day programmes for the children are also being arranged.

### During Xmas Week.

The Studio Service at 6.30 will also be common to most stations, but at 7.15 London Regional listeners will hear a concert by Reginald King's Orchestra, followed by a violin recital by Albert Sammons.

At 9 p.m. Mr. Percy Pitt is conducting a concert version of Massenet's "Cinderella," after which, dance music.

Other Christmas Week programmes upon which I can give brief details are those on Monday, December 21st, when the well-known Nativity Play will be relayed from St. Hilary, Marazion; Tuesday, December 22nd, a vaudeville entertainment; Thursday, December 24th, a musical comedy programme by the B.B.C. Theatre Orchestra and Saturday, December 26th, a running commentary on the Rugby Football Match between London and South Africa, and another vaudeville entertainment.

(Continued on page 764.)

## FOR THE LISTENER

By "PHILEMON."

A note on what the stay-at-home feels about the B.B.C.'s promised  
Empire Broadcasting Station.

THE idea of having an Empire broadcasting station, capable of transmitting home news and Empire news to the four corners of the earth is a fine Imperial gesture. It quickens the patriotic and Imperial imagination. One wonders why it was not carried out before.

When I was in South Africa a few years ago, I was astonished at the welcome which Britishers there accorded to me because I had just come from England, and at the greediness with which they devoured any news I could give them. The news itself was perhaps not the chief thing, for they had their morning papers with paragraphs regularly supplied by the familiar "Reuter,

Exchange Telegraph, Central News": but it was the living link which counted for most with them, an English voice actually speaking to them about England.

### They Never Forget.

I confess, too, to being surprised that the home-hunger was so acute with so many of them. My idea had been that, with their adopted country to think of, with their own life to live there, and with little expectation of ever seeing the homeland again, they would soon have forgotten.

No doubt in many ways they had forgotten, had become weaned (as it were)

(Continued on page 766.)



A two-valve receiver which compares favourably with many "threes," and not very old ones at that. It will give you good "loudspeaking" from quite a number of stations, and is just the set for the "household," as it is so simple to handle.

THE recent great improvements in 2-volt valves and the general raising of the standard of component efficiencies make a two-valve set of the nature of the "Full-Range" something much more than a mere "junior" type of instrument. Actually, it is capable of giving a very great many listeners everything they want

to bring in distant stations on the "Full-Range" Two that would have been quite beyond the capabilities of the earlier "threes" and "fours." And the "Full-Range" is, as you can plainly see by glancing at the component list and photos, a particularly easy set to build. There are but few parts, and these are readily obtainable at competitive prices. We strongly recommend their purchase in the form of a complete kit from one of the established kit suppliers. By obtaining the components in

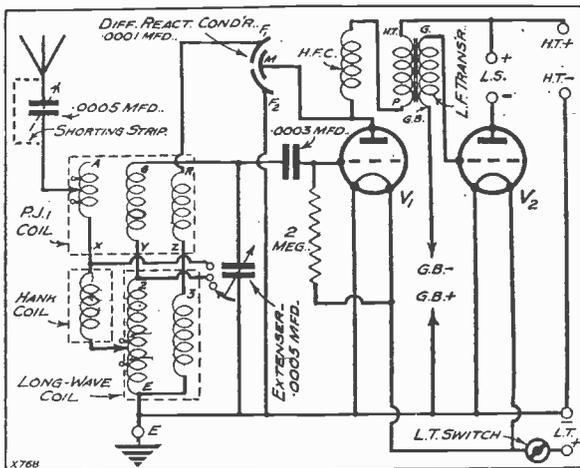
and the advantages of this device will be very well known to all regular readers. But we recognise that in these hard times there are many people who must perforce negative certain things on grounds of economy, however desirable they may be.

**An Extenser Preferable.**

If you happen already to have an ordinary variable condenser in your possession, you may be satisfied to use this in conjunction with a wave-change switch.

Therefore, in a future article we propose to show how an ordinary variable can be (Continued on next page.)

**A HIGH-EFFICIENCY CIRCUIT**



The circuit includes our very effective "P.J." system of wave-changing, which is automatically controlled by the extenser.

in the way of programmes. Using a fairly good outdoor aerial, or even an indoor aerial of extended wire construction, sufficient volume results from the local stations and from the more powerful foreigners to operate the largest loudspeaker at excellent quality.

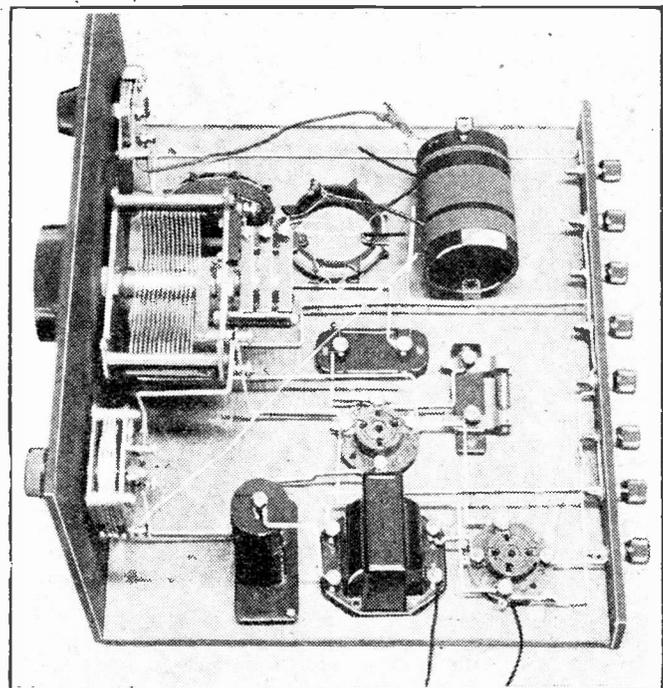
**Easy to Handle.**

Indeed, for these a second L.F. amplifying valve, were it used, would have to be volume-controlled to some considerable extent. And because of its up-to-the-minute inductance and reaction arrangements it is no difficult matter for the tyro

this way you are saved all the trouble of collecting together the small items such as screws, etc., and, moreover, the panel is already drilled for you.

In this particular model of the "Full-Range" Two that we are dealing with this week an Extenser is included.

**NO CROWDING—NO COMPLICATIONS**



There is heaps of room for all the components, even if some which you use are larger than those which figure in the original model.

## THE "FULL-RANGE" TWO

(Continued from previous page.)

used, although we assure those new readers who have had no personal contact with the Extenser that it has many points of advantage over and above that of mere tuning facility.

You will notice that a "Brookmans"

condenser is specified as one of the front panel controls. This is a variable condenser of compact construction that serves to give an aerial-balancing effort and added selectivity on the ordinary broadcast waves.

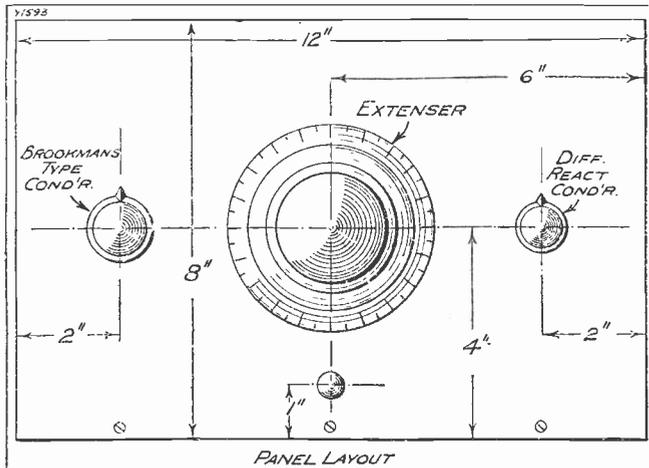
It is not needed on the long waves, and is provided with a shorting device so that it can, if desired, be thrown right out of circuit.

Messrs. Ferranti supply a "variable" that is suitable for the job which actually has such a shorting

so equipped and modify it yourself in the simplest possible manner.

All you have to do is to cut a small piece of copper foil or tin, pierce a hole through it, and secure it under the fixed vanes securing screw; this is clearly shown in the wiring diagram. You then bend the metal over so that the moving vanes come into contact with it when they are turned right round in their "fully out" position.

### VERY FLEXIBLE CONTROLS



After a little experience you will be surprised at the extent to which this wile little set can be "pushed" when searching for distant stations.

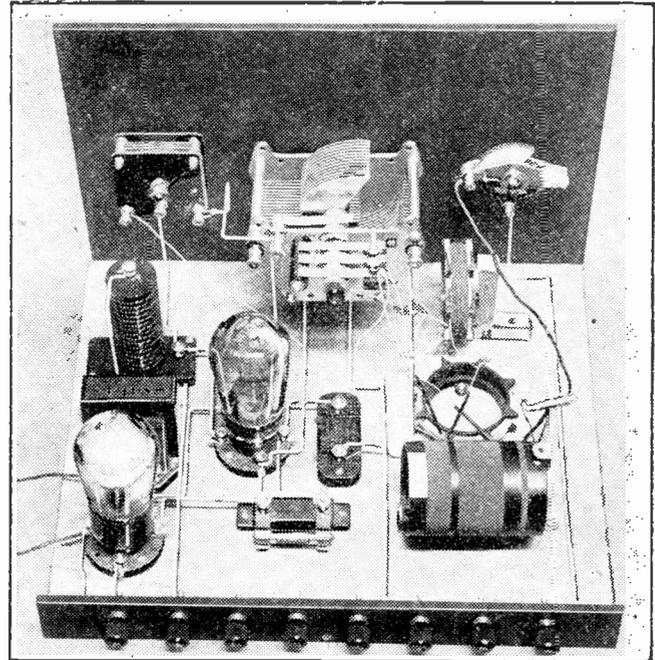
#### LIST OF COMPONENTS for the "FULL-RANGE" TWO.

- |  |   |
|--|---|
| 1 Panel, 12 x 8 in. (Permeol, or Becol, Wearite, Red Seal, Goltone).   | 1 H.F. choke (Lewcos, or Ready Radio, Telsen, R.I., Lotus, Varley, Dubilier, Wearite, Sovereign, Lissen, Atlas, Tunewell, Graham Farish). |
| 1 Cabinet, with baseboard 10 in. deep to fit (Camco, or Pickett, Gilbert, Ready Radio, Osborn).  | 1 L.F. transformer (Lotus, or Telsen, R.I., Igranic, Lewcos, Varley, Ferranti, Lissen, Graham Farish).                                    |
| 1 '0005-mfd. Extenser (Cylton, or J.B., Formo, Wavemaster).  | 2 Coil quitois (Peto-Scott, or Wearite, Sovereign, Melbourne, Parex, Ready Radio).  |
| 1 '0001-, '00012-, or '00015-mfd. differential reaction condenser (J.B., or Ready Radio, Telsen, Cylton, Wavemaster, Lotus, Polar).      | 1 P.J.1 coil (Lewcos, or Ready Radio, Parex, R.I., Melbourne, Formo, Goltone, Wearite, Ferranti, Peto-Scott).                             |
| 1 '0005-mfd. solid di-electric condenser (Ready Radio, or Telsen, Wavemaster, Lotus, Polar, Graham Farish, Parex).                       | 2 ozs. of No. 24 D.S.C. wire.   |
| 1 P.J.1 coil.  | 2 ozs. of No. 30 D.S.C. wire.   |
| 1 L.T. switch (Ready Radio, or Colvern, Telsen, Goltone, Lissen, Igranic, Lotus, Graham Farish, Bulgin, Peto-Scott, Wearite).            | 1 Terminal strip, 12 x 2 in.  |
| 2 Valve holders (Telsen, or W.B., Lotus, Graham Farish, Igranic, Bulgin, Burton, Clix, Wearite, Formo, Junit).                           | 8 Indicating terminals (Belling & Lee), or Eelex, Igranic, Clix, Goltone).  |
| 1 '0003 mfd. fixed condenser (Dubilier, or T.C.C., Mullard, Ediswan, Goltone, Telsen, Lissen, Igranic, Graham Farish, Ferranti, Watmel). | Glazite or Lacoline, Quickwire, Jiffilinx.  |
| 1 2-meg. grid leak and holder  | 2 Crocodile clips (Goltone, Bul-Screws, flex).  |

#### ACCESSORIES

- Loudspeakers.—(Amplion, B.T.-H., H.M.V., Mullard, Celestion, W.B., R. & A., Graham Farish, Blue Spot, Undy).
- Valves.—1 Det., 1 L.F. or small power valve. (Mazda, Osram, Mullard, Six Sixty, Cossor, Tungstram, Eta, Fotos, Dario, Lissen).  
Using H.L. (Mazda) and P2 (Osram) H.T. consumption at 120 volts with 9 volts bias, is 10.5 milliamps (4- or 6-volt valves of similar characteristics can be used).
- Batteries.—H.T. 99-120 volts (double capacity) (Ever Ready, Lissen, Drydex, Ediswan, Magnet, Petrix, Columbia).  
G.B., 9 volts (as above).
- Accumulators.—Voltage to suit valves (Exide, Ediswan, Lissen, Petrix, G.E.C.).
- Mains Units.—(Regentone, Heayberd, Ekco, Tannoy, Lotus, R.L., Atlas, Tunewell).  
State voltage and type of mains and also milliamperage and description of set when ordering.

### STRAIGHTFORWARD WIRING



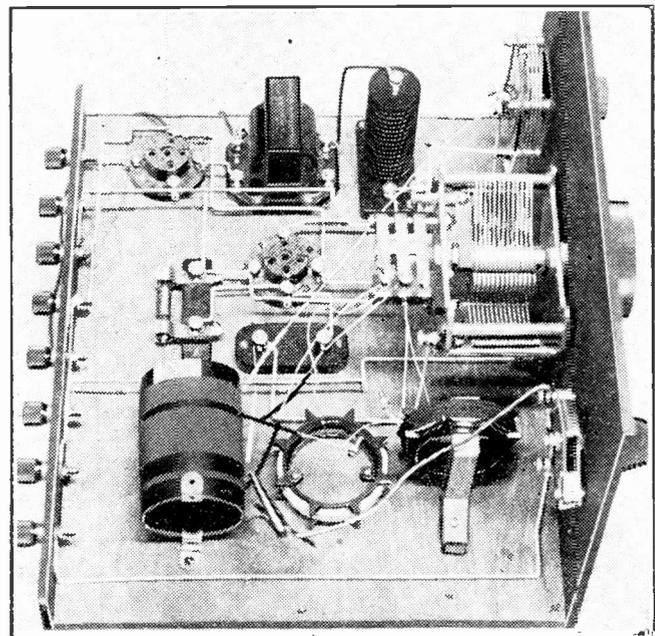
The extenser, together with a careful disposition of the components, makes the wiring particularly simple.

scheme included. But you can use another make not

Alternatively, you could short the condenser out of circuit by joining a short wire across its ordinary terminals; but

(Continued on next page.)

### FIXING THE "L.W." COIL QUIT



You fix the long-wave coil quito by screwing it to a piece of wood, which in turn is held to the baseboard by another piece of wood, as shown above.

# THE "FULL-RANGE" TWO

(Continued from previous page.)

that is a clumsy alternative. (If you buy a kit of parts, ask for a Brookmans condenser with shorting device fitted; the extra charge for this should only be two or three pence. if, indeed, any charge at all is made.)

### The Coils.

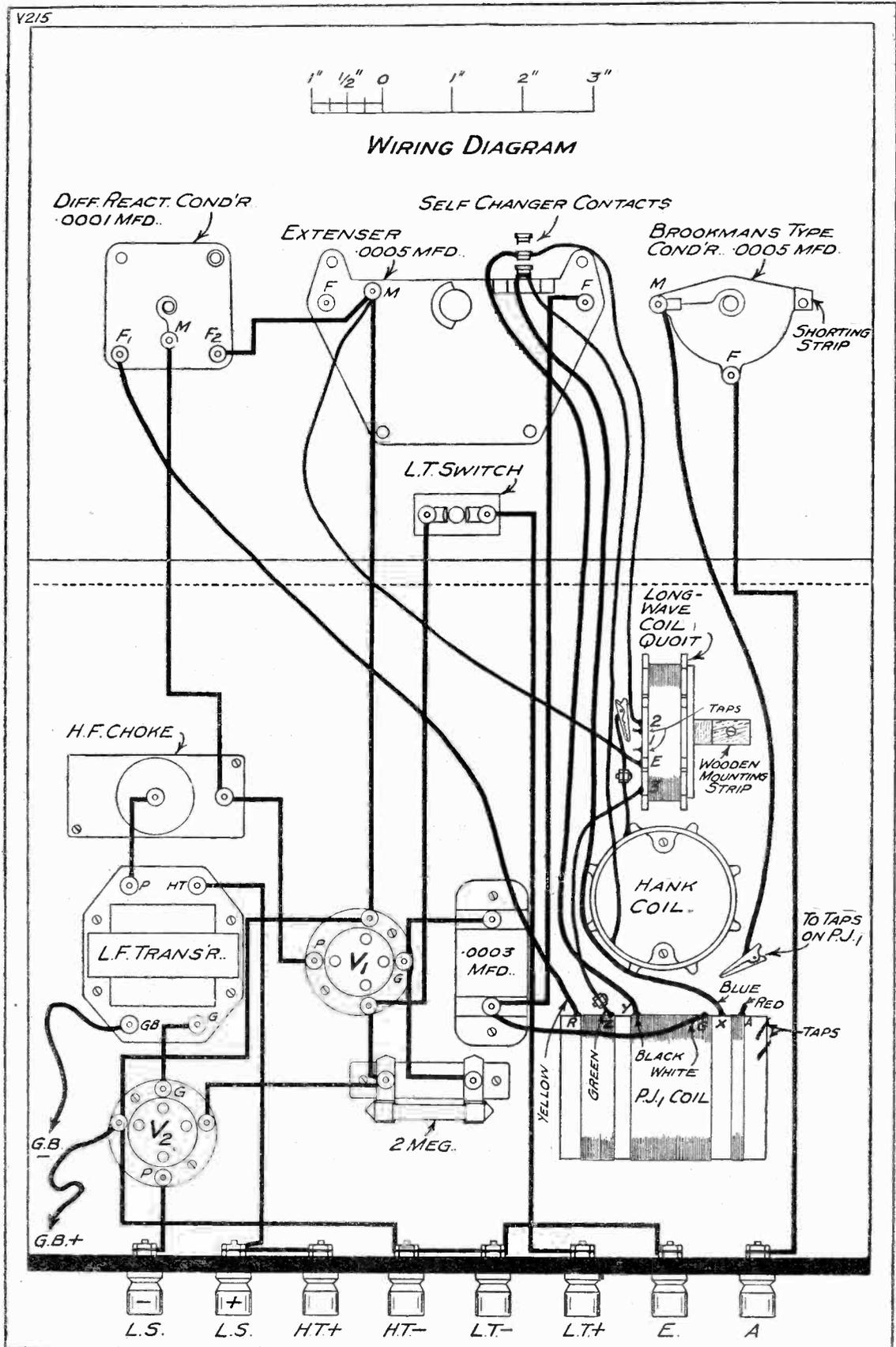
We would advise you to purchase the P.J.1 coil for it is an inexpensive component, and the "ready made" version is fitted with coloured connecting wires agreeing with the colour indication given in our diagram. However, if you do desire to wind your own P.J.1 coil you will not discover the job to be anything but quite easy. The required details are given in our Radiatorial columns. The P.J.1 coil is a standard unit and has been used in other sets, and will appear in future designs.

The long-wave and bank coils must be accommodated on "P.W." Coil Quoits; these cost 6d. each. The hank coil comprises 60 turns of No. 24 gauge double silk-covered wire, and this should be wound on fairly loosely. You need not take any particular precautions, but just don't pull the wire on tightly; wrap it on as you would wind up string on your fingers.

### Long-Waves.

Much the same applies to the long-wave winding, only for this you will need 30 gauge double silk-covered wire. You will find the instructions for making and using this coil, too, in our Radiatorial columns this week.

## THIS IS A "SCALE" DRAWING OF THE SET



As with all "P.W." wiring diagrams, the above is drawn exactly to scale, so that you are able to place your components in exactly the same way as in the original model. The long-wave coil quoit is mounted edgewise, and is held in position by a wooden bracket (see also the photos).

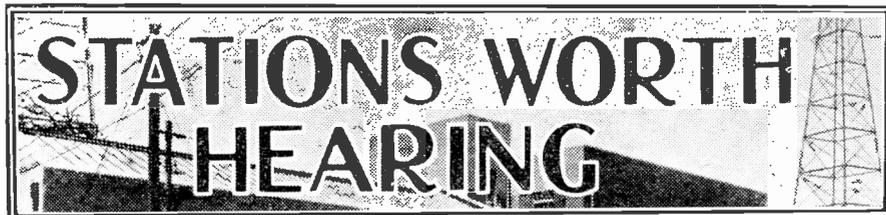
**H**AVE you heard the Americans yet on the medium band? If not, now is the time to think about adding some of them to your list of captures. It is no good going for them until after mid-night since until that time there are too many Euro-

pean stations at work on the band. Naturally, you don't want to sit up long past your usual bed-time unless there is some chance of success. Here is a tip worth noting. One of the most fruitful patches in the medium wave-band for Americans is that between 230 and 290 metres.

#### Some Useful "Yanks."

When bed-time comes along try Lille, Turin, Heilsberg, Bratislava, Nurnberg and Trieste and see how these stations are coming in. If there are no atmospherics, if strength is good and if fading is not severe, then it is well worth while sitting up and you can feel pretty sure that you will bag your first American.

The stations best worth going for are W I O D on 230.18 metres, K O B on 254.1 metres, W H A M on 260.7 metres, W P G on 272.6 metres and W T I C on 282.8 metres. If you don't find the lower part of the band good try between 300 and 400



Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

metres, going for W B Z on 302.8 metres, K D K A on 305.9 metres, W E N R on 344.6 metres, W G Y on 379.5 metres, W B B M on 389.4 metres and W J Z on 394.5 metres.

Conditions for long-distance listening to European stations are now very fine indeed. I mentioned in my last notes that a surprising number of foreign stations could be heard before dusk. Since writing that report I have found more and more stations coming in as early as three o'clock in the afternoon.

If you haven't tried daylight reception on the medium band for a time, set your tuning condensers at or near zero and use just enough reaction to bring the set into a sensitive condition. Then advance the readings steadily without pausing when a station is heard, so that you turn from end to end of the dials in a minute or so. I think that you will be amazed to find how lively the set is and how many stations are there.

The long waves are now superb, all of

strength varies a little.

Between the top of the band and 400 metres there are now at least a dozen stations which can be relied upon for loud-speaker reception. In addition to the two already mentioned we have Brussels No. 1, Milan, Prague, Langenberg, Rome, Stockholm, Beromunster, Witzleben, Katowice and Sottens. Not a bad lot, eh?

#### Can You Get Them?

Between 300 and 400 metres the number of stations that will provide first-rate loud-speaker reproduction depends rather upon how much you suffer from the wipe-out of the Midland Regional, the London Regional and the North National stations. The stations actually "there" are Frankfurt, Toulouse, Lwów, Hamburg, Stuttgart, Barcelona, Strasbourg, Brno, Brussels No. 2, Breslau, Goteborg and Bordeaux.

In addition, Belgrade, Bucharest, Munich, Sundsvall, Madrid, Algiers, Naples, Grenoble and Marseilles are all worth attention.

**T**HE select circle of we who confide in each other, and argue with each other, through the medium of these weekly notes, seems to be growing. In fact, no sooner do I settle someone's inquiries about a "mystery station" than a third party comes along and says we are both wrong.

As an example in point, F. J. F., of Raynes Park, steps in now and says that there is a Spanish "mystery station" on about 32 metres, and that the Spanish talks that have been mentioned probably come from him, and not from W 2 X A F. As a matter of fact, the "mystery" is dispelled, for the station is none other than our wandering friend E A Q.

#### Another "Lost Soul"!

He is scheduled as working on 30.4 metres, but he seems to move about between 29 and 32 metres. I think several of the Spanish stations are offenders in this respect, for one of them, E A K by name, has just settled down right inside the amateur 20-metre band, after moving to five or six different wave-lengths. How long it will be before the authorities tell him to move I cannot say, but he certainly is a decided nuisance at the moment.

To return to F. J. F., he really does seem to be in an unfortunate situation, for he tells me that his self-same receiver, moved to a friend's house quite a short distance away, does surprising things. In spite of this, he successfully enters the "H.A.C. Club."

## SHORT-WAVE NOTES



News and views regarding an exciting and fascinating wave-band.

By W. L. S.

Talking of that august collection of enthusiasts, we must have a roll-call one day, in the form of a receiving competition for "H.A.C. Club" members only. With so many hot-stuff receivers absorbing signals from the ether, things should be quite dull for those that are left!

Can anyone help to trace yet another unknown station below 20 metres, with a programme consisting mostly of tangos, and announcements in a little-known language? It has caused a lot of bother to D. P., from Chesterfield.

#### Metal Screening.

Some time ago I suggested the use of aluminium on baseboards or panels as a rough kind of emergency screen. Since then I have had several letters on the subject. Most of those readers who have not tried it say that they don't believe it would do a

thing. On the other hand, all those who have tried it report it quite effective.

One suggestion forthcoming as a result of the note is that it might be an effective way of "metallising" a favourite old valve instead of buying a new one!

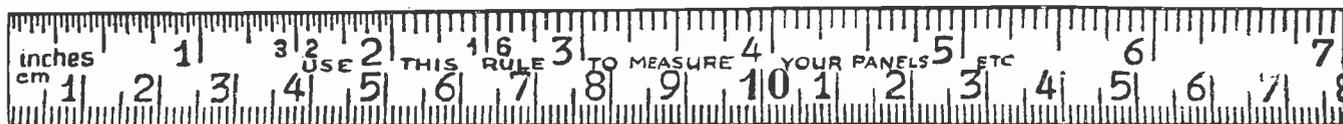
An interesting epistle from F. N. B. (Hale) condemns all kinds of screening. F.N.B. says that he builds sets with a sufficiently good layout to give absence of hand capacity, etc., without having to resort to metal panels and baseboards. And, furthermore, that they beat any other receiver in the district, particularly the "armour-plated" variety.

#### Renewed Enthusiasm.

He has returned to the short-wave fold after a long absence (being quite an old stager) and thinks conditions are terrible. I don't know, F. N. B., that I should go so far as that. I have logged as many Australians during the past month as I have ever heard before during a similar period.

Likewise, I have heard amateur stations in all continents and all U.S. and Canadian districts in a single afternoon and evening. What's wrong with that? Suppose you do try a metal panel?

Seriously, though, I think our receivers have improved so vastly since two or three years ago that those of us who have been active all the time have not noticed the dropping-off in conditions very much. The improvement in transmitters has also done something to prevent an absolutely blank period.



*No excuse for buying foreign  
batteries for your wireless set*

---

**BRITISH BATTERIES  
ARE PROVED THE BEST**

---

*No excuse for having any but  
the best British battery... **GET AN***

**Exide  
BATTERY**

*and have clear, constant reception!*

---

N.60

MADE ENTIRELY IN ENGLAND, EMPLOYING BRITISH LABOUR AND BRITISH CAPITAL

Obtainable from Exide Service Stations or any reputable dealer.

Exide Service Stations give service on every make of battery.

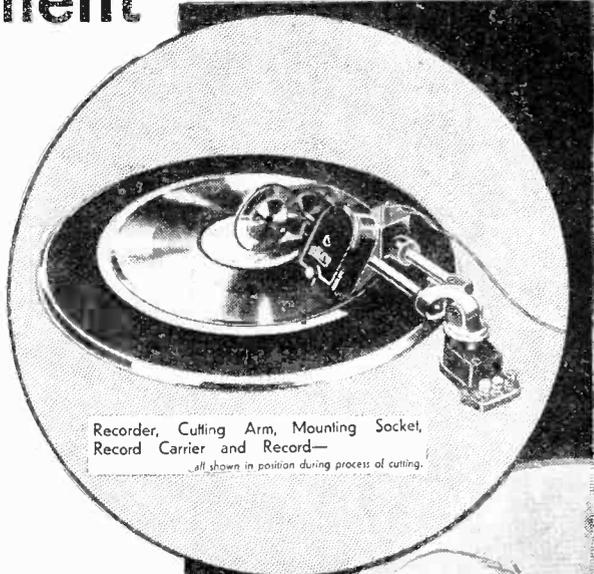
Exide Batteries, Exide Works, Clifton Junction, near Manchester.

Branches: London, Manchester, Birmingham, Bristol, Glasgow, Dublin, Belfast

# A really new home entertainment

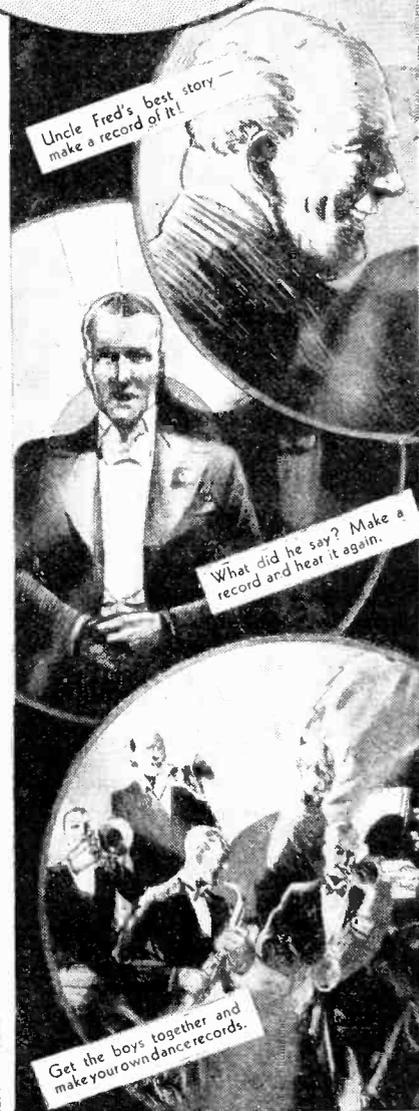


As a source of infinite variety of home entertainment the new and improved EKCO Radiocorder is unequalled. It enables you to make in your own home, in your own words and style, *unbreakable* gramophone records as easily as playing an ordinary record.



Recorder, Cutting Arm, Mounting Socket, Record Carrier and Record—  
*all shown in position during process of cutting.*

Imagine a Christmas greeting to your friends which will actually speak your own words in your own voice. Imagine capturing radio items, your friends' voices, anecdotes, musical accomplishments and thereby providing a store of golden memories for your leisure hours. What could be more novel or acceptable! The EKCO Radiocorder does all these things simply and quickly. At a remarkably low cost you can build up a library of records such as money can never buy.



**Your dealer will willingly give you a demonstration.**

**Price £5:5:0 complete.**  
*(Microphone £2.2.0 extra)*

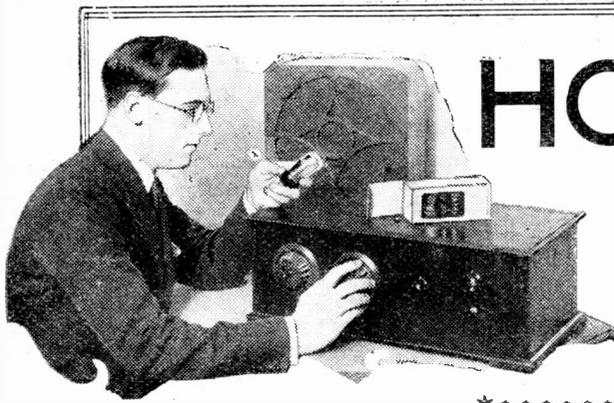
# EKCO RADIOCORDER

To: E. K. Cole Ltd., Dept. A.18.  
EKCO Works, Southend-on-Sea.

Please forward me your new fully illustrated EKCO Radiocorder literature.

Name.....

Address.....



# HOW YOUR SET WORKS

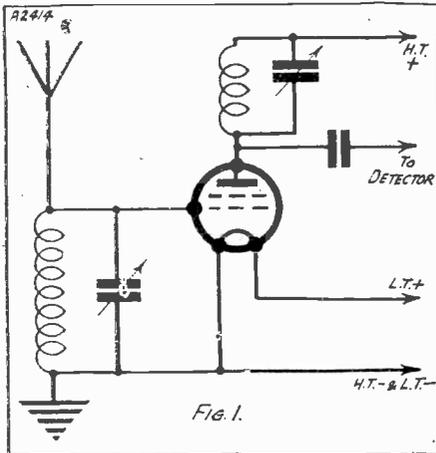
OUR subject this week is that of how the small currents we pick up with the aerial can be amplified. There are two distinct forms of amplification.

The first deals with the tiny received currents before they reach the detector, and is called "high-frequency," or "radio-frequency" amplification.

The second method magnifies the currents after they have been dealt with by the detector, and is called low-frequency amplification, because it deals with the comparatively low frequencies of the speech currents. (It is also termed "note magnification," or "audio-frequency" amplification.)

The first method is very useful to give longer range to a radio receiver, because it

## H.F. AMPLIFICATION



High-frequency amplification enables us to magnify the oscillations picked up by the aerial, thus greatly increasing a receiver's range. In this scheme both the grid and plate circuits of the valve are tuned, and the amplified impulses are passed on to the detector through the fixed condenser.

often happens that the "modulated" impulses from a far-away transmitter are at first too weak to be rectified properly by a one-valve set. To increase them, we have to arrange another valve in front of the detector.

### Magnification Before Detection.

This high-frequency amplifying valve does not make any attempt at rectification, but reproduces in its plate circuit an exact replica of the impulses applied to the grid, greatly amplified. In Fig. 1 you'll see a circuit diagram which shows how such a valve can be connected up.

In the plate circuit of this valve there is connected a coil which is tuned to the correct

\* \* \* \* \*

**Have you ever wondered how a valve amplifies? Here is an interesting article which tells you all about it.**

**BY FRANK BRIGGS.**

\* \* \* \* \*

wavelength by the variable condenser connected across it. Impulses amplified by this first valve are then passed on to the detector valve through the fixed condenser.

If you have a look at Fig. 2 you'll see a diagram of the characteristic curve of a valve specially designed for high-frequency amplification. Such a valve magnifies many hundreds of times and for a very small input to the grid it produces comparatively tremendous changes of anode voltage in the plate circuit.

### Effect of Screening-Grid.

The main reason why it gives such high amplification is because a fourth electrode, or "screening grid," has been interposed between the control grid and the plate, thus ensuring stable operation. Hence the reason why it is called a "screened-grid" valve.

The curve of Fig. 2 really shows how the plate current, or electron flow through the valve, varies at different grid voltages. With the grid at zero volts in relation to the filament, a steady current of about 3 milliamps will pass.

This can easily be seen by taking a line from zero grid volts on the bottom line to a point on the actual valve curve directly above it, and reading off the corresponding milliamps on the right-hand upright.

It is better to first apply a steady potential of about 1 volt to the valve grid, thus shifting the operating point to the place marked X on the curve. We now have a steady plate current of only 2 milliamps, which, by the way, illustrates one advantage of working with a negative bias on the grid of the valve, as it saves the high-tension supply.

### The Changing Direction.

It was explained in a previous article that the small currents induced in the aerial by the ether waves from a distant transmitter keep changing their direction. When this is so, in rushing up and down the aerial circuit they must alternatively pile up, and then take electrons away from the grid. Or to be more precise, make the grid first positive and then negative.

For our purpose, we will imagine that the maximum voltage at the grid is half a volt. And that it rises to that maximum first in one direction and then in the opposite direction, as shown at G in Fig. 2. This is

reproduced in the plate circuit as high-frequency current variations, which set up greatly amplified voltage changes across the tuned coil there (shown in Fig. 1).

Radio-frequency amplification is all right for dealing with very small inputs and enabling us to receive weak transmissions over large distances. But it will not give big volume. It is always limited by the capabilities of the detector valve.

### For Loudspeaker Results.

What we need now, then, is to magnify the currents again, after they have been detected. This is the second method of amplification, and is necessary for loudspeaker results.

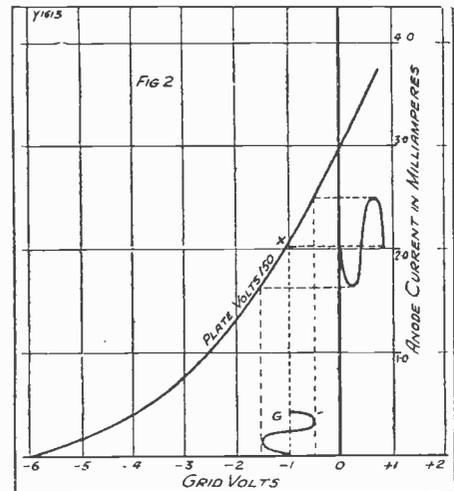
Fig. 3 shows the circuit diagram of a single-valve low-frequency amplifier, for connecting after the detector. You'll notice that the speech currents are not fed direct to the grid of the valve, but through a transformer.

This component often has five times as many turns in its secondary as in its primary, which means that if an alternating or pulsating current is passed through the primary winding and the voltage is, say, 1 volt, there will be 5 volts given out across the secondary winding.

This is because the current in the primary magnetises the iron core, and as the current rises and falls the magnetic field does the same. In doing so the magnetic lines of force cut five times as many turns of wire

(Continued on next page.)

## A VALVE "CURVE"



This curve shows the relation between applied grid volts and the anode current. Quite small changes of grid voltage produce tremendous swings in the plate current passing through the valve.

**NOW THEN, "ARIEL!"**

An amusing letter received from an American reader.

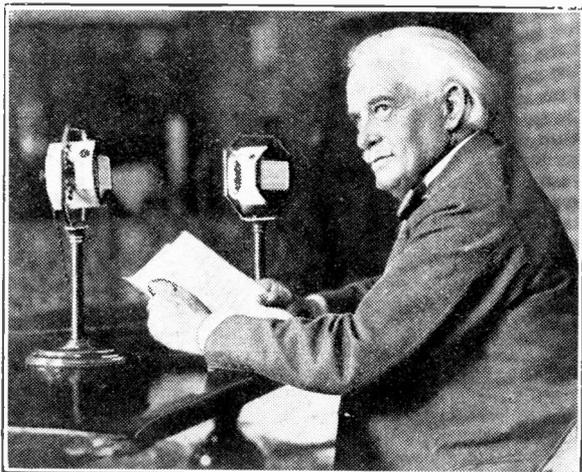
The Editor, POPULAR WIRELESS.

Dear Sir,—“ARIEL'S” comments in POPULAR WIRELESS give me more amusement, I believe, than any other radio column which I have read. It is with great interest that I read them whenever a copy of the magazine comes into my hands.

One thing about ARIEL which vastly amuses me is that he never misses the opportunity to take a crack at things American. Perhaps I should rejoin with irate comments, but I feel moved to laughter rather than to anger. It sounds like sour grapes to me. Maybe I am wrong, but the impression is that overwhelmed by the bewildering immensity of American radio, he tries to belittle it to suit his insular standards. As I say, maybe I am wrong—I hope I am.

I know that we Americans are regarded as about the next thing to nothing. That amuses me, too.

**APPEALING TO THE PUBLIC**



Mr. Lloyd George giving his election broadcast before the microphones at his home in Churt.

Well, maybe we are crazy, but we get what we demand in radio entertainment, and don't pay a licence fee to listen to whatever the Director-General deems is fit for us to hear. And what about those Sunday Programmes??????

And while ARIEL and others point their fingers and shake their heads we dial our radios and listen to the voices of England's great men who are more international minded and have taken the trouble to speak to us in transatlantic relays. We hear at least one talk per week from London, and are familiar with the voices of King George, Ramsay MacDonald, and many others. Our daily papers keep us as well informed on the political situation in England as of our own country, and the day the gold standard was abandoned a coast-to-coast programme was interrupted to broadcast the flash. Meanwhile, from what I can gather through reading English publications, we are regarded as spending the days machine-gunning with gangsters.

**Amusement.**

Yes, ARIEL amuses me. Some time ago he made the rash assertion that advertising by radio doesn't pay. I took him up on it and he came right back at me with another challenge, to which I failed to respond. In the issue of August 29th he says: "An interesting sidelight on the small controversy I had about the value of radio advertising in the States." I wonder if he can be

referring to our set-to? His paragraph concludes with: "I pause for a reply." O.K.!

When ARIEL tilted back at me in the May 23rd issue, I determined to secure statistical proof to back my statements. We spoke of Amos and Andy, so I wrote to the Pepsodent Company. A prompt and courteous reply informed me that they did not reveal such statistics as I required, pointing out the obvious fact that if radio advertising did not pay, it certainly wouldn't be so extensively utilized.

Next I tried a radio station. The matter was taken up with the board of directors, and the answer was that while the argument amused them it was of no importance what ARIEL or anyone else thought about it—it did not matter, and they couldn't spare the time to go into the intricate business of compiling statistics for such a purpose.

**Money and Broadcast Advertising.**

In other words, ARIEL got the Bronx cheer. But I can see him smiling and answering: "No proof, eh? What did I say?"

Yes, I will have to grant that this plays into ARIEL'S hands, on the surface. But I let him grasp this straw, for perhaps he really believes that the hundreds of firms advertising by radio are expending huge sums merely to pass the time.

As I recall, ARIEL'S chief argument against the sponsored programme is that he would not buy a certain tooth-paste because its makers broadcast divine music.

This brings up an interesting point. ARIEL no doubt, would buy a certain brand of tooth-paste because his father bought it and his grandfather bought it.

An American doesn't do things that way. He is always looking for something new. Nor is the American listener so cold as ARIEL. In common with many others, I use Pepsodent tooth-paste because I appreciate that nightly dose of good fun they give us through Amos and Andy. In an aside I might add that while I see reports in English magazines to the effect that Amos and Andy are dead, I noticed, walking home the other evening, that I could practically follow that night's skit along the route.

**"The D.G. in America."**

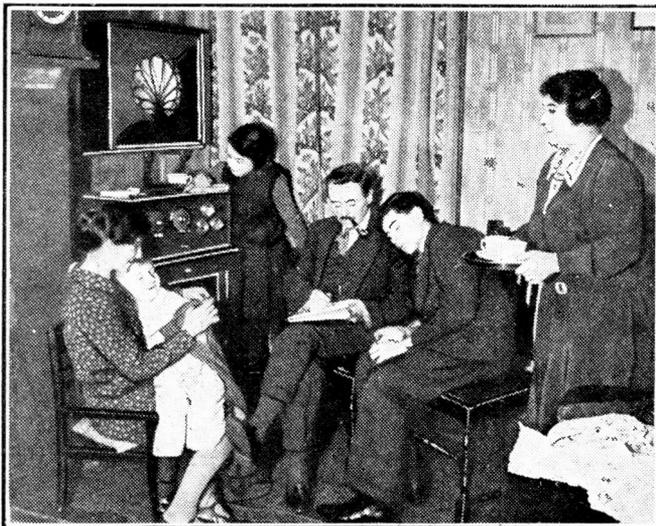
Returning to the sponsored programme situation, another thing that amuses me is a story in the June 20th issue of "P.W." on "The D.G. in America." Because the nation listened while he spoke and the newspapers gave him a break, the opinion seems to be that we humbly bowed before the great mind of radio—witness these remarks on Page 470 of the June 20th issue:

"Sir John seems to have made it pretty clear to the Americans how and why it is we in this country have a far, far better broadcasting system.

"Whether the Americans will take Sir John's hint and change their broadcasting methods is open to doubt—but the fact remains that they have heard our 'Radio Czar' and have his word for it that the B.B.C. organization is the best thing of its kind in the world."

Such conceit! Again, I am amused! But seriously, such a spirit is not the true radio

**WHEN THE FIGHT IS OVER**



A domestic scene typical of many thousands, taken on Election night.

**HOW YOUR SET WORKS**

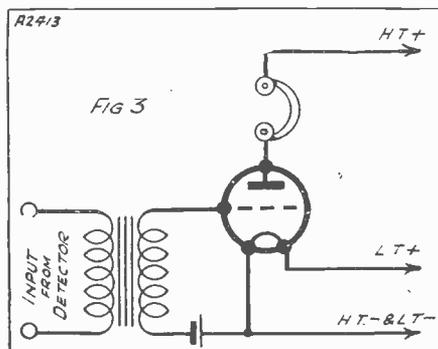
(Continued from previous page.)

in the secondary, thus inducing in this winding five times the voltage. It is known as a step-up low-frequency transformer. (And in this case it would be described as having a ratio of one-to-five.)

The secondary of this transformer is then connected to the grid and filament (via the grid bias) of the low-frequency amplifying valve. Magnification is then obtained in the plate circuit in the same way as for high-frequency amplification.

There are several other methods of obtaining low-frequency amplification, but there is not space to deal with them fully here. The method I have given above is that which is most commonly used; in fact, it is almost universal. There is another scheme, however, which was much in vogue

**GETTING MORE "MAG"**



If really large outputs are required from a radio receiver, it is essential to use L.F. amplification. Part of the step-up is provided by an intervalve transformer, and the remainder by the valve.

some years ago, and that is resistance-capacity coupling.

It consists of a valve connected up in the usual way, but having a high resistance of about 100,000 ohms instead of the primary of the transformer in series with the plate. The voltage variations developed across it by the changing current are then passed on to the next valve through a fairly large grid condenser.

The great advantage claimed for this system was that it gave practically equal amplification to all the notes in the musical scale but, unfortunately, it could not provide the step-up given by the transformer.

In the days when transformers were none too good from a quality point of view this loss was gladly put up with for the sake of good reproduction, but nowadays when transformers are greatly improved there is often no advantage in resorting to this method.

**NOW THEN, "ARIEL!"**

(Continued from previous column.)

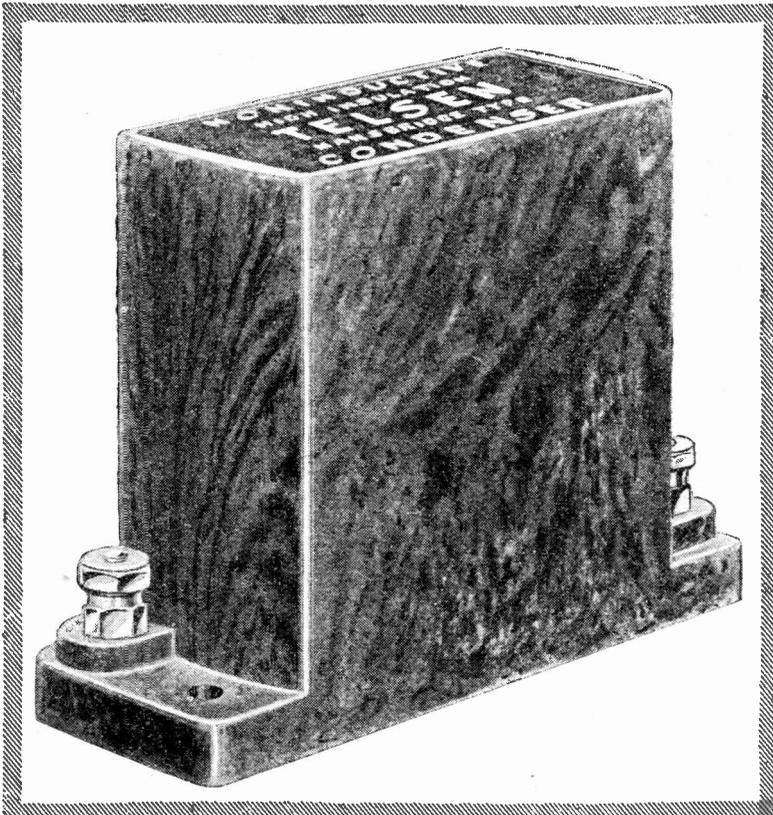
spirit. Radio is international, and a true radio fan does not devote his time to ignoring the other fellow's good points and sneering at his alleged bad ones.

In my humble opinion ARIEL, as a devotee of the greatest potential good-will factor, radio, should devote his efforts to creating a better international understanding rather than belittling the efforts of his fellow "fans."

All right, ARIEL, it's your turn.  
Respectfully yours,  
W. WERNER,

1468, Seventh Avenue, San Diego,  
California, U.S.A.

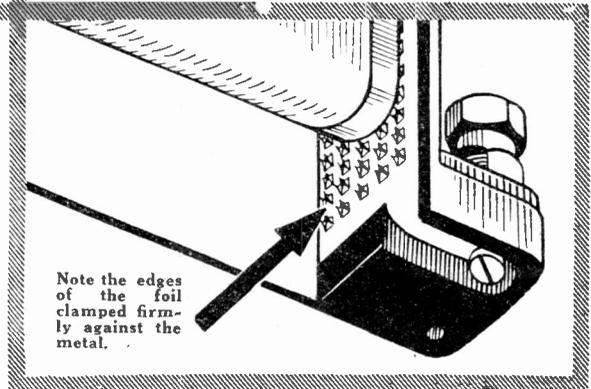
# ABSOLUTELY NON-INDUCTIVE



## TELSEN MANSBRIDGE TYPE CONDENSERS

It is essential for condensers used in radio work to be non-inductive to ensure negligible resistance to H.F. currents. Telsen Condensers are made by a special process which ensures *hundreds* of points of contact along the edge of each foil, thus preventing the possibility of any inductive effect.

The illustration below shows the base of a Telsen Condenser stripped to show the method of "Nutmeg-grater" contact.



Note the edges of the foil clamped firmly against the metal.

### EVERY

Telsen Condenser is completely non-inductive.

### EVERY

Telsen Condenser is of the true Mansbridge self-sealing type, dehydrated in vacuo, impregnated and hermetically sealed.

### EVERY

Telsen Condenser undergoes five laboratory tests before it is packed.

### EVERY

Telsen Condenser is tested to the high insulation standards of the G.P.O.

### EVERY

Telsen Condenser is 100% British.

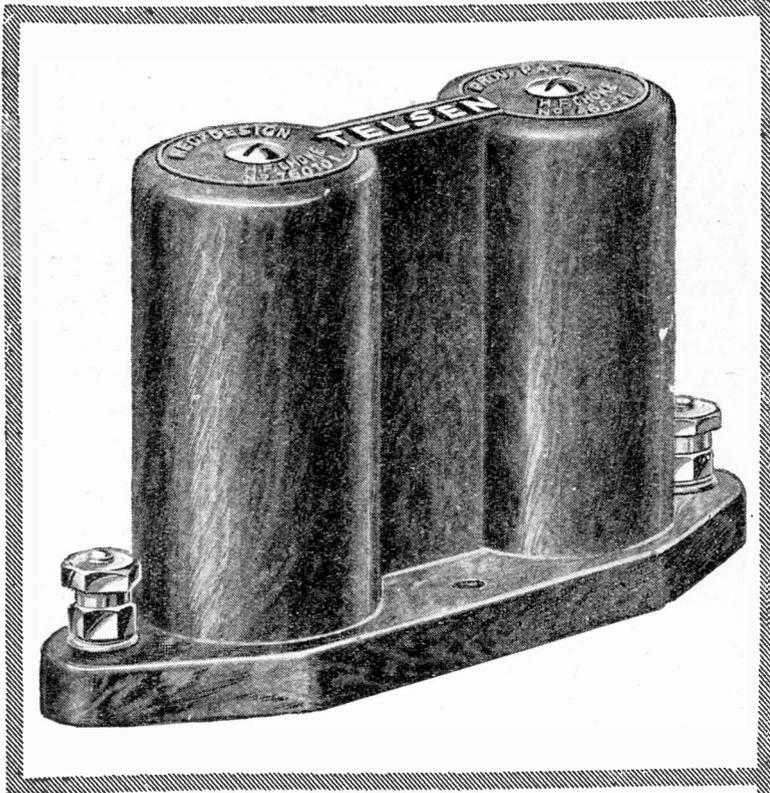
Telsen Mansbridge Type Condensers, made in capacities from .01 to 2.0 microfarad from 1/6.

Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to The Telsen Electric Co., Ltd., Aston, Birmingham.

# TELSEN

THE SECRET OF PERFECT RADIO RECEPTION

# IMPEDANCE . . .



## TELSEN BINOCULAR H.F. CHOKES

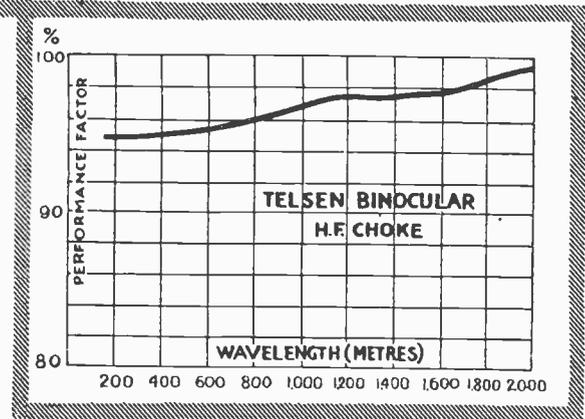
It is the function of an H.F. Choke to present the highest possible impedance to H.F. currents at all wavelengths. Particularly does this apply to the popular tuned grid arrangement of screened-grid amplification, where the performance of the whole set is limited by the value of the impedance in the anode circuit of the screened-grid valve. It is equally important that this high efficiency should be maintained over the whole broadcast band.

Telsen Binocular H.F. Choke - Price 5/-  
Telsen Standard H.F. Choke - Price 2/-

The Curve adjoining (published by courtesy of AMATEUR WIRELESS) represents the efficiency over the Broadcast Band, as measured at the Furzehill Laboratories by J. H. Reyner, B.Sc., A.C.G.I., D.I.C., A.M.I.E.E., M.I.R.E., who says: "This curve shows the fine performance of the new Telsen Binocular H.F. Choke . . . the performance factor exceeds 95 per cent. at all points, and there is a distinct freedom from subsidiary resonances. . . . This Choke must be considered as taking its place as the best on the market."

Combined with its "fieldless" properties these figures show that where superlative performance is called for the choice must be the TELSEN Binocular H.F. Choke.

Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to The Telsen Electric Co., Ltd., Aston, Birmingham.



# TELSEN

ALL-BRITISH  
RADIO COMPONENTS



NOT one listener in a thousand knows that there is a tiny talks studio in Bristol, and that an "unknown" studio centre is springing into being at Leeds. The Bristol studio serves the West Region, and when I went down to see developments at the Watchet site (for the new West Regional station) last month I took the opportunity of getting acquainted with the Bristol centre.

**A So-called "Little" Studio.**

At Savoy Hill they had referred to it as a "little" talks studio, and I expected to find one solitary room with a microphone and reading desk. But, no! Bristol is rapidly becoming a local headquarters, and the office and studio accommodation is truly generous.

The local studio at Bristol is very useful, because on many occasions it has saved an artiste crossing the Severn to go to the Cardiff headquarters. For residents on the south side of the channel this is not always a convenient journey.

The studio has now been opened long enough to show the Western Regional officials how useful it is to have studio centres in order to pick up local talent. I chatted with one of the West Regional officials, and he told me that the studio was opened on Saturday, April 25th, and a talk at 7.15 in the evening was given after the unofficial opening ceremony.

**Saving Time.**

This was a good example of the way in which time can be saved, because had the speaker gone to Cardiff to give his talk on that particular opening evening of the Bristol

\*-----\*

**Our Special Correspondent here describes the studios at Bristol and Leeds, unknown to the general public, but of the greatest importance to the B.B.C. in programme building.**

\*-----\*

studio he would have had to leave the city at 5 o'clock, and would have returned to Bristol at 10.45. As it was, he just went down to Queen's Road and said his part.

The B.B.C. has a liking for banks, the Manchester headquarters being partly over a bank, and down at Bristol the premises consist of five rooms on the second floor of the Midland Bank Chambers, in Queen's Road, Clifton.

You might wonder why five rooms are needed, but I should explain that these are taken up, not only by the talks studio and

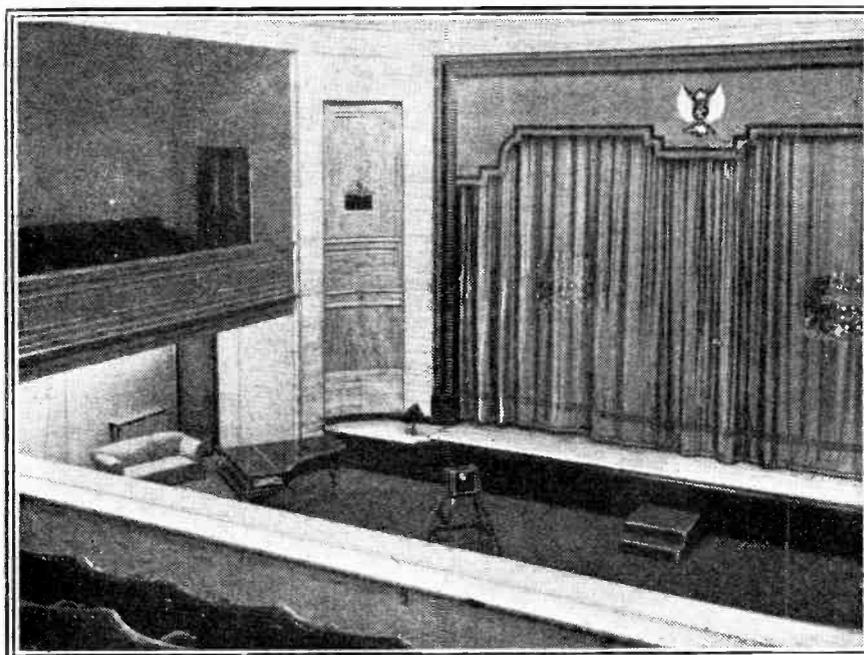
the control-room, which houses the "A" and "B" amplifiers at the Bristol end of the 'phone line to Cardiff, but by a small board room and office accommodation for Mr. E. F. H. Mills, who is the Education Officer of the West Region.

**Rather Futuristic Finish.**

I was taken all over the place, and was rather impressed. The studio is a very bright room; the colouring has been obtained without much effort, for the walls are simply panelled with Insulite. In contrast to the panels, the woodwork is painted fawn colour, and the appearance is rather futuristic. For the rest the place is simply furnished, there being the usual reading desk and standard lamp.

After my visit to Bristol I made inquiries about other "unknown" studios, and was told about Leeds. In great contrast with the Bristol studio centre is this new centre at Leeds.

**EDINBURGH'S "THEATRE" FOR BROADCASTING**



Strictly speaking, we should call it a studio, it being the largest one at Edinburgh, but the layout is just the same as a proper theatre, with stage, circles, etc. Theatre artistes should certainly feel at home when broadcasting from here.

This was started because the need was felt for bigger premises on that side of the Pennines, and the Leeds officials set about looking for a likely place. They found it in Woodhouse Lane, which is in a fairly central part of Leeds, and it was formerly a Friends' Meeting House.

**Conversion Started.**

After it had been given up by the Quakers it was taken up by a well-known cloth concern, and it is from this that the B.B.C. is renting the premises. Rent was paid from the beginning of August last, and now the work of conversion is well in hand. The house was taken over because the programme people

(Continued on next page.)

THERE must have been many of you who, like myself, came away from the Radio Exhibition this year with an attack of mental indigestion after having partaken deeply of that exhilarating feast of new developments and bewildering exhibits.

To me the most striking feature of the show was the development of "canned" radio, which was noticeable in almost every receiver of merit. This "canning" of coils, valves, and condensers seems to have been developed rapidly by all manufacturers since last year's exhibition, when only a few examples of this new idea were to be seen.

Last year we had the first real development of metal partition screening, which, in the case of some of the foremost designs, resulted in rather complicated chassis constructions.

#### Simplification of Chassis Design.

This year, however, the simplification of chassis design was particularly noticeable. If you examined closely any number of the receivers on view you will have observed a wide-spread use of coils, band-pass and intervalve, in aluminium cans with built-in and ganged wave-change switches. Also totally enclosed ganged condensers were much in evidence with H.F. valves also in cans or of the metallised type.

Taking a general view of the receiver exhibits one could not help but be struck by the remarkable standardisation of both circuit and chassis design. In many cases the chassis was virtually a set built round a screened ganged condenser assembly. This results in a general compactness of

## "CANNED" COMPONENTS.

A review of how the use of metal is increasing both in set and component design.

layout very striking when compared with multi-valve receivers of even only a year or two back.

#### Wooden Baseboards Being Ousted.

From our impressions of the Radio Show each year we get a good idea of the future trend of receiver design. This year, for example, you will have noticed that the one-time wooden baseboard is being ousted by a metal platform, hollow underneath, on which are mounted the ganged condenser assembly, and the "canned" coils and valves.

The general scheme is to have the H.F. stages upstairs and the L.F. and output stages at the back or below. Underneath we find all the de-coupling components, H.F. chokes, voltage controlling resistances, etc. This type of layout is particularly compact and reduces wiring to a minimum.

#### Ebonite Panels Disappearing.

As for the once universal ebonite panel, you perhaps noticed that in very many designs there is now nothing left but the escutcheon plate of the tuning condenser!

There is no doubt that a study of these modern tendencies in receiver design is of practical use to the home constructor,

especially those of you who plan your own receivers.

When these ideas have been placed upon a simplified and economised basis, a practical design of the near future for home construction might well include a simple metal chassis with "canned" coils and a ganged condenser assembly; subsidiary controls will, of course, be side-operated as in the "P.V. Star" receiver. Metallised H.F. and detector valves will probably be favoured in place of metal valve-cans, while all de-coupling components will be grouped beneath the chassis.

As regards the tuning circuits, the increasing congestion of the ether makes band-pass tuning particularly attractive, especially in conjunction with a ganged Extenser assembly.

#### Band-Pass Tuning a Feature.

As regards this band-pass tuning, which was such a prominent feature of this year's exhibits, we must not forget the new development of post-detector tone control, using sharp-tuning single circuits. Of this we shall hear more in the near future.

One other feature of the show which interested me particularly was the diversity and number of components of new and improved types on view. This will certainly confound the pessimists who prophesied a decline in the amateur constructor game!

Here again, the "canning" process, applied to all manner of coils, band-pass, intervalve, super-ict, etc., was very much in evidence. Some of these units were certainly very attractive both in appearance and technical performance.

## THE B.B.C.'s "UNKNOWN" STUDIOS

(Continued from previous page.)

demanding three studios, the largest of which should be able to accommodate a fair-sized band.

The radio play people wanted space, and not only did this mean extra studio accommodation, but it meant the fitting of a dramatic control panel and a whole lot of extra wiring in connection with the faders and effects. Of course, there is also to be a talks studio.

This will mean that when the new Leeds premises are in full swing there will be more work for the control engineers, and it is planned to have quite a deal of apparatus at Woodhouse Lane, so that this studio centre will be self-supporting.

#### P.O. Lines Always Available.

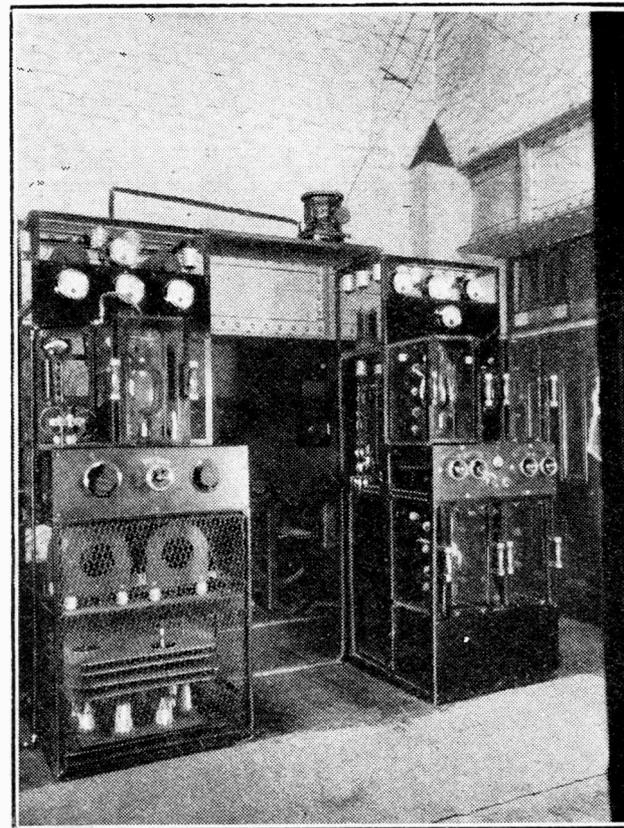
It will link up with the existing B.B.C. landline scheme in any way made necessary by the programme arrangements of the moment, and the "O.B." section at Savoy Hill have made plans for taking over the P.O. lines whenever the studios are needed.

The third of our "unknown" studios is at Glasgow, and is the old studio site vacated in favour of Edinburgh's palatial studios. Not all Scotsmen, and certainly few Englishmen, know that Glasgow is still maintained as a studio centre.

Everybody knows it is an important landline junction for the B.B.C. Because the studios are used on an average only once a week, they come in the ranks of the "unknown."

The studio accommodation at Glasgow is

## IT WAS ONCE A KITCHEN!



"Bottles" of a different type are now housed in the one-time kitchen, now transmitting room, of the old house which is the B.B.C. premises at Glasgow. The cellar forms an echo room, and upstairs are two studios which are still used, in spite of the new ones at Edinburgh.

likely to be maintained indefinitely in spite of the fine studios at Edinburgh, and the reason is the same as that for the opening up of Bristol's local studio in the south, namely that it saves artists making unnecessarily long journeys.

#### Old Headquarters.

There are two studios at Glasgow, and although these now seem small, it must be borne in mind that until the old Queen's Hall was taken over at Edinburgh, this was the B.B.C.'s Scottish headquarters. At the time of writing the engineers are fitting up a dramatic control panel, as for a long time they have made use of ordinary volume control faders to switch in the echo room, which is a converted cellar of the old house.

In the room which used to be the kitchen are the three-valve low-frequency amplifiers used on the lines which link up Glasgow and Edinburgh. I think we are likely to hear more of Glasgow's studios in the future.

# TELSEN TRANSFORMERS & CHOKES

## TELSEN L.F. & OUTPUT TRANSFORMERS

Telsen transformers have achieved fame in the radio world on account of the high standard of their quality and performance. Designed and built on the soundest engineering principles, these robust, full-size transformers will not only give efficient but enduring service.

### TELSEN L.F. TRANSFORMERS

Telsen "Ace" Transformer, Ratios 3-1, 5-1 .. .. .	Price 5/6
Telsen "Radiogrand" Transformer, Ratios 3-1, 5-1 .. .. .	Price 8/6
Telsen "Radiogrand" 7-1 Transformer .. .. .	Price 12/6
Telsen "Radiogrand" 1.75-1 Transformer .. .. .	Price 12/6

### TELSEN OUTPUT TRANSFORMERS

Telsen Multi-Ratio Output Transformer, giving three Ratios of 9-1, 15-1, 22.5-1 .. .. . Price 12/6

Telsen Output Transformer, Ratio 1-1 .. .. . Price 12/6

Telsen Pentode Output Transformer .. .. . Price 12/6

### TELSEN L.F. CHOKES

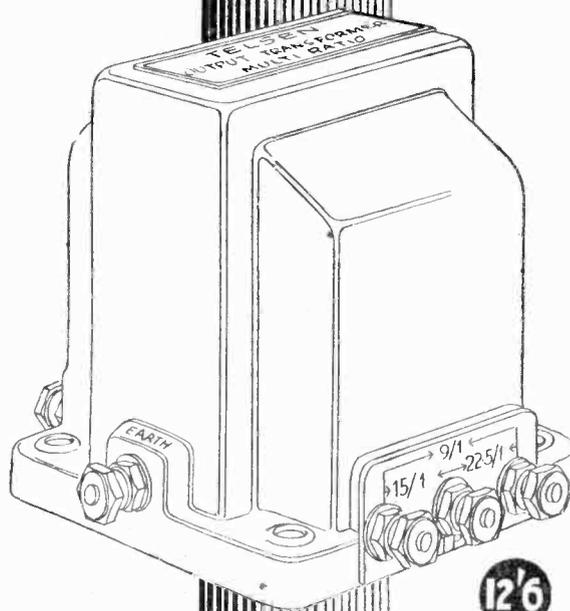
Telsen L.F. Intervalve Coupling Choke, 40 and 100 henrys .. .. . Price 5/-

Telsen Heavy Duty Power Grid L.F. Choke, 40 henrys .. .. . Price 8/-

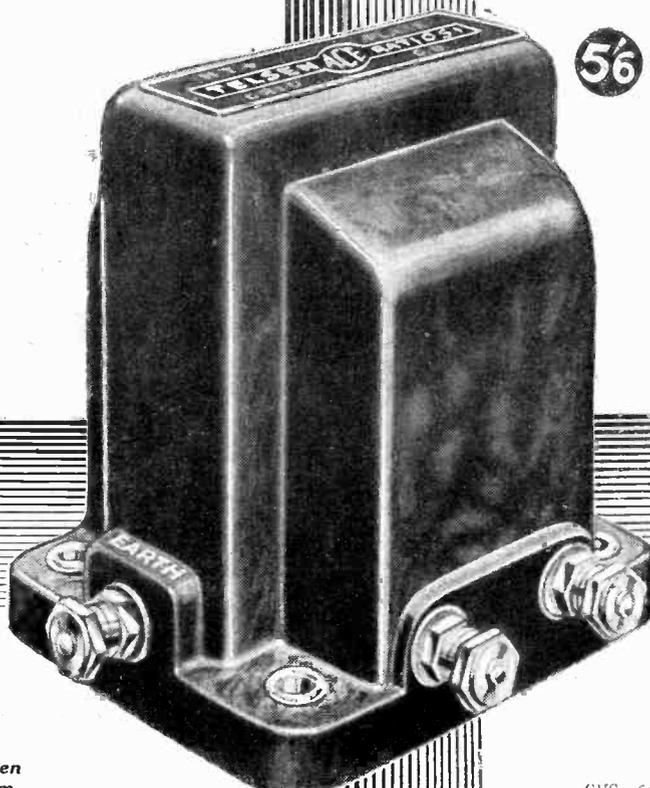
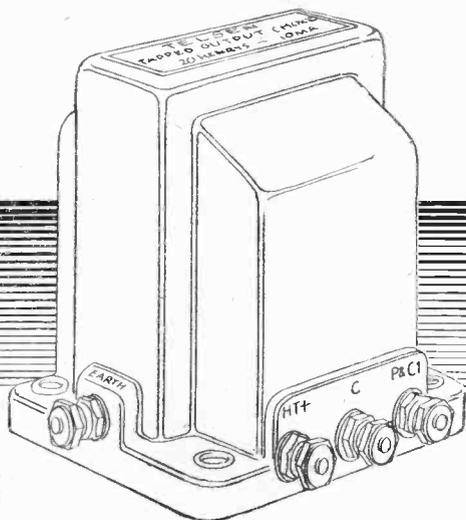
### TELSEN OUTPUT CHOKES

Telsen Output Choke (Plain), 20 henrys .. .. . Price 8/-

Telsen Output Choke (Tapped), 20 henrys .. .. . Price 8/6



THE SECRET OF PERFECT RADIO RECEPTION



Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to—The Telsen Electric Co., Ltd., Aston, Birmingham.

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?



## A HIGH-CLASS SPEAKER.

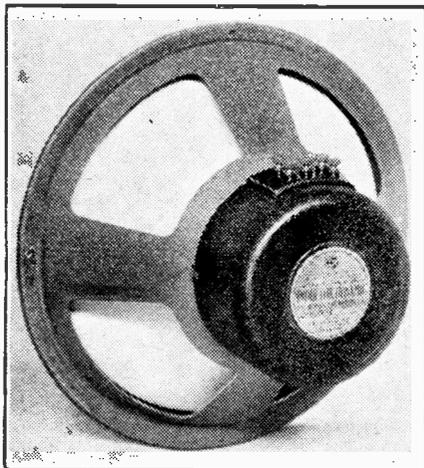
IF I have one outstanding technical weakness, it is a decided prejudice in favour of the "inductor" loudspeaker principle. But in my loudspeaker testing I endeavour to avoid allowing any partiality to creep in.

And that, unless one is very careful, is just the sort of thing to make one *over-critical!*

These observations are a direct result of my examinations of the latest Lamplugh Inductor loudspeaker.

I have been particularly meticulous in checking its response characteristics, and I

## THE LAMPLUGH "INDUCTOR"



Note the range of terminals which enable the speaker to be adapted to varying set output conditions.

find these are as good as those of a high-class moving-coil loudspeaker of modern design providing a good "baffle" or cabinet is used.

So far so good, but here's the snag. The Lamplugh Inductor seems to give *better* results than the average high-class moving-coil loudspeaker, and I find it difficult to see why that should be so, and why ordinary frequency tests do not reveal the discrepancy.

You might suggest that my ears react better to the one than the other. I do not accept that suggestion, for the differences are of the nature keenly appreciable by one with a knowledge of acoustics and music.

I have definite ideas as to the whys and wherefores of this curious business, and I believe I have happened across something

new in the way of moving member effects in loudspeakers.

But I am not sure enough of my ground to place them on record—yet. In the meantime I will say this: If you are thinking of spending your money on a moving-coil loudspeaker, don't forget the Lamplugh "Inductor." As its name suggests, it isn't a moving-coil loudspeaker, but, believe me, it will take a good moving-coil instrument to give equal, let alone superior, results.

## RADIO CABINETS.

The new W. & T. Lock, Ltd., catalogue has the phrase "Put your Radio in Dress Clothes" on its cover—a very striking way of conveying the idea of high-class cabinet work. It is an interesting list and illustrates some attractive cabinets of all kinds.

## FERRANTI PRICE REDUCTIONS.

The new prices of the Ferranti A.C. mains Console Receivers are: Inductor Console, in blue or brown rexine, 15 guineas; Moving-Coil Console, in similar finishes, 18 guineas. Either is available in walnut at 1 guinea extra. Amateurs will also welcome the news that the price of the Ferranti Multi-Range Test Set is reduced from £9 13s. 6d. to £8 5s. 0d., and the price of the Ferranti Valve Tester from £7 5s. 0d. to £6 10s. 0d.

The name of the latter is to be changed to the Ferranti Set Tester in view of its application to the general testing and servicing of radio receivers. Also it should be noted that there is an adaptor available for the instrument which enables it to take measurements in A.C. sets.

## A STRIKING COVER.

The cover of the new Cyldon catalogue is of a gold material and is unlike anything I have seen before. It is most striking and is a fitting accompaniment for the interesting and attractive components which are described in the list itself. Of course, Extenders occupy a leading position, and a fine range there are of these unique components, too.

## THE NEW "VARLEY" SETS.

The catalogue describing the Varley "Square Peak" sets, which comprise first-class mains receivers and radio-gramophones, is a very well produced publication. And all those desirous of noting what high-grade instruments the British Radio industry is producing this season should send for it at once.

## A SHORT-WAVE FRAME.

Super-het owners will be interested in the Goltone Short-Wave Miniature Frame Aerial.

This is not much larger than a plug-in coil, but is fitted with a neat base, as you can see in the photo.

It is wound with silk-covered stranded wire on an air-spaced former fashioned from high-grade ebonite.

There is a centre tap, making the device suitable for direct connection to many popular frame-aerial super-hets.

The cost of this little frame is but 5s. 6d., at which figure I think it very cheap, for it

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot in any circumstances undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

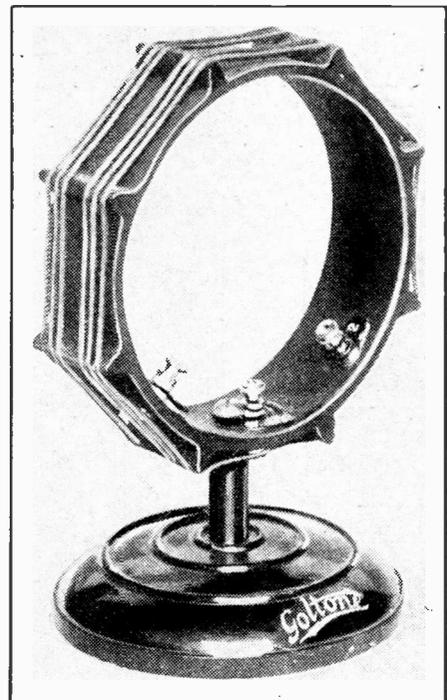
And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

is excellently constructed and has a high-class finish imparted to it.

Readers who are unacquainted with the effectiveness of supers may wonder how such a tiny frame can pick up anything.

But they need have no doubts—the Goltone Miniature Frame brings in the "Yanks" and other distant stations with a "pick-up" reminiscent of a lofty vertical aerial of the K.D.K.A. type!

## FOR SUPER-HETS



The "Goltone" Short-Wave Miniature Frame Aerial.

# TELSEN SWITCHES AND DIALS

## TELSEN PUSH-PULL SWITCHES

(Prov. Pat. No. 14125/31) .. .. . From **1/-**

The Telsen Push-Pull Switches employ a proper electrical knife switch contact and are soundly constructed on engineering principles. The centre plunger is wedge-shaped, so that as it is pulled out it forces the inner fixed contacts outwards, tightly gripping the moving contacts. There is no fear of crackling with Telsen Push-Pull Switches. Their low self-capacity makes them suitable for use in H.F. circuits.

### Telsen Push-Pull Switches—

Two-point .. .. .	Price 1/-
Three-point .. .. .	Price 1/3
Four-Point (2-pole) .. .. .	Price 1/6

## TELSEN SLOW-MOTION DIAL

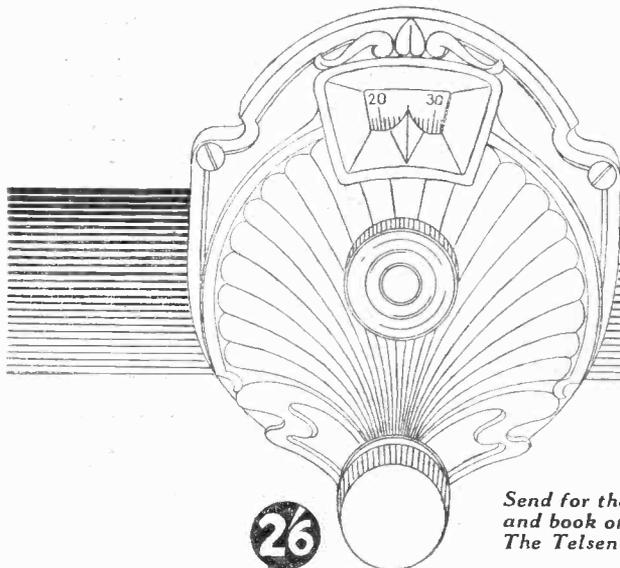
The Telsen Slow-motion Dial has an exceptionally smooth action with an approximate ratio of 8-1. There is no toothed gearing, so that it is impossible to strip the dial. The figures are clear and arranged to provide for right and left-hand condensers.

Telsen Slow-motion Dial .. .. . Price **2/6**

Supplied in Black or Brown Bakelite

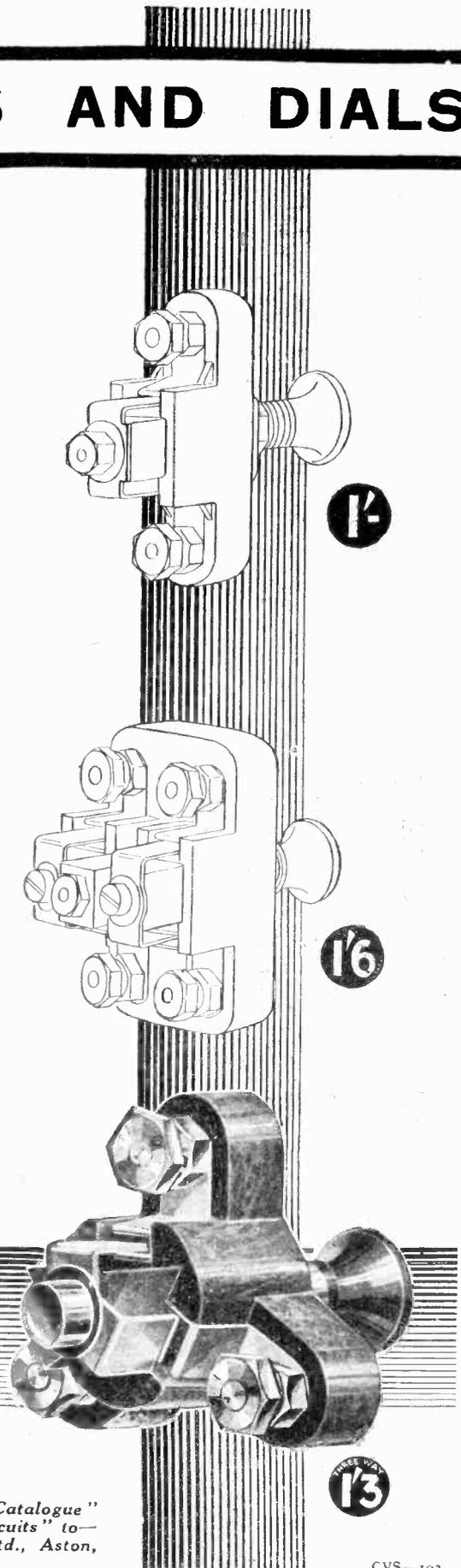
# TELSEN

ALL-BRITISH  
RADIO COMPONENTS



**2/6**

Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to—  
The Telsen Electric Co., Ltd., Aston, Birmingham.



**1/-**

**1/6**

**1/3**

# CAPT. ECKERSLEY'S QUERY CORNER



Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.

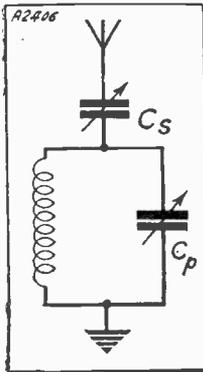
Don't address your questions direct to Capt. Eckersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

### Selectivity with a Long Aerial.

B. R. S. (Ballock).—"I have had in use since the early days of broadcasting a large outdoor aerial, which I have had to gradually reduce in length so as to obtain satisfactory results, until now it is only a fraction of its original length and height. Do you think that it would be wise at this point to scrap the existing large masts entirely, or is there a possibility of my requiring them at some future date, due to a change in broadcasting conditions?"

A large aerial gives poor selectivity for reasons we need not go into here and now. But a large aerial does not give poor selectivity if it is series "tuned." Have you tried that?

### FOR SHARP TUNING



The Condenser Cs, in series with a big aerial, removes the tendency to flat tuning.

Cs in my sketch is a very small condenser indeed—four-noughts something, in fact. Cp is the ordinary sort of condenser. By making Cs very small you have what is in effect a series-tuned circuit.

By making Cs very, very small you have the aerial pick-up sensitivity under control, and can make it so much less to give the required volume from the local powerful Brookmans Park station, but with those distant stations Cs can be increased a bit. Cp must vary with Cs, of course, to get

the same station.

No; keep a fair-sized aerial, but use the series-tuning condenser

### Can You "Beat" It?

J. O'B. (Cork).—"In a super-heterodyne receiver a change of frequency is effected by allowing an oscillation generated at the receiver to 'beat' with oscillations set up in the receiver's aerial by the transmitter.

"Is there any limit to the magnitude of this new frequency relative to the frequency of the received signals? Could it not, for instance, be arranged to 'change' a received 'radio' frequency into the frequency of light and thereby obtain a solution of the television problem?"

You've beaten me with your beat frequency. In common practice the frequency received is greater than the frequency derived (beat frequency) by intro-

### ONLY IN "P.W."

can you read Captain Eckersley's replies to listeners' own problems.

### AND REMEMBER—

Captain Eckersley's technical articles appear only in the "Big Three."

"POPULAR WIRELESS,"  
"MODERN WIRELESS," AND  
"THE WIRELESS CONSTRUCTOR."

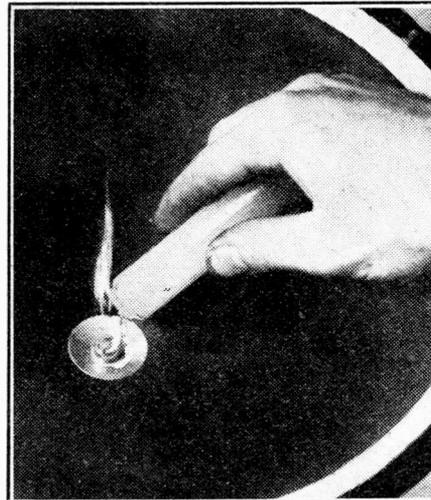
ducing the third frequency (oscillator).

Thus a frequency received of a million, has a new frequency, say, one million, one hundred thousand introduced to it and, after rectification, we have a (lower) frequency of 100,000. But you can do it the other way round when the beat frequency is the sum of the received and the oscillator frequency.

It cannot be done.

If you could make the oscillator frequency equal to the frequency of light-waves you'd get light frequencies I suppose. But how could this help to solve television? And, if you could produce light frequencies with a valve, well—at any rate, you can't!

### STOP THAT RATTLE!



A good dodge for preventing the lock-nut of a cone loudspeaker from working loose is to seal, in its place with a single spot of grease from a candle.

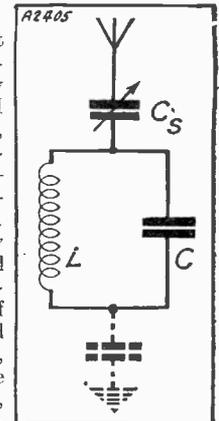
I may have missed your point. I think you have some ingenious idea somewhere, but it'll have to wait, won't it, until we can, in fact, produce light frequencies. This we cannot do by taking the sum of two wireless frequencies which is the only way two frequencies can be made to make a third greater frequency.

Without an Earth.

A. B. S. (Leeds).—"I have always understood that a good earth is essential for radio reception. Judge my surprise when I recently removed the earth wire from the set and, by slightly detuning, received the local station as good as ever. As this seems to point to just the opposite, may I ask:—

"Is this due to some peculiar conditions in my own particular set, or could this be done with any set. If so, then why use an earth connection at all?"

### THE CONNECTING CAPACITY

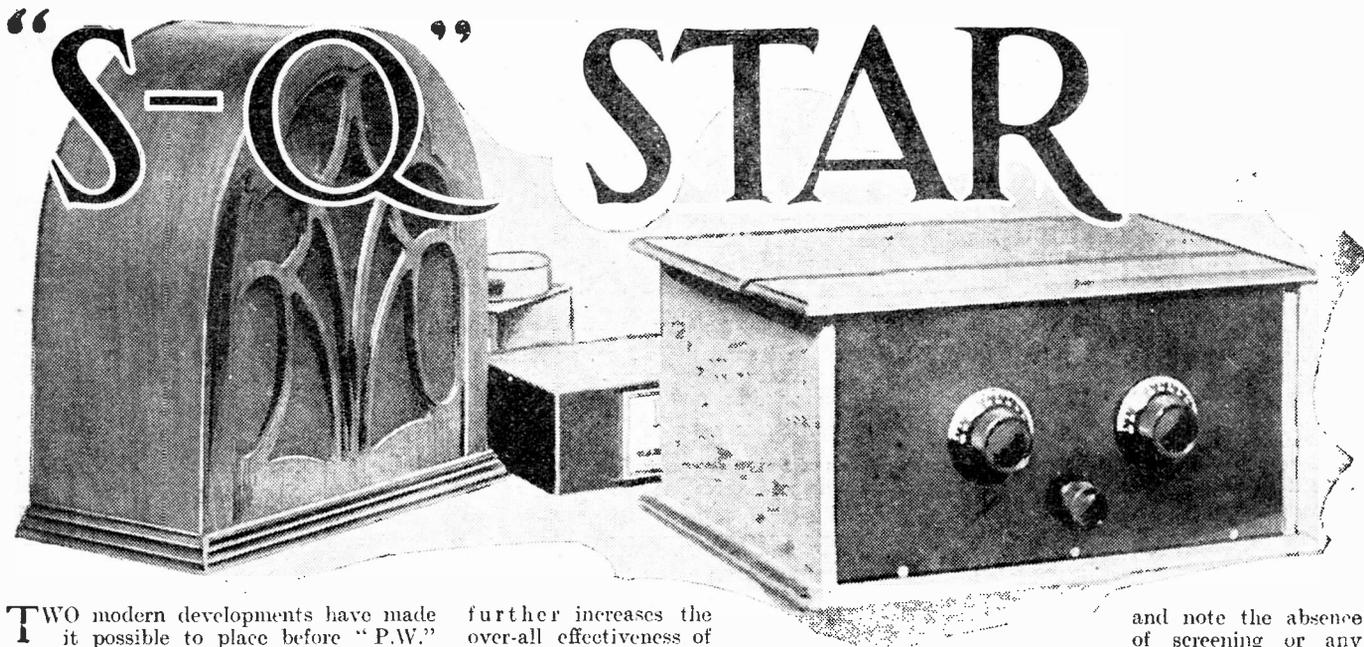


Sometimes a direct connection to earth seems detrimental, the better connection being via the sets "natural" capacity, as shown by the dotted condenser.

I have used a set without an earth connection for a very long time, because I find, living in flats, that an earth is frequently even detrimental to performance. It's this way. If you consider my diagram you will realise that the bottom, non-aerial end of the coil is connected to valve filaments, valve filaments are connected to mains, or batteries, to screening case, to a whole heap of stuff which has a capacity to earth.

A capacity to earth, with the kind of circuit shown, will have much less impedance than the closed circuit L.C., and a less impedance probably than Cs. So you are really connected to earth, but through a capacity.

Sometimes, however, the lack of an earth connection introduces bad mains hum. Thus it is better, taking it all in all, to have an earth, or tie things down, but it's not always absolutely necessary. When the "earth" as in a flat, is 50 ft. above the earth it's sometimes better not to connect it at all.



**T**WO modern developments have made it possible to place before "P.W." readers a super-heterodyne receiver of the highest possible efficiency which is almost fantastically simple in construction when compared with the intricate and unreliable "super" of the past.

These are greatly improved components for this class of set, and remarkably improved valves. But before I particularise, I must tell you exactly what "S-Q" Star is and what it does.

It is a four-valver into which an H.F. stage, necessitating the addition of but three or four normal, inexpensive parts, can be built in almost a matter of minutes.

Thus once again we meet the "P.W." Progressive principle which is rapidly becoming one of the most popular phases of home-construction.

The "foundation" of "S-Q" Star comprises a combined oscillator and first detector, a screened grid intermediate H.F. valve, a second detector and an L.F. valve.

**THE "S-Q" STAR IS UNDOUBTEDLY THE MOST INEXPENSIVE AND SNAG-FREE SUPER EVER EVOLVED.**

In this form it closely resembles the original "P.W." "Super-Quad" set, but it does not include the more or less expensive hand-pass coil and two-gang condenser. There is an ordinary aerial tuning circuit controlled by a normal variable condenser.

Nevertheless, all the selectivity needed is obtained by the very excellent tuner employed. But the "foundation" complete though it is, should not be used permanently without the easily added H.F. stage.

**Easy Tuning and No Screens.**

Without this it will certainly give you a hundred or so stations at loudspeaker strength, and will cut through interference in an astonishing manner, but it will tend to re-radiate.

Re-radiation is prevented by the addition of an aperiodic H.F. stage. This also contributes a degree of amplification which still

further increases the over-all effectiveness of the set.

The H.F. stage occupies only two or three square inches on the baseboard, and it in no way complicates the control of the set. The tuning with or without the H.F. stage is exactly the same.

Glance at the accompanying photographs

A few years ago the mere mention of the term "super-heterodyne" was sufficient to conjure up visions of costly, complicated apparatus right out of the reach of ordinary home-construction.

Just as "crystal" was synonymous with simplicity in set assembly, so "super" was regarded by constructors as implying something that was indeed super in construction and operation.

The "P.W." "Super-Quad" succeeded in re-installing the term in its proper place as a prefix indicating a "super" principle giving super results.

And thousands of constructors have learnt to their advantage that a "super-heterodyne" designed with economy and simplicity as the guiding watchwords, can also be an immensely powerful collector of programmes. But that is only if various modern innovations are adopted and the circuit is prepared by technicians able to ignore useless precedents and apply original thought and ideas to the problem.

It is our firm belief that the "P.W." "Super-Quad" instituted a "milestone" in the progress of reception technique, and that it set entirely new standards—standards which render it difficult to maintain in other designs the same competitive individuality which hitherto existed.

However, we are able to record one further step forward along "Super-Quad" lines, and in many ways it is a big step forward in view of the reduced number and cost of parts required.

"S-Q" Star, as our new "feature" receiver has been called, is, in its way, as unique and as original as the "Super-Quad" and— But read about it in our Technical Editor's article which appears on this page. Even if you do not feel the immediate urge to construct a new set, we feel sure you will enjoy reading this important contribution.

and note the absence of screening or any other kind of con-

structional intricacy. I think you will have to agree that in this regard the "S-Q" Star has more in common with a crystal set than with a multi-valver of the usual form!

Indeed, the assembly of "S-Q" Star is merely a matter of screwing a few components down on a wooden baseboard, fixing one or two more on a straightforward panel and wiring them all up. Even this last operation calls for no skill whatever, since there is no soldering to be done, and the circuit does not demand meticulously placed wires.

A failure to obtain results, even on the part of a constructor who has never before tackled a valve set of any kind, could only be due to a faulty component, providing the wiring diagram (which will appear next week) is followed.

And you are not likely to come across a

**IT IS AN EASY TO BUILD SUPER-HET SET EMBODYING THE FAMOUS "P.W." PRINCIPLE OF "PROGRESSIVE" HOME CONSTRUCTION.**

faulty component if you choose your makes from the list we are publishing.

In view of the unusually large number of circuit innovations which we have encountered this progressive season, there may be many of you who feel you would like to tackle "S-Q" Star but are hesitant because you think there may quickly follow something else that will put "S-Q" Star in the shade.

**Outstanding Simplicity.**

I do not believe there is any possibility of that. It is most improbable that you will be able to build an equivalent "super-heterodyne" receiver at a lower cost for components, for a very long time to come—certainly not this year.

"S-Q" Star seems to have brought the "super-heterodyne" principle, as applied  
(Continued on next page.)

## "S-Q" STAR.

(Continued from previous page.)

properly, right "down to the bone"—in the financial sense.

During the next few months there may be (I say "may" for there is little in sight at the moment) a few new "super-het" improvements disclosed, but it is practically certain that these would be of an expensive, de-luxe nature.

### Star Value for Money.

You see what I mean? At this very moment it is possible to design a "super-heterodyne" receiver giving, perhaps, as good results as "S-Q" Star, and having certain attractions of a subsidiary nature

not found in that set. But it will cost more both to build and to operate.

For instance, there is in existence a "Modern Wireless" "Super-Quad" design for A.C. mains having Extenser tuning—a magnificent set, that—but it costs two or three times as much as "S-Q" Star, even with all its five valves.

"S-Q" Star is the receiver for the economist—the man who wants to get every pennyworth of full value for his money, and who is prepared to waive a few of these refinements which do not effect the power of the set.

And in thus going right down to the root of modern "super" practice, as it were, taking advantage of every up-to-the-minute improvement in fundamental technique, you must obviously have a receiver which is capable of holding its own against all-comers of a similar calibre for a long time.

The super-heterodyne principle is about

as old as broadcasting itself, and the essential advances it has made have really been remarkably few. It is quite possible that another decade will pass before it progresses another trifling step.

### Very Easy to Handle.

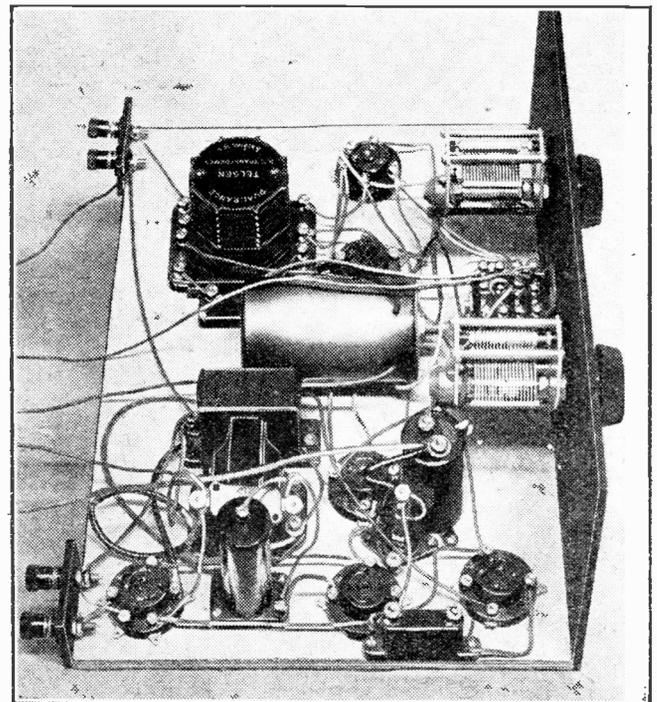
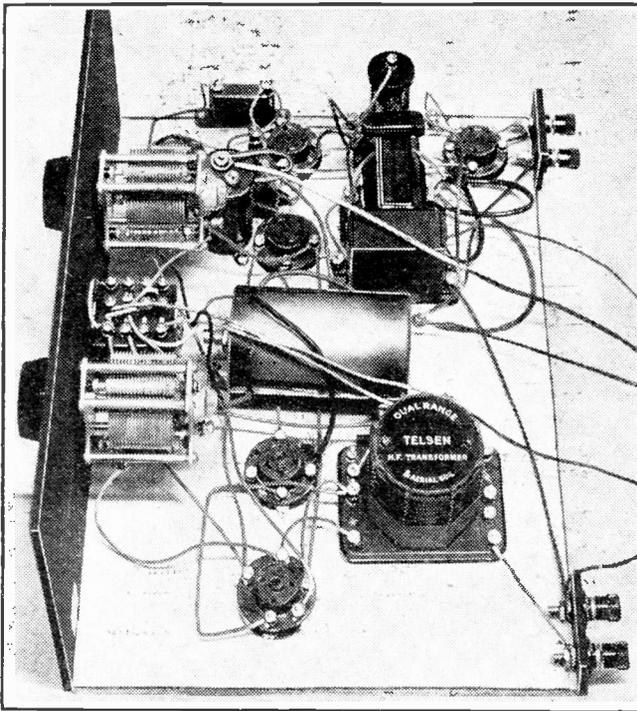
I am inclined to believe, as I have said before, that already we have practically reached rock-bottom in regard to this particular principle of radio reception, and that any further developments will be little more than minor improvements in practical application.

Anyway that, on all the evidence at our disposal, is what seems to be the probability, although I must warn you that it does not do to be too dogmatic about anything scientific!

But let us look at this modern example of the "super-heterodyne," the "P.W."

(Continued on page 746.)

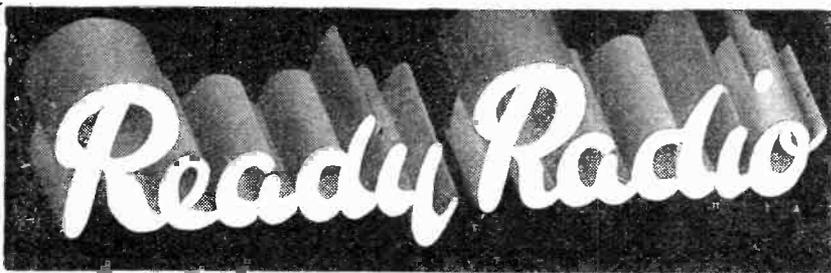
## A FIRST-CLASS PROPOSITION FROM EVERY POINT OF VIEW



Two views of "S-Q" Star, showing its remarkable simplicity of assembly, which was enhanced still further in the final model (shown on the next page) by the omission of the tubular condenser near the oscillator condenser.

## THIS IS A VERY SMALL SHOPPING LIST FOR A FULL-POWER "SUPER"

- |  |  |  |
|--|--|--|
| <p>1 Panel, 14 in. × 7 in. (Permeol, Becol, Peto-Scott, Wearite, Goltone, Parex).</p> <p>1 Cabinet with baseboard, 10 in. deep (Peto-Scott, Camco, Ready Radio, Pickett, Osborn, Gilbert).</p> <p>2 0005-mfd. tuning condensers (Polar No. 2, Telsen, Dubilier, Lotus, Igranic, Ormond, J.B., Cyldon, Wavemaster, Astra).</p> <p>1 4-pole double-throw switch with terminals (Wearite).</p> <p>4 4-pin valve holders (Graham Farish, Lotus, Telsen, W.B., Igranic, Wearite, Clix, Bulgin, Formo, Dario).</p> <p>2 5-pin valve holders (Graham Farish, etc.).</p> <p>1 1-meg. grid leak and holder (Dubilier, Telsen, Igranic, Graham Farish, Ready Radio, Peto-Scott, Ferranti, Ediswan, Loewe).</p> | <p>1 100,000-ohm spaghetti resistance (Lewcos, Varley, Telsen, Bulgin, Graham Farish, Igranic, Sovereign, Peto-Scott, Ready Radio, Goltone, Lissen).</p> <p>1 25,000-ohm spaghetti resistance (Varley, etc.).</p> <p>1 H.F. choke (Ready Radio Superhet, Lewcos, Telsen, Atlas, Climax, Igranic, Graham Farish, Varley, Parex, Lotus, Sovereign, R.I., Wearite, Dubilier, Tunewell).</p> <p>1 0002-mfd. grid condenser (T.C.C., Telsen, Mullard, Ediswan, Dubilier, Graham Farish, Ferranti, Lissen, Formo).</p> <p>1 0003-mfd. fixed condenser (Lissen, etc.).</p> <p>1 001-mfd. fixed condenser (Dubilier type 670, etc.).</p> | <p>1 2-mfd. fixed condenser (Telsen, Igranic, T.C.C., Lissen, Dubilier, Helsby, Hydra, Ferranti).</p> <p>1 L.F. transformer (Lotus, R.I., Telsen, Varley, Climax, Lissen, Formo, Ferranti, A.W., Graham Farish, Igranic).</p> <p>1 H.F. transformer (Telsen).</p> <p>1 Oscillator unit (Lewcos Ext. Osc. 123, Wearite, Colvern).</p> <p>2 Intermediate frequency transformers (one with pigtail). (Lewcos, IFT and IFT P, Wearite, Colvern.)</p> <p>2 Ebonite strips, 2 in. × 2 in.</p> <p>4 Terminals (Igranic, Eelex, Belling &amp; Lee, Clix, Goltone).</p> <p>Battery plugs, etc. (Belling &amp; Lee, Clix, Igranic, Eelex).</p> <p>Flex, screws, wire (Jiffilix, Glazite, Quickwire, etc.).</p> |
|--|--|--|



## MATCHED KITS for the "S-Q" STAR

### APPROVED LIST

	£	s.	d.
1 Ebonite Panel, 14 x 7 in., drilled to specification	4	6	
1 Polished oak cabinet, 14 x 7 in., with 10 in. baseboard	15	0	
2 Lotus 0005 variable condensers with dials	7	0	
1 Wearite 4-pole double-throw switch	5	0	
4 Junit 4-pin valve holders	2	8	
2 Junit 5-pin valve holders	1	8	
1 Readirad r-mog. grid leak and holder	1	4	
1 Leweos 100,000-ohm spaghetti resistance	1	6	
1 Leweos 25,000-ohm spaghetti resistance	1	6	
1 Readirad super-het. choke	5	6	
1 T.C.C. 0002-mfd. fixed condenser, type 34	1	6	
1 T.C.C. 0003-mfd. fixed condenser, type 34	1	6	
1 T.C.C. 001-mfd. fixed condenser, type S.	1	6	
1 T.C.C. 2-mfd. fixed condenser, type 50	3	10	
1 Lotus L.F. transformer	5	6	
1 Telsen H.F. transformer	5	6	
1 Leweos oscillator unit, type Ext. 126	12	6	
2 Leweos intermediate frequency transformers	1	1	0
2 Sovereign terminal blocks	1	0	
4 Belling & Lee terminals, type R	1	0	
1 packet Jiffilix for wiring	2	6	
4 Valves as specified	2	19	0
5 Belling & Lee wander plugs			10
Flex, screws, etc.			8
<b>Total</b>	<b>£8</b>	<b>3</b>	<b>6</b>

Any component can be purchased separately.

**TO INLAND CUSTOMERS.**—Your goods are despatched Post Free or Carriage Paid.  
**TO OVERSEAS CUSTOMERS.**—Everything Radio can be supplied against cash. In case of doubt regarding the value of your order, a deposit of one-third of the approximate value will be accepted and the balance collected by our Agent upon the delivery of the goods. All goods are very carefully packed for export and insured. All charges forward.

**KIT "A"** (Less Valves and Cabinet) **£4-9-6**

**OR BY EASY PAYMENTS**

**8/3** down and 11 monthly payments of 8/3.

**KIT "B"** (With Valves, Less Cabinet) **£7-8-6**

**OR BY EASY PAYMENTS**

**13/6** down and 11 monthly payments of 13/6.

**KIT "C"** (With Valves and Cabinet) **£8-3-6**

**OR BY EASY PAYMENTS**

**15/-** down and 11 monthly payments of 15/-.

Be sure to read Kendall's book entitled "10 Hows for Modern Radio Constructors." Send four 1d. stamps now.

### A READY REFERENCE TO RADIO

Our new 100-page fully illustrated Catalogue contains details of all modern radio products. You need a copy. Price 1/- post free.

## ESSENTIAL IN THE "S-Q" STAR



The **READIRAD**  
**SUPERHET CHOKE**

PRICE **5/6**

Specially designed for use in the modern type of superheterodyne. Excludes the intermediate frequency currents from the low-frequency circuits. Will effectively block H.F. currents of wavelengths even as high as 3,500 metres. Can be used wherever a choke of extra high inductance is required. Special features:—

- (1) Highly efficient sectionalised windings, almost entirely air-spaced. Completely enclosed in a protective case.
- (2) Self capacity and losses exceptionally low for a choke of such high inductance.
- (3) Low D.C. resistance, 500 ohms.

### CASH or C.O.D. ORDER FORM

To: **READY RADIO LTD.,**  
Eastnor House,  
Blackheath, S.E.3.

Please dispatch to me at once the following goods:

for which (a) I enclose (cross out line) (b) I will pay on delivery (not applicable) £.....

Name.....

Address.....

P.W. 28/11/31.....

To: **READY RADIO LTD.,**  
Eastnor House,  
Blackheath, S.E.3.

Please dispatch to me the following goods:

for which I enclose first deposit of £.....

Name.....

Address.....

P.W. 28/11/31.....

### EASY PAYMENT ORDER FORM

## "S-Q" STAR.

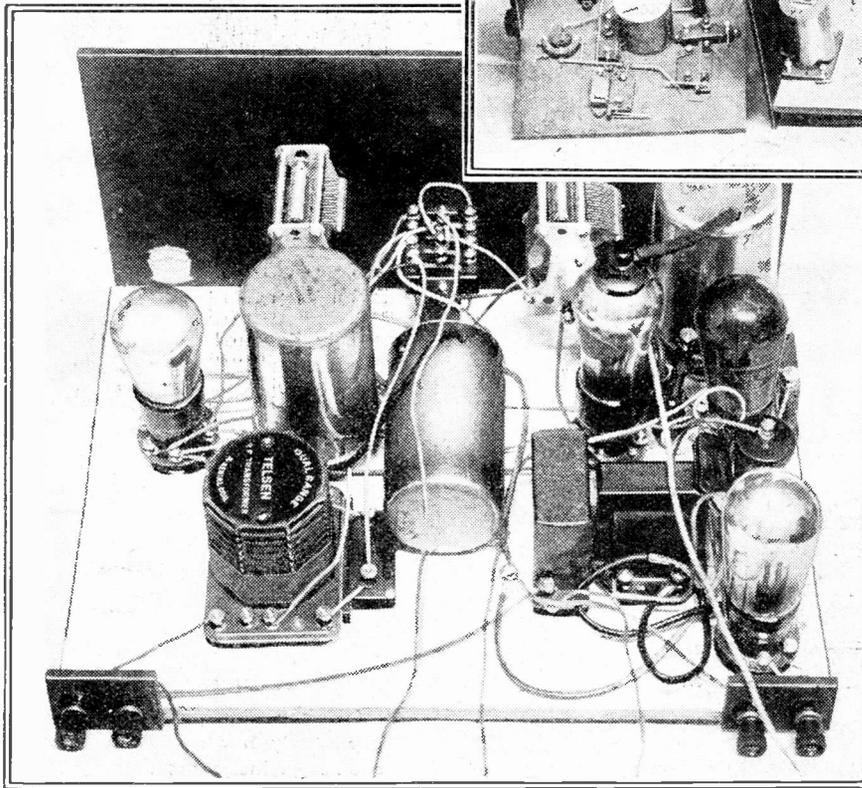
(Continued from page 744.)

"S-Q" Star, in detail, and try and visualise where it could possibly be improved. In operation there are only two tuning controls to manipulate and these can be compared, in a way, with the wave-length adjustment and reaction control of an ordinary "single dial tuning" set, except that it is advisable to calibrate, or at least note the readings on both dials of our super.

These two dials could certainly be merged into one control, but that would mean a special condenser costing a bit more than the price of both the ordinary tuning condensers at present used. There are many constructors who would rather pay less and have two dials, particularly in view of their ease in handling!

### No Frame Aerial Needed.

The wave-changing could be done away



The "S-Q" Star enables anyone to tune-in those usually extremely weak stations at full loudspeaker strength.

with by using a couple of extensers. Now there may be many who would like that, but most of these have been satisfied already by the overwhelmingly popular "M.W." "Super-Quad."

Turning to the efficiency of the set as a programme collector, the issue is even clearer. An ordinary extended wire indoor or outdoor aerial has to be used. But most of us have such a thing already, and those who have not will not find it difficult to run a piece of wire up the side of the window frame and around the picture-railing—that is all "S-Q" really needs.

To get similar results on a frame aerial would necessitate two more valves above the "foundation" four. Would the extra

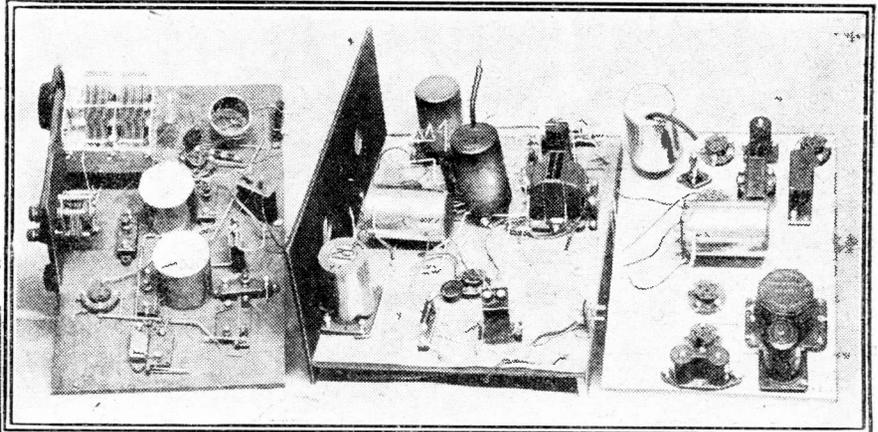
initial and running costs be worth it? A few of you may be richer than most of us, and the same, or a further few, may not object to the sight of a frame aerial poking up into the room—personally, I can't stand the things and can see little justification for their existence, remembering the simple and inexpensive alternative of a hidden, cotton-covered wire around one or two walls of the room. Of course, a frame is directional, but this quality is not generally in demand with supers!

justification for any other kind of circuit? That question I have dealt with in previous articles and I do not propose to go through it again. I can but refer you to the introductory article which announced the arrival of the first "P.W." "Super-Quad" design.

### Superb Performance.

Suffice it to say that we have now been able to iron out many of the disadvantages that pushed earlier super-hets into oblivion

## FINDING THE "STAR" THAT SHONE BRIGHTEST!



Here are three of the many experimental models that were tried out by the Research Department in their efforts to find an "S-Q" Star of the first magnitude. It is to the preliminary work on these sets that much of the super-efficiency of the final "S-Q" Star is due; and it is by virtue of its unequalled facilities for such investigation and practical test that our Research Department finally combs out the complete winner from a batch of promising possibilities.

in face of straight circuit competition.

And now we have "S-Q" Star—but I must not dwell on the merits of this "star" set too long, or I too, will begin seriously, very seriously, to wonder if there really is any justification at all for the existence of any other kind of circuit!

Undoubtedly, "S-Q" Star is a proposition which should provide a great stimulus to home-construction, for it gives you a performance equal, if not superior, to that given by the most expensive of all commercial sets.

And the extreme simplicity of its construction brings it within the reach of all set-builders. It is no exaggeration to say that it is as easy to make as most ordinary two valves, while it is definitely superior in its selectivity and power to any normal outfit employing an equivalent number of valves.

We are convinced that all who construct this latest "feature" set of ours will consider that the comparatively little time and money they spent on it brings them a more than ample return.

In the photograph at the heading of this article the loudspeaker shown with the "S-Q" Star is "His Masters Voice" L.S. 7.

## NEXT WEEK.

Full constructional details of "S-Q" Star will appear in our special, enlarged Christmas Number, which will be on sale next Thursday, Dec. 3rd. Price Threepence.

On anything at all in the way of an extended wire aerial, the "S-Q" Star will give anyone anywhere thirty, forty, fifty, etc., up to one hundred or so alternative programmes at loudspeaker strength, depending upon one's experience of its controls. You can say that its receptivity is limited only by atmospheric conditions. Could you have more than that?

### Piercing Through the Mush.

In regard to selectivity—well, "S-Q" Star has the full super-heterodyne power to pierce through mush, and your powerful local station is lost in a degree or so on the dials.

Where then, you may well ask, is the

# TELSEN RADIO COMPONENTS

## TELSEN VALVE HOLDERS (Prov. Pat. No. 20286/30)

The Telsen four and five-pin valve holders embody patent metal spring contacts which are designed to provide the most efficient contacts with split and non-split valve legs, and are extended in one piece to form soldering tags. Low capacity and self-locating.

Telsen 4-pin Valve Holder . . . . . Price 6d.  
Telsen 5-pin Valve Holder . . . . . Price 8d.

## TELSEN FIXED MICA CONDENSERS (Prov. Pat. No. 20287/30)

Telsen Fixed Mica Condensers are made in capacities from .0001 microfarad to .002 microfarad. They can be mounted upright or flat and the .0003-microfarad Telsen fixed mica condenser is supplied complete with patent grid-leak clips to facilitate series or parallel connections.

Telsen Fixed Mica Condensers . . . . . Price 6d.

## TELSEN GRID-LEAK HOLDER

The Telsen Grid Leak Holder will hold firmly any standard size or type of grid leak. Ample clearance is provided between the terminal screw leads and the baseboard (underneath), preventing any surface leakage upsetting the value of the grid leak. The terminals and fixing holes are accessible without removing the grid leak.

Telsen Grid-Leak Holder . . . . . Price 6d.

## TELSEN SPAGHETTI FLEXIBLE RESISTANCES

These are made in a range of values from 300—200,000 ohms with a maximum current varying from 42 m/a to 1½ m/a. The terminal tags are firmly fixed to the wire and clearly marked with their respective resistance values; they are impregnated with special insulating compound which renders them proof against corrosion.

Telsen Spaghetti Flexible Resistances . . . . . from 6d.

## TELSEN FUSE HOLDER

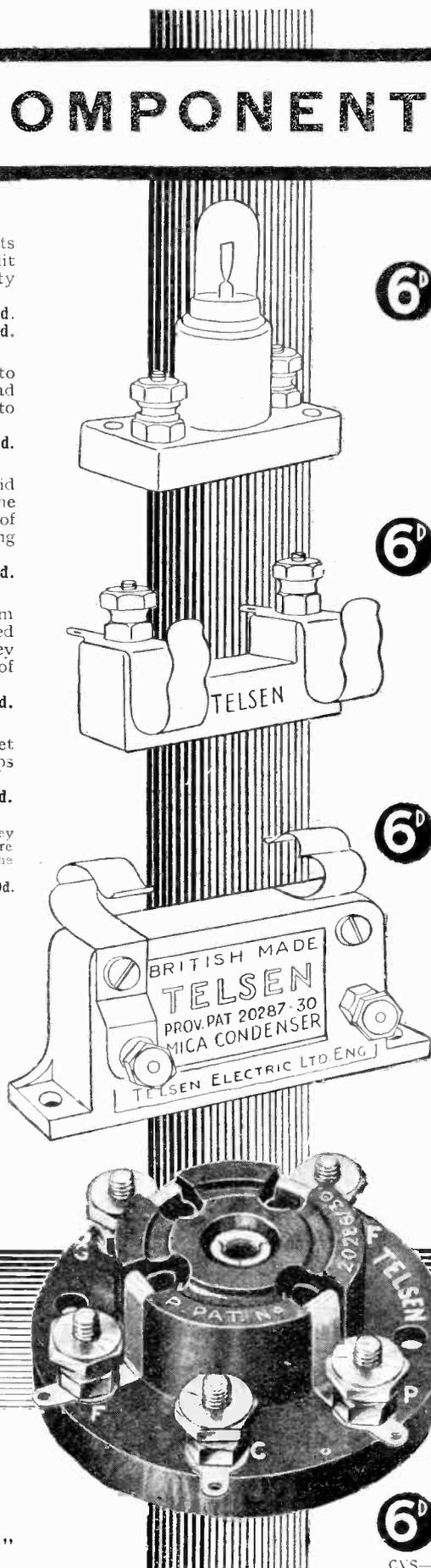
This is a neat and inexpensive device which should be incorporated in every set as a precaution against burnt-out valves. The Telsen Fuse Holder firmly grips the standard radio fuse, giving a perfect contact.

Telsen Radio Fuse Holder . . . . . Price 6d.

## TELSEN GRID LEAKS

Telsen Grid Leaks are absolutely silent and non-microphonic, and practically unbreakable. They cannot be burnt out, and are unaffected by atmospheric changes. Telsen Grid Leaks are not wire wound, and therefore there are no capacity effects. Their value is not affected by variation in the applied voltage. Made in values from ¼—5 megohms.

Telsen Grid Leak . . . . . Price 9d.

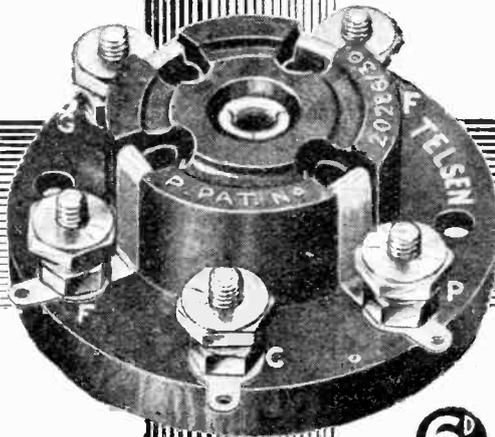


# TELSEN

THE SECRET OF  
PERFECT RADIO RECEPTION



9<sup>d</sup>



6<sup>d</sup>

Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to The Telsen Electric Co., Ltd., Aston, Birmingham.

# FURNACES FOR FILAMENTS

A surprising title, isn't it? And there are also some surprising facts in this article!

BY R. E. BLAKEY.

THE discovery of a means by which a continuous current could be generated was made by Volta and Galvani a few years before the dawn of the 19th century, and from that discovery have sprung into existence our present-day enormous electrical industries.

Little more than a score of years had passed when Seebeck announced in 1821 a second and purely independent means by which the same object could be accomplished.

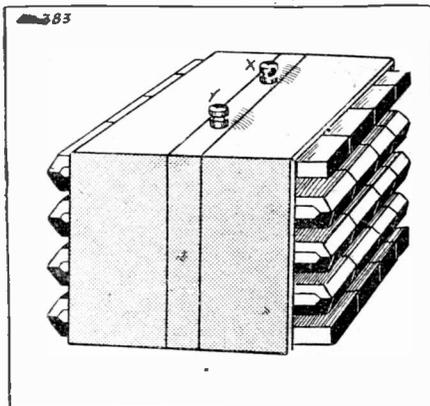
## Producing a Current.

He found that by applying heat to the junction of two dissimilar metals a current was generated which flowed through the junction in a definite direction, depending upon the nature of the metals. He obtained the strongest effects when using the metals bismuth and antimony.

A combination of two such metals is called a thermo-electric couple, and the current generated by them—though they differ in no way from "ordinary" currents—are called thermo-electric currents.

If I give a few examples of the primitive apparatus, you will be able to form an idea of the underlying principles.

## A SINGLE "CELL"



In practice a "thermopile" is made up into units, the one illustrated here being a typical arrangement.

For practical purposes it matters little from what place or places the E.M.F. is derived in a thermo-electric couple; it is sufficient to know that the application of heat to one junction generates a certain E.M.F. in the circuit, the amount of which we can determine when we know the difference of temperature between the heated junction and the remainder of the circuit.

For a single couple of any but the rare metals, the E.M.F. that can be obtained, even with a large difference of temperature, is extremely small when compared with an

ordinary dry cell or accumulator, and to this cause alone must be attributed the fact that thermo-electric batteries have not come into popular use.

## Useful for Radio.

Everything else appears to be in their favour: they contain no liquids, nor do they require any renewals of any materials like ordinary batteries: they contain no moving parts, nor are they liable to break down like dynamos, for example, not to mention batteries of all sorts; they have a fairly small resistance, and when once fixed in position, it is only necessary to light a jet of gas or some other such heating force in order to start and maintain them working, whilst their E.M.F. can be easily controlled by raising or lowering the flame.

It would, therefore, appear that if this form of supply could be successfully applied to radio receivers, people residing in remote districts would for the first time be amply catered for, since we must remember many have neither gas nor electric supply.

The first really useful thermo-electric battery was constructed by Melloni, who called it a thermopile. (Fig. 1 illustrates it.)

The metals consist of bismuth and antimony, each metal being square and substantial in section. These metals are laid alternately side by side, so as to build up a cube, and each piece is carefully insulated from its neighbour by a layer of gypsum or similar substance.

The alternate ends are then soldered together so as to convert the whole into a battery containing as many couples as there are pieces of bismuth or antimony in the cube. Four sides of the cube are then covered by a brass case, leaving the soldered junctions exposed as shown, and a pair of insulated terminals, *x* and *y*, are fixed to the last bismuth of the series and the other to the last antimony.

As a current generator, the Melloni Pile is very expensive to make, and very inefficient, but as it was never intended for this purpose we must pass over this. It was intended for measuring small differences of temperature, and for this purpose it is very useful.

## A Commercial Unit.

As a current generator for use on a commercial scale Clamond constructed his thermo-electric battery. This battery contains 50 couples joined up in series: the couples are arranged in rings of ten, and five of these rings are placed one above the other. The plan on the right shows this apparatus.

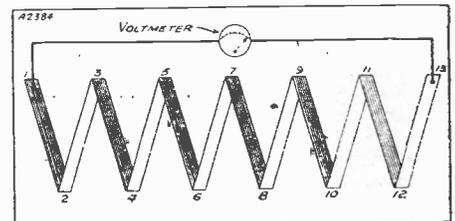
The thermo-positive element consists of an alloy of bismuth and antimony: they are solid substantial blocks marked "A," and are arranged in a circle. The thermo-negative elements consist of sheet iron,

and are marked "F" in the diagram. The junctions to be heated are made on the interior portions of the blocks, and are marked 1, 3, 5, 7, 9, 11, 13, 15, 17, and 19, whilst the junctions to be cooled are marked 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20. These, you will note, are external. The inner junctions are packed with asbestos cement, and in the circular space which is shown, an earthenware tube containing a number of holes is fixed vertically.

## Economical to Run.

Ordinary gas or flame from a spirit lamp, or other such method of heating is passed into this tube, and when the jets are lighted, they heat the inner junctions 1 to 19 to the desired temperature. The projecting sheets of iron marked "F" present a large radiating surface, and thus help to keep the exterior junctions moderately cool. The five rings of ten couples are insulated from each other, but are all joined up in series by means of a clamp by means of which

## THE HEATED JUNCTIONS



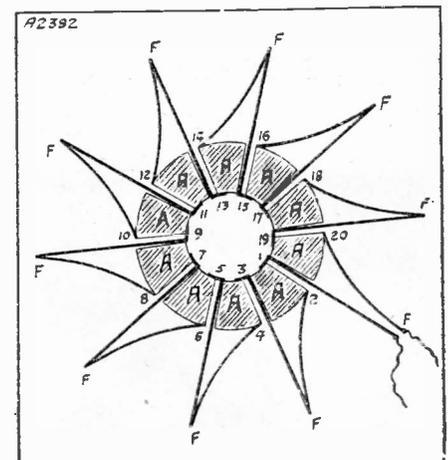
The heat is applied at alternate points where the different metals touch, and results in a small voltage being generated there.

the rings can be joined up in series or parallel as desired.

The E.M.F. of this battery is 2.5 volts and the internal resistance  $\frac{1}{4}$  ohm, and the battery consumes about 6 cubic ft. of gas per hour. If any of you attempt the construction of such a battery, I suggest a Bunsen burner is used in preference to ordinary jet flames.

Considering the enormous strides that have been made in electricity during the last hundred years it is singular that this subject has so little advanced. It would appear well worth consideration, and the primitive batteries would be very interesting to procure in order to enable tests to be made upon them.

## IN THE RING



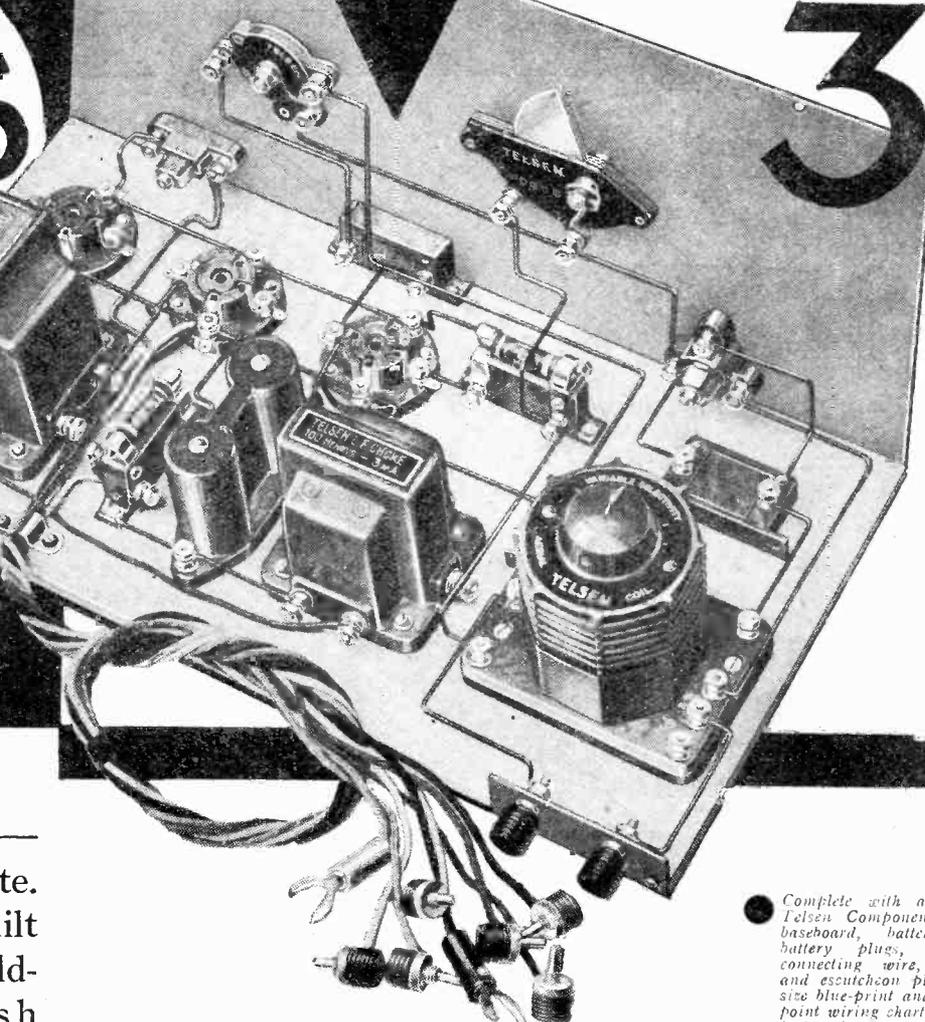
Note the numbers in the centre which denote the points to be heated, and the projecting arrangements of sheet-iron (marked F) which present large radiating surfaces.

# BUILD THE TELSEN VICTOR

# 39'6

A super 3-valve receiver built entirely with All-British Telsen Components.

**S**IMPLE to build—simple to operate. A 3-valve receiver built entirely with the world-famous all-British Telsen Components, all matched for efficiency. Separation of Regional from National programmes is guaranteed, thanks to the incorporation of the Telsen Dual Range Aerial Coil. Ask to see the kit at your radio retailer's.



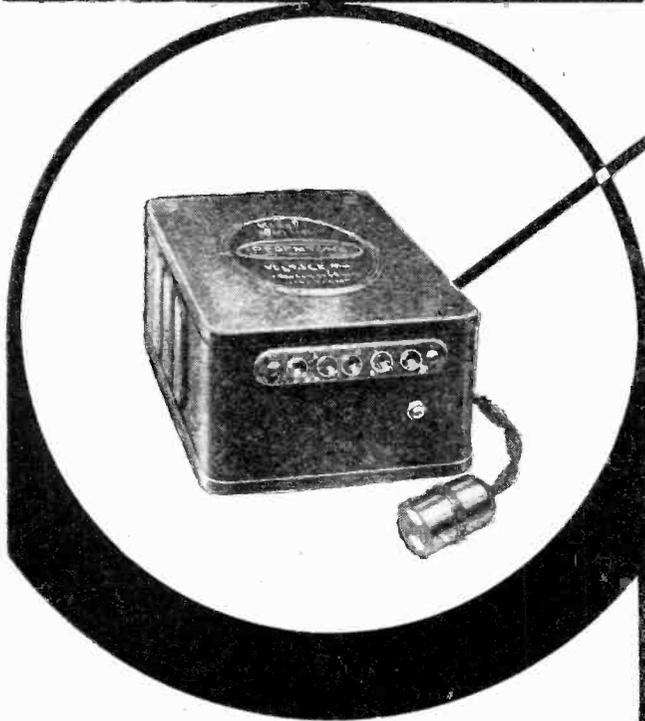
# TELSEN

ALL-BRITISH  
RADIO COMPONENTS

- Complete with all-British Telsen Components—panel, baseboard, battery, cord, battery plugs, terminals, connecting wire, terminal and escutcheon plates, full-size blue-print and point-to-point wiring chart, with full instructions, etc., etc.
- Super 3-valve receiver, built entirely with all-British Telsen Components, matched for efficiency.
- Separation of Regional from National programmes guaranteed by incorporation of Telsen Dual Range Aerial Coil.
- Very simply built and simply operated. Full constructional details with every kit.

# Change from batteries to mains but. CHANGE WITH REGENTONE

*Experts say*



Regentone Model W.I.F. (H.T. only) **50/-**  
Three tapings (S.G., Detector and Power). Output 120/150 v., 12 m/a.  
There is a complete range of Regentone Mains Units for A.C. and D.C. Mains, H.T. only, and Combined H.T. with L.T. Charger. Prices from 35/- to £10.

"Regentone Mains Units are the finest in radio to-day."

Here is our proof. Before a manufacturer of a well-known set will recommend a Mains Unit for his sets he must be satisfied that it gives at least as good performance; that it is just as reliable; and that it is simple in operation.

Not one, but a considerable number of prominent manufacturers consistently specify Regentone for their sets. More than that, experts have tested them with all the popular Kit sets, and they recommend them, too. And if further proof is necessary, read what the Wireless Press say of Regentone:

"Our test of the Regentone Model W.5 gave perfectly satisfactory results with several commercial portables."

"Regentone have produced some fine Mains Units."

"These (Regentone) Units will prove attractive to those who want to make their sets as efficient and trouble-free as modern technique makes possible."

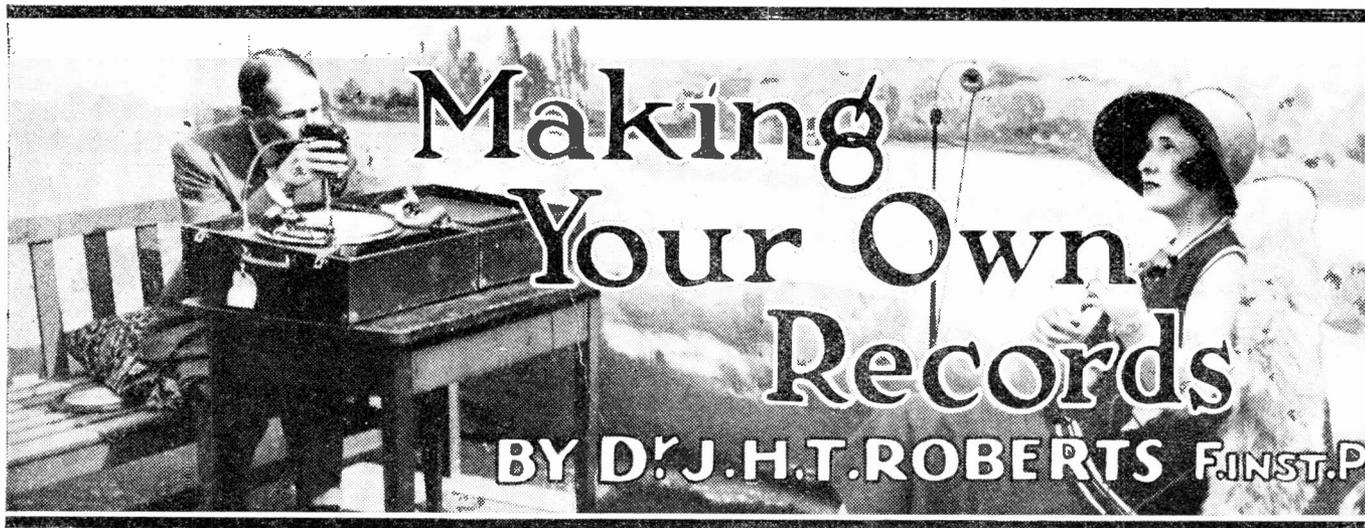
Regentone Mains Units are, without doubt, the finest in radio to-day.

Nothing could be simpler than to make your battery-operated set all-electric with Regentone. You have only to take out the run-down H.T. Battery and substitute a Regentone Combined Unit. Connect up the leads that originally went to the H.T. battery to the Regentone Mains Unit, and the two leads in the unit to the L.T. accumulator. Now you have an all-electric receiver—no more trouble, no more expense, just simple, reliable, care-free radio.

Write for the new Regentone Art Booklet "All-Electric Radio"—or get a copy from your nearest radio dealer.



REGENTONE LIMITED, Regentone House,  
21 Bartlett's Buildings, E.C.4. Tel.: Cent. 8745 (5 lines).  
Irish Free State Distributors: Kelly & Shiel, Ltd., 47 Fleet St., Dublin.



"COME along. Your turn next." "Oh, I couldn't possibly make a record." "Of course you can. It's perfectly simple." "But that's not my voice!" Visions of Christmas parties with the home recorder in great demand—a wonderful new toy to add to the fun and amusement of the occasion.

If you have never made a record before, you will be tickled to death to hear yourself—as others hear you. Whether the sound of your own voice brings feelings of pride, or covers you with embarrassment, (probably the latter) it will cause endless amusement and delight to your friends.

**Friends in Australia.**

I often wonder whether home recording has purely a novelty appeal, or whether it will prove of permanent interest. I am told that when I've made a record I can post it to my friends in Australia (why Australia I can't tell you; I should have thought it might just as well be India).

At first sight this seems very intriguing, but when I stop to think about it I find it doesn't amount to much, because I haven't any friends in Australia. And even if I had, I'm afraid I should promptly lose them (judging by the unkind observations on my attempts at home recording) if I dared to "say it with aluminium." Even my private letters have to be typed because nobody can read my handwriting.

But perhaps I have not got what you call a good recording voice, albeit when I broadcast some time back from the London Studio many of my readers were kind enough to say that I "came over" very well.

Voices vary greatly in their "recording" properties, and I have heard many home records which were remarkably good. Indeed, this variability in the characteristics of different voices, together with the need for a certain amount of practice and skill, makes home recording all the more interesting. In this respect it resembles that strange game of golf—if it were too easy it would lose all interest!

**"Dubbing" Commercial Records.**

By means of a home recording outfit it is possible, as I say, to obtain a lot of amusement, but at the same time you can make permanent records of the voices of your friends or of broadcast items of particular interest.

Readers should find this article of particular interest, in view of the fact that Dr. Roberts was for many years technical head of the great Columbia Gramophone concern, and has contributed several important patents to the industry.

You can also make duplicate copies of commercial records by "dubbing" (professional slang for picking-up and recording) from the commercial record to the aluminium disc; this last item is, however, more of experimental interest than anything else.

With regard to the making of permanent items, these records must be only for your private use; any attempt to deal with them in any other way constitutes, or may constitute, an infringement of copyright.

The methods of making home records, just as methods of reproducing records, fall naturally into two classes, the acoustic or "direct" method, and the electrical method. In the direct acoustic system you speak straight into a short metal trumpet, the lower end of which is inserted into a more or less ordinary form of soundbox, and the vibrations from your voice actuate the diaphragm which in turn vibrates the cutting needle. In the electric method you speak into a microphone; the speech currents from this are passed through a suitable valve amplifier, the output from the amplifier being fed into what is virtually an electrical pick-up, so as to actuate the cutting needle in the corresponding way.

**Electrical Recording.**

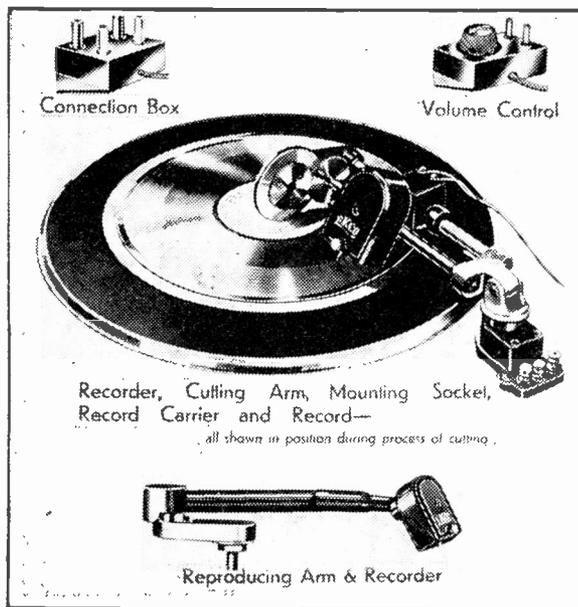
The advantage of the electrical method over the other is that it permits of greater amplitude of vibration of the cutting stylus, and also that it gives the speaker much more freedom of movement, since he is not obliged to put his mouth close up to a trumpet. In fact, with a fairly sensitive microphone and a good amplifier, the speaker may move about at a distance of several feet from the apparatus.

The recording is almost universally done upon small aluminium discs, although on the Continent a special type of celluloid disc is sometimes used instead. The cutting stylus is a specially-pointed steel or diamond needle and is secured in the needle holder of the soundbox or pick-up in the usual way.

There is scope for a certain amount of skill and judgment in the placing of the cutting needle, both as regards its orientation to the track and as regards the angle which it makes with the face of the disc and, indeed, success in making a good record depends very largely upon getting to know and understand the little idiosyncrasies of your recording stylus. It is impossible to turn out these recording

(Continued on next page.)

**NEW SOURCE OF ENTERTAINMENT**



You can do all manner of things with a home recorder—record favourite radio artistes, duplicate your own records, etc. And the necessary gear is by no means complicated, as this photo of an Ekco Radiorecorder clearly shows.

## MAKING YOUR OWN RECORDS

(Continued from previous page.)

needles, especially if of diamond, to an absolute standard of uniformity, and therefore the user has plenty of room for experiment in finding out the most effective adjustments

### "Tracking."

Apart from the arrangements for the cutting of the track, the only other essential feature of the recording device is the means for making the cutter progress gradually across the face of the record.

There are several devices on the market for this purpose, one of the simplest making use of what is called a "tracking disc." This tracking disc is for all practical purposes an ordinary commercial record of about 10 in. diameter, but the tracks have no sound impressed upon them, that is to say, they are *plain* tracks instead of having microscopic waves in them.

The aluminium disc to be recorded is smaller in diameter than the tracking disc, so that when it is placed upon the peg of the gramophone it covers only the centre portion of the tracking disc, leaving the outer part of the tracking disc exposed.

The recording arrangement is furnished with two needles, separated by a distance of perhaps a couple of inches; the outer needle lies in the groove of the tracking disc, whilst the needle nearer to the centre of the turntable is the cutting needle which rests upon the surface of the aluminium disc.

### Entirely Automatic.

As the turntable rotates, the needle in the tracking disc is gradually progressed towards the centre of the turntable, and in this way it pushes or leads forward the soundbox carrying the cutting needle, so that the latter cuts a spiral upon the aluminium disc, this spiral being a replica, as regards pitch, of the spiral on the tracking disc. There are, as I say, other methods for "tracking," all comparatively simple and depending in some way or other upon the motion of a screw which turns in definite relationship to the revolutions of the turntable.

Home-recording outfits can now be bought very cheaply, and, as I say, there is a lot of

fun to be got out of them. The only "running expenses," so to speak, are the aluminium discs, but these can be bought in packets of half-dozens and dozens at very low rates.

### Room for Improvement.

For the average user the aluminium disc is quite satisfactory and the serious experimenter can, in fact, obtain excellent results from these aluminium discs by the use of a good amplifier and microphone.

But I think that if home recording is to establish itself beyond the novelty stage, it will be necessary for someone to invent an improved type of recording disc, something giving a result nearer to that of an ordinary commercial record.

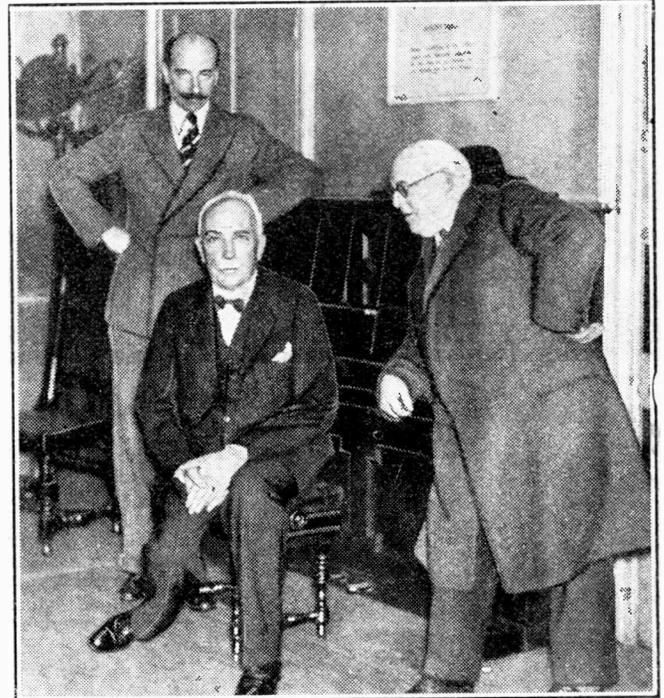
About the only remaining point needing any remark is the question of the strength of the gramophone motor. I have experimented a good deal with these home-recording devices and I have found that quite a number of ordinary gramophones are not powerful enough to turn the record uniformly against the friction of the cutting needle.

There are some types of gramophone which will work quite well, but in many cases you will find it necessary to assist the motor by turning the winding handle whilst the record is being made. To do this you wind-up the motor fully before commencing to make the record and then you continue to turn the handle whilst the record is being made, the force which you have to exert being determined largely by experience.

It is not too easy by this means to make the record turn at a uniform speed, but with practice you can get quite a good approximation to it. Incidentally, if someone can produce a type of home-recording blank disc which can be recorded with very

much less frictional reaction between the cutting point and the disc, so that it will really work easily on any gramophone motor without assistance, it will be a

## RICHARD STRAUSS IN LONDON



The celebrated composer photographed with, left, Dr. Adrian Boult, of the B.B.C., and Mr. Percy Pitt.

considerable step forward. Here is a fine opportunity for all you experimenters to get to work.

## CORRESPONDENCE

A couple of interesting letters received from "P.W." readers.

### CURING MAINS HUM.

The Editor, POPULAR WIRELESS.

Dear Sir,—I notice Capt. Eekersley's reply to R.Y. (Newcastle) in your 24th Oct. issue, and would mention I have met the same trouble, but am wondering whether a mistake has not been made.

If two 1-mfd. condensers are connected between the two anodes and H.T.—they would not necessarily cure self-oscillation. That hum might be due to a badly made transformer core vibrating, and that hum picked up by the larger anode winding and modulating the D.C. output.

More likely what was meant is the same trouble mentioned by some valve manufacturers and cured by two 0.1-mfd. condensers connected between the two anodes and opposite sides of the filament (H.T. side).

I should also be glad if Capt. Eekersley will continue with the subject as he suggests, since I have not yet managed to cure my hum completely, partly owing to the fact that I get a pick-up effect from a nearby D.C. generator which masks the other almost entirely.

Yours faithfully,

J. H. W. SHIRLEY.

Regent's Park, N.W.1.

### OUR FAULT FINDER.

The Editor, POPULAR WIRELESS.

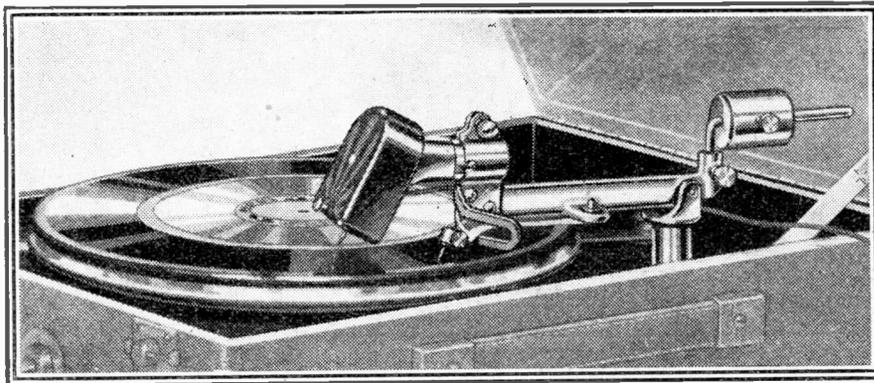
Dear Sir,—With reference to the "Complete Fault Finder" given with good old "P.W.," may I express my thanks for the tips given? Last night the set went completely plint! I sat down, read the "Fault Finder," went and tested the set right through and lo! found it—a broken connection on the H.F. choke. Once again, many, many thanks and wishing "P.W." all the best.

Yours faithfully,

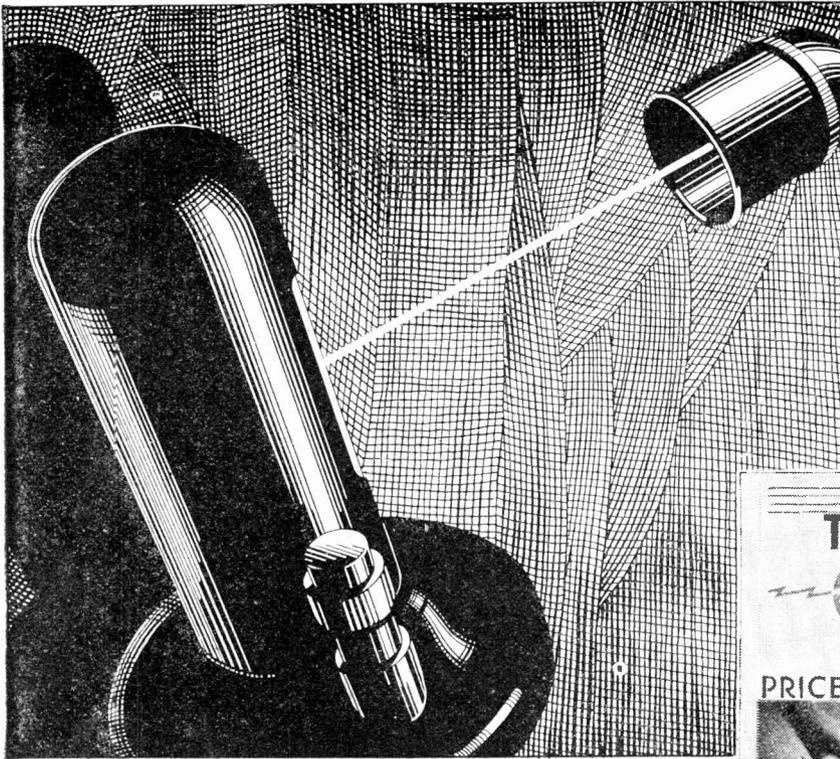
F. POOLEY.

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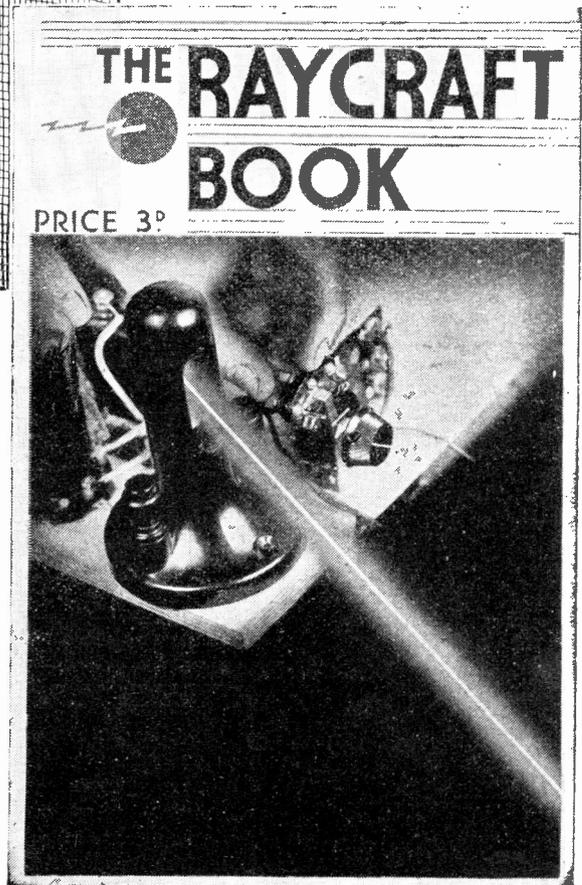
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P.W. 28/11/31



# THIS "CLAQUE" BUSINESS

I ADMIT that I am a little biased about the argument as to whether there should or should not be a studio audience, because as I am a "gentleman" of the Press (if I do not put in these inverted commas, the Editor will put them in for me!) I am very frequently one of the studio audience.

So, as it is my clapping which you sometimes hear, I cannot speak without prejudice! When one is in the studio it seems quite a natural thing that artistes should be supported by a little honest applause.

## It Helps the Artiste.

Without it an artiste becomes something of an automaton, beginning his performance in the stillly silence of the studio and ending it in a silence which seems even more deathly because it replaces what, to the artiste, at any rate, is the more usual applause. I am not at all sure, though, that it is a good plan to have this applause broadcast.

When anyone speaks of studio audiences and "clagues" I am reminded of George Robey's old gag when he couldn't get his audience into a laughing fit. He would walk down to the footlights, put his hand to his ear, and say, "Oi, what's the matter? There's only two clapping, and I paid for four to come in!"

Broadcast artistes do not pay for claps. Or "clagues." These things were done only in the old days of Italian opera, when there were paid professional applauders.

At least one broadcast artiste has confessed, though, how the orchestra in the studio helped him—once! It was Leonard Crocombe, who broadcast first in 1923 when the B.B.C. was a Company.

## A Funny Story.

A year or so back when Crocombe was at Glasgow he thought of the idea of arranging for the studio orchestra to act as his audience and to laugh and applaud at the right moment. The right moments were signalled by Crocombe! The idea was such a success that the following day the *Glasgow Evening News* congratulated the B.B.C., and said what a good idea it was to have a studio audience.

So far so good. When he was at Glasgow a month later, he found a new orchestra who had not heard of this excellent applause scheme. The orchestra leader explained it to them briefly before he went out and before Crocombe was announced

\*-----\*

Every listener has heard the B.C.C.'s "clapping claque," and no matter whether you like to hear the noise of the studio audience or not, you will be interested to read the comments of our Special Correspondent on the subject of studio applause.

\*-----\*

over the mike. This is how he describes what happened subsequently.

"After my first funny story they gave a fine hefty howl of laughter. Excellent. After the second story the outburst of laughter was not so loud. At the end of my third story—dead silence! Yes. I turned round from the microphone in

## IT SURPRISED HIM!



This is Leonard Crocombe, whose amusing story of the clapping that failed, and left him in the lurch, is recounted on this page.

astonishment, just in time to see the last of the men tiptoe out of the studio.

"It was explained later that my talk had taken place during their interval for refreshment. I have never ceased to wonder what

the 'unseen multitude' (if any) thought about the silence during the remainder of my talk."

It's all very well for listeners to say that a studio audience should not clap and laugh freely. When one visits a studio for the first time one wants so much to sneeze, cough, or make some other equally stupid disturbance, that the opportunity to have a good hearty laugh is too good to be missed.

## Controlling the Audience.

There may be studio humorists who invite only their own personal friends. Who can blame them? I don't think they laugh any the more for that.

One radio producer who is very well known over the microphone has a lady studio manager who, before the broadcast starts, instructs the audience that, although within reason they may laugh and clap as they like, they must not clap too much when she gives a certain signal, for this would confuse the dialogue for listeners.

With musical broadcasts, studio applause brings in a new set of difficulties, because unless one is thoroughly musical there is the chance of being caught napping. You have only to be at the Queen's Hall and hear ignoramuses (a few of them) set up a feeble clapping between the movements of a symphony to realise how hefty is the disdain of the Highbrows.

## Good Advice!

One can almost feel the weight of disapproval in the air when the intimate silence is broken. If you are ever invited to a highbrow musical performance in a studio and are in doubt about clapping, take the advice given me by a famous broadcast conductor whose character I will not profane by giving his name!

He said: "If you want to be considered a highbrow when at an orchestral concert, *don't* tap your feet or wag your head in time with the music; *don't* look pleased when you hear a melody you recognise, but be careful to smile graciously when the din is at its worst; and, finally, *don't* clap."

I think he is right.

A convincing argument I have heard against studio clapping is that the best broadcasters—the B.B.C. announcers and Jack Payne—don't have "clagues." The obvious answer to this is that I don't see how either of these could have "clagues."

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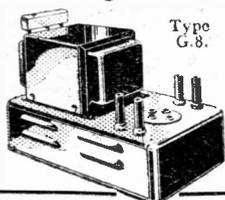


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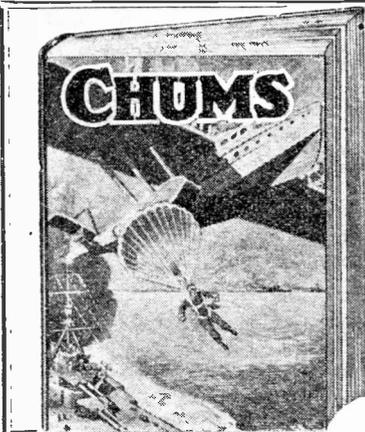


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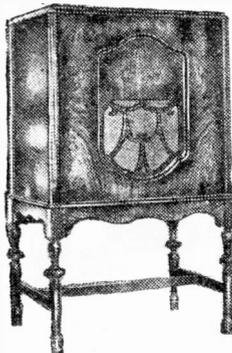
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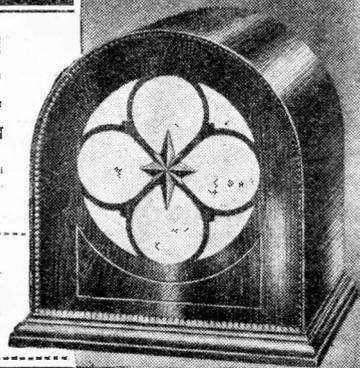
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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

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As there was insufficient room in the pages devoted to description of the set, some further notes on constructional matters, coils, etc., are given below:

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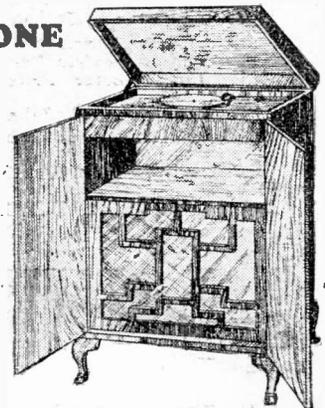
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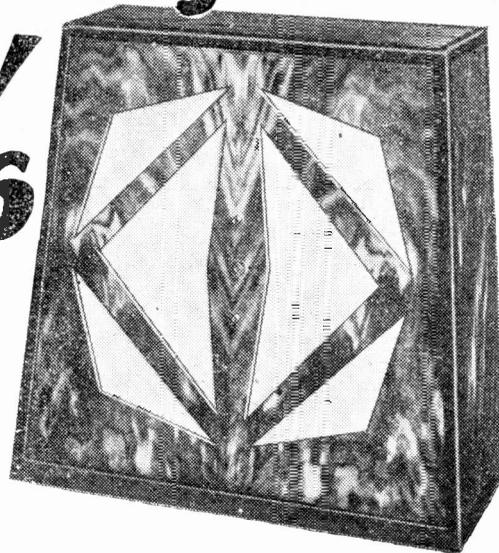


# How to build a 2-guinea Loudspeaker for 5/6

Here is an intensely interesting development—the Home Constructor's Loudspeaker, which you can build for 5/6 and which for tone and volume compares with many 2-guinea speakers you may have heard. And from a distance of 2 feet away its handsome appearance closely resembles a solid walnut cabinet of fine finish.

**A WONDERFUL FREE GIFT to every purchaser of the NEW LISSEN SOLENOID SPEAKER UNIT**

That extra loudspeaker for the other room is now available to you at small cost. See the completed loudspeaker above. That is what the Lissen free gift enables you to build. You buy the new Lissen Solenoid Cone Unit for 5/6. With it you will get



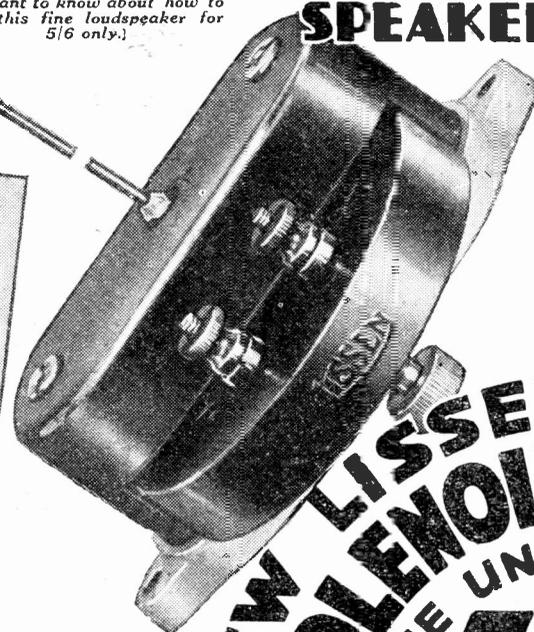
- 1. Special Cone paper printed to exact size ready for cutting out and gluing up to make a 14-inch cone.
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Anybody can easily build this speaker—the essential parts are all provided for you at an all-in cost of 5.6. The other sundries such as gum you probably have at home already.

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**NEW LISSEN SOLENOID CONE UNIT 5/6**

## RADIOTORIAL QUESTIONS AND ANSWERS

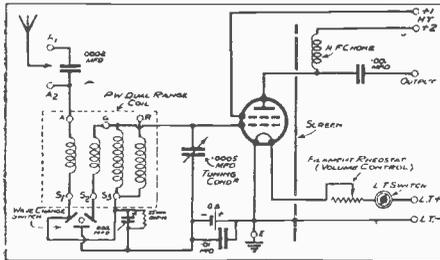
(Continued from page 758.)

cabinet for the battery. This is really the best place for the accessory. It is more accessible and is removed from the baseboard components.

Four short, flexible leads are needed for the grid-bias and coil tapplings. And the appropriate plugs and clips should be fitted to those wires.

Regarding the P.J.1, from the home-construction point of view this is quite a straightforward job, but correct sizes of former and wire must be used, and it is vital that the windings should be laid on with care, and the following instructions re direction of winding obeyed exactly.

### MISSING LINKS, No. 22 AN S.G. H.F. UNIT



Here is last week's diagram repeated, but with the three missing "components" in place. It will be seen that they were an "Interwave" resistance, the G.B. battery, and the coupling condenser.

The P.J.1 coil is wound on a good-quality tubular coil former, 2 in. in diameter, and 3 in. long. The wire for all the windings is 30 D.S.C. and the photographs in the article itself show the general appearance of the completed coil.

Anchor the beginning of the "aerial" winding in the usual way by threading and rethreading through small holes near the edge of the former, and mark this beginning "A." Then wind on 9 turns, tapped at 4 and 6 turns, finish off, and mark the lead "X."

Next comes the grid winding, which must be separated from the "aerial" winding by a space of three-eighths of an inch. Its beginning is marked "G."

It consists of 64 turns of the same wire (30 D.S.C.) wound in the same direction as before. The turns are wound closely side by side, as for the aerial winding, and the end, when finished off at the 64th turn, is marked "Y."

Finally comes the reaction winding, which is spaced to leave a gap of 1/4 in. between its beginning and the end of the grid winding. It consists of 34 turns, beginning marked "Z," end marked "R."

It is vitally important that the direction of winding should be the same for all the coils, and that the spacing named should be maintained. In the commercial coils, a further aid to identification is afforded by coloured flexes, to denote the different leads.

These are given below, and can with advantage be copied by the constructor:

- |                 |                  |
|-----------------|------------------|
| A = Red flex.   | Y = Black flex.  |
| X = Blue flex.  | Z = Green flex.  |
| G = White flex. | R = Yellow flex. |

**The Long-Wave Coil Quoit.**—The beginning of the 30 D.S.C. wire is fastened to the coil quoit in the usual way, by threading it two or three times through small holes in the former until it holds fast. About 6 or 8 inches

should first be pulled through the hole, and will be used as a connecting lead.

Mark the beginning "Reaction," wind on fifty turns, hank fashion, and then don't break the wire, but bring out a long loop, and label it "Earth."

Continue winding in the same direction until 30 turns are neatly wound on. Do not break the wire at this point, but twist a neat loop in it, about 3/4 in. in length.

This loop will be allowed to stick out from the winding, and when its insulation has been scraped off the wire it enables a crocodile clip to make connection at the 30th turn.

(Continued on page 762.)

## TECHNICAL TWISTERS

### No. 89. CLASSES OF VALVES.

CAN YOU FILL IN THE MISSING LETTERS?

The fundamental difference between classes of valves is the number of . . . . .; and valves having only two (filament and plate), such as half-wave rectifiers, are known as diodes.

Ordinary valves, with three electrodes, are classed as . . . . .

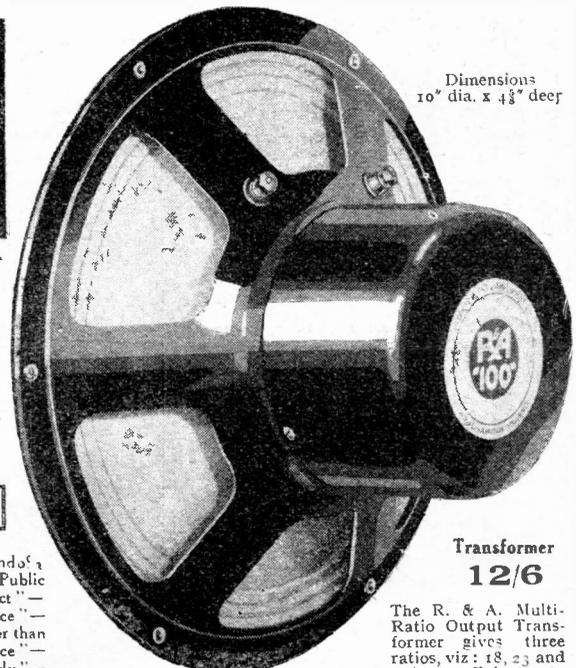
S.G. valves, having four electrodes, are in the . . . . . class.

The special output valves of the five-electrode type are known as . . . . .

Last week's missing words (in order) were: Switch; Disconnect; Negative.

# AN EPOCH-MAKING REPRODUCER

The **R & A**  
**"100"**  
PERMANENT MAGNET  
MOVING COIL  
REPRODUCER



Dimensions  
10" dia. x 4 3/8" deep

**A FULL-SIZED REPRODUCER — not a miniature speaker.**

R. & A. Ltd., have risen to their present position as Specialists and Leaders in the field of Sound Reproduction by producing Loud Speakers that are above the ordinary and by making R. & A. design, workmanship and material so superior to competitive products as to make the ownership of an R. & A. Reproducer a matter of pride to the possessor. R. & A. could make cheaper reproducers by using inferior materials; this only at the sacrifice of our reputation. We prefer to produce the best, and have

offered them at a price which has been imitated, and of a quality which has not been equalled at the price. Public acclaim—"marvellous value"—"quality perfect"—"output doubled"—"astonishing performance"—"wonderful tone"—"amazing results"—"better than any other"—"good value at four times the price"—"demonstrate R. & A. pre-eminence unflinchingly"—"in loud speakers R. & A. is the hall mark of quality"—These are extracts from letters in our possession.

Transformer  
**12/6**

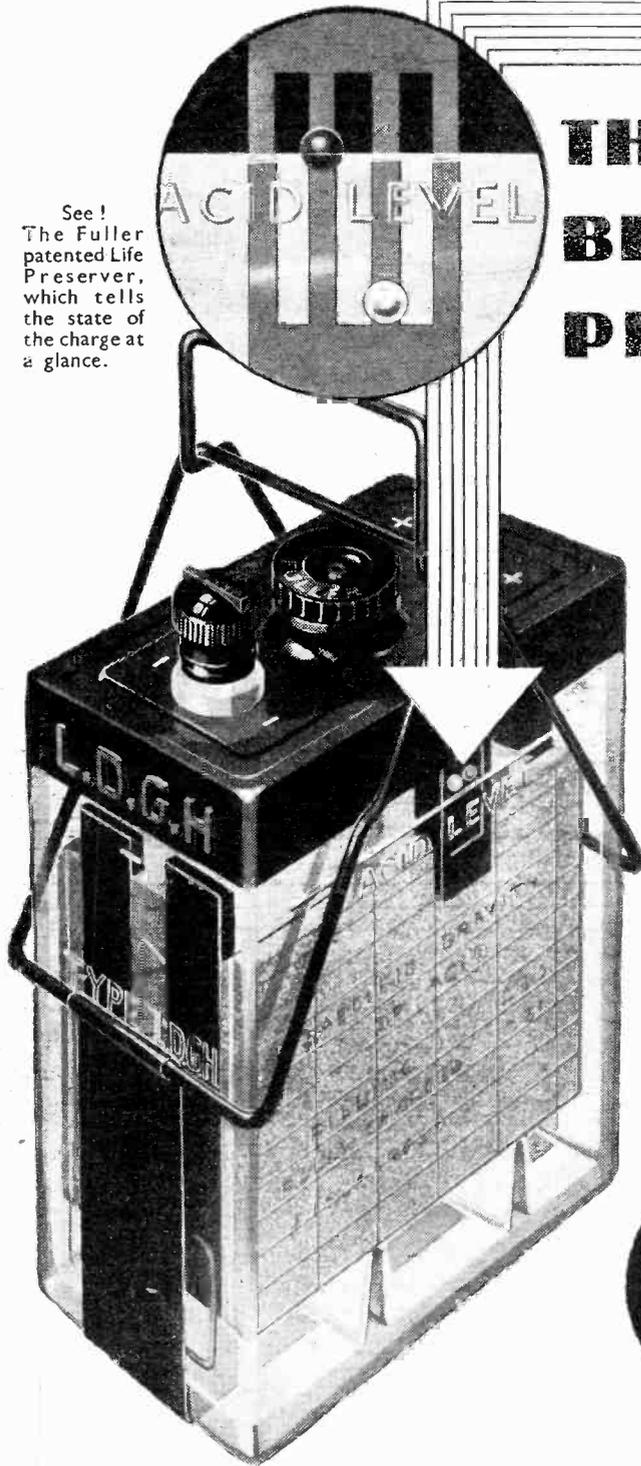
The R. & A. Multi-Ratio Output Transformer gives three ratios, viz: 18, 23 and 32/1, sufficient to cover the whole range of power valves, including Pentodes. Primary inductance 12.5 henrys, leakage inductance 2.5%.

**Insist on an R. & A. "100" and refuse substitutes. If any difficulty, write us.**

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which tells  
the state of  
the charge at  
a glance.



## THIS BRITISH BATTERY PROTECTS ITSELF

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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 760.)

The scraping of the insulation is best left till the coil is made. During the winding you simply make the loop at the 30th turn, and then carry on the winding in the same direction as before.

At the 60th turn another loop must be made, and then 90 more turns must be put on (still winding in the same direction) before the end is fastened off.

This fastening is done by cutting the wire and drawing it through small holes in the coil, exactly as at the start of the winding. And, as before, 6 in. or so should be left with which to make the connections to the coil. This end is marked "G."

### THE COIL QUIT OF THE "DUAL-RANGER."

H. J. (Wisborough Green, Sussex).—"I have built the 'Dual-Ranger.' One point I am not clear of. That is, the Quoit Coil, and how the leads are fixed to it from the switch. And also the one from the P.J.3 Coil. (The Quoit Coil I have in use is a Peto-Scott.)"

Referring first to the Coil Quoit there are five different places on this to which external connections can be made.

The beginning of the winding is one of them; and after the first 50 turns (for reaction) had been wound on the quoit a "loop" or tapping-point was arranged at the fiftieth turn, where reaction ends and joins the grid coil. This is the second connecting-point, and it is marked "E" because it will be connected to Earth.

Then another 30 turns of wire were laid on, and the third connecting-point is reached. We will call this the "30" tapping.

And after another 30 turns there is another connecting-point which we will call the "60" tapping. Finally, there is the end of the grid coil, making five connecting-points in all. Taking them one by one, the start of reaction must be joined to "Z" on the P.J.3 coil.

"E" (Where the grid coil and reaction coil meet) is joined to the moving vanes of the 0005 tuning condenser, which is connected via filament-pin of V<sub>2</sub> valve holder, etc., to earth.

Thirdly, the end of the grid coil is joined to that section of the wave-change switch which is connected to "X" on P.J.3.

There is one more connection to be made, and there are two points to which it can go.—namely, the "30" or the "60" tapping. The connection in question is that coming from "X" on the P.J.3, and one side of the wave-change switch.

It should be tried first on the "60" and then on the "30" tapping, to see which is better. In nearly all cases the "60" is the better tapping, because it gives greatest strength and sufficient "sharpness" of tuning.

In cases where great selectivity is necessary, owing to a near-by station, the "30" tap may be required, instead of the "60." But a test will soon decide which is better, and then the connection can

qualified success, as the "Economy" Three was a rather special circuit arrangement.

You would need a 3-point wave-change switch, a .002 compression-type condenser, a 25,000-ohm Spaghetti, and also an H.F. choke in addition to the "P.W." Dual-Range coil.

The present coil holder would, of course, need to be removed, and replaced by the Dual-Range coil, and you would have to mount the new wave-change switch on the panel.

This could be placed underneath the differential reaction condenser, and incidentally, the three leads from this component also should be "stripped," as it will need complete rewiring.

The new connections will be as described below. A terminal on the terminal-strip to "A" on the coil-unit, "G" on the coil-unit to the fixed vanes of the tuning condenser, which are joined to the 0903 mfd. as before.

"S2" on the coil-unit goes to one contact of the wave-change switch. S<sub>1</sub> and S<sub>3</sub> on the coil unit are

### "P.W." PANEL, No. 47. Overloading Amplifying Valves.

Although results which are virtually distortionless can be obtained from valves worked under proper conditions, all amplifier valves can be overloaded.

As the name implies, the condition exists when excessive voltages are delivered to the valve in question. Its output being strictly limited, the effect of an excessive input to a valve is that the output can no longer faithfully correspond with the input, and consequently there is a distortion of the wave-form.

The effect is chiefly noticeable on the local station's programme, and can be removed by a suitable volume control.

be left there, the other tapping point being left vacant and unused.

If the set is to be used in Sussex we expect you will find that best results are obtained by using the "60" tapping, and leaving "30" blank.

### USING DUAL-RANGE COIL IN THE "ECONOMY" THREE.

A. E. M. (West Ham).—"Can I use a 'P.W.' Dual-Range coil in the 'Economy' Three? Would it mean a lot of rewiring?"

"Will you please let me know how to wire the set with the 'P.W.' coil?"

There is a fair amount of rewiring to be done for this, and we are not sure that it would be an un-

joined together and also to another contact of the wave-change switch, and to one side of the new .002 semi-variable (compression) condenser, and to one side of the 25,000 Spaghetti resistance.

The remaining side of this resistance is joined to the remaining side of the .002 condenser, to the third contact on the wave-change switch, and also to the Earth terminal on the terminal strip, which still connects with the filament terminals on V<sub>1</sub>, V<sub>2</sub>, V<sub>3</sub>, tuning condenser and on-off switch.

Instead of the lead which formerly joined E, etc., to the moving vanes of the differential, you need a similar lead, but going this time to one set of the fixed vanes of the differential.

The other set of fixed vanes must be joined to the R terminal on the new coil unit. Finally, the anode-circuit wiring must be completed as follows.

(Continued on page 764.)

# Lanchester



MOVING COIL  
**Speakers**

COBALT STEEL PERMANENT MAGNET

**High Sensitivity  
Full Musical Response  
Speech Perfect**

Designed by F. W. Lanchester  
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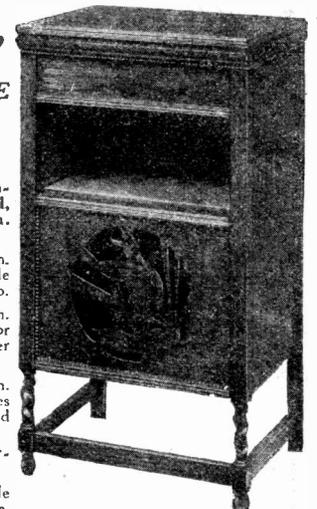
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"LANGMORE"  
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These cabinets are very strongly constructed of selected Oak. Size overall, 3 ft. 6 in. high by 21 in. wide by 15 in. deep.

THE TOP SECTION. Size, 4 1/2 in. high, by 18 in. wide by 14 in. deep, gives ample accommodation for gramophone or pick-up.

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Wooden panels to fit, with oval aperture, 12 in. by 5 1/2 in. 2/- extra.

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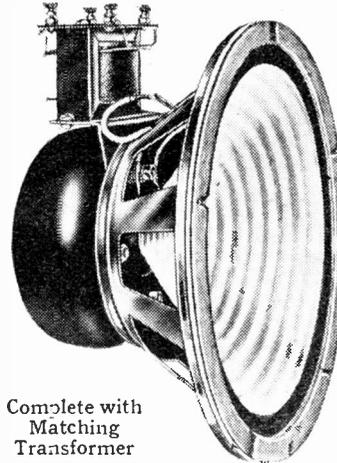
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H.T. OUTPUT: 25 milliamperes. 1 variable tapping-0/100 volts. 1 tapping .. 50/90 .. 1 tapping .. 150 .. Trickle charger for 2-, 4-, and 6-volt accumulator at 5 amps. CASH PRICE £5 5 0	For indirectly-heated valves. H.T. OUTPUT: 25 milliamperes. 1 variable tapping-0/100 volts. 1 tapping .. 50/90 .. 1 tapping .. 150 .. L.T. OUTPUT: 4 volts 4 amps. (Raw A.C.) CASH PRICE £5 5 0	H.T. only. OUTPUT: 120 volts at 20 milliamperes. 1 tapping .. 50/90 volts. 1 tapping .. 90/100 .. 1 tapping .. 120/150 .. CASH PRICE £3 3 0
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*Works Address: CROWN WORKS, SOUTHAMPTON.  
See also page 764.*

# AMPLION MOVING COILS



**M.C.6 UNIT.  
PERMANENT  
MAGNET**

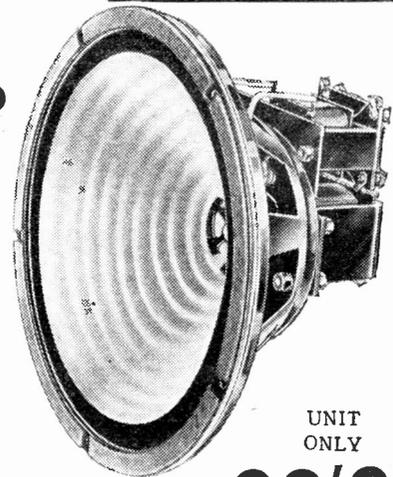
This famous Amplion M.C.6 Unit is acknowledged as the most efficient moving-coil speaker of its type. Its sensitivity and true reproduction are really remarkable, and it handles without distortion adequate volume for all normal requirements. It is as sensitive as a balanced armature speaker, and the universal transformer which is fitted enables the speaker to be correctly matched to either power, super-power or pentode output from standard 2-, 3-, or 4-valve receivers.

Complete with  
Matching  
Transformer

**67/6**

## THE E.M.644 UNIT. D.C. ENERGISED MODEL

Another of Amplion's successes is this D.C. Energised Model. Ideal for A.C. sets. Its perfect performance and reproduction has been proved by its inclusion in the famous "Amplion Six" receiver, which has reached record sales. Ideal for home constructors to incorporate in A.C. receivers and radiograms. A most efficient unit for D.C. voltages 100/110, 200/240. Full details of alternative methods of operation supplied with each model.



UNIT  
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UNIT WITH  
MATCHING  
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**42/-**

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The M.C.9 Unit is a permanent magnet, but is much larger and more powerful than the M.C.6. **UNIT ONLY.** A suitable matching transformer for this model can be supplied at 15/- extra. **£6:0:0**

GRAHAM AMPLION LTD., 26, Savile Row, W.1

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 762.)

Anode terminal of the V1 valve holder to the moving vanes of the differential, and also to one end of the H.F. choke. The other end of this choke goes to the P. terminal on the R.C. unit.

This completes the alterations, and the operation of the switch gives long- or medium-wave tuning, selectivity on long-waves being governed largely by the setting of the .002 compression condenser, as so often described in "P.W." sets where this system of "Interwave" coupling is employed.

### THE "P.V. PLUS."

R. C. (Stafford).—"Having constructed 'P.V. Plus.' I am puzzled about the tap from the .001 mfd. When this is tapped to the red or lower taps on P.J.3 I can only get National, 1.554 metres, nothing else. But when tapped to .0003 mfd. (same terminal as white from P.J.3) everything seems O.K., getting stations on both wave-bands. The coil quitoes I wound myself."

Are you sure that this coil quito is wound correctly? We suggest you re-read the description, to see if you went astray in this part of the work.

The likeliest cause of the fault you mention is a dud component causing bad results from the H.F. stage.

Examine carefully, and if possible, see that a coil terminal is not separated from the winding by a severed lead, as sometimes happens.

### OPERATING A MAINS SET.

A. D. E. (Bordeaux).—"What are the chief points for the inexperienced person to watch when using a mains set? I have to leave home for periods of five months at a time and should like to leave behind a clear idea of the correct treatment for the wireless set, for the benefit of my wife."

The modern wireless set run from the electric-light mains is a very trouble-free proposition, and

provided it is properly installed, and worked with ordinary care, it should give no bother whatever and require no more attention than the mere switching on and off.

Usually the maker supplies explicit operating notes covering the various operations to be performed, and these can generally be simplified considerably because they embody installation as well as operation; and, of course, the actual mode of installing the set will not need to trouble an inexperienced person who is called upon to handle it only after it is in place in the home.

### MAKE AN INSTRUCTION CHART.

Probably the best plan is to paste-up a sketch of the set showing each control-knob, etc., marking this one "down for long waves," that one "don't alter," etc., as required by circumstances. Then nothing can go wrong but what any maintenance service (dealer's or manufacturer's) can put right at once, provided the general care of the set is reasonably good.

This implies that aerial and earth are in good condition, and will not be interfered with, and that satisfactory earthing switch-contacts (if these are provided) will be maintained for long periods. (Usually a once-a-year overhaul is sufficient for this class of contact.)

All wires to or from the set, and particularly those from the power-point, should be regarded as fixtures to be left alone, for constant shifting of them, such as occasioned by moving the set about, or by careless movements during mopping and cleaning, etc., might result in a fracture of the wires.

If such precautions are taken, and no unauthorised person is allowed to interfere with the set, it will "carry on" indefinitely without giving a moment's trouble or uncertainty.

### AN ADVERTISER'S CORRECTION.

The attention of our readers is directed to an important omission from the advertisement of British Ideal "Daptacon" Pick-Ups in our last issue. The "Daptacon" Junior Pick-up at 17s. 6d. was described as having a British Steel Magnet, whereas it has a British COBALT Steel Magnet, of everlasting strength. (This pick-up is entirely British, and it is claimed that its sensitivity is so developed that with it the owner of the most modest wireless set can make a really efficient radiogram.)

## MIRROR OF THE B.B.C.

(Continued from page 726.)

All these items are for National listeners, while London Regional has its vaudeville on Monday, a Military Band programme and a concert by the Pall Mall Players on Tuesday, an Orchestral Concert conducted by Joseph Lewis on Wednesday, a Chamber Music Concert on Thursday, and an Orchestral Concert entitled "Memories" which follows a repeat performance of Ernest Longstaffe's pantomime on Saturday.

### Madrigals and Mummings.

Provincial stations are also busy with seasonable programmes, and I learn that as early as Saturday, December 12th, West Regional listeners will hear a special Christmassy entertainment to be given by the University of Bristol Madrigal Singers.

The choral side consists of original music and arrangements of traditional Christmas tunes, and there will also be pianoforte solos played by J. J. Bryant, of Bristol University, including Balfour Gardiner's "Noel," and Percy Grainger's arrangement of the "Sussex Mummings Christmas Carol."

On the same day listeners will get their first ghost story of the festive season in the form of a true tale told by Mr. H. C. Lawlor in the Belfast Studio.

### "A Lesson from Mrs. Siddons."

Meanwhile, there are many other interesting programmes between now and Christmas, including the comedy entitled "A Lesson from Mrs. Siddons," in which

(Continued on page 766)

**ALL ROUND EFFICIENCY**  
is guaranteed with



**POP-VOX**  
3/9  
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Crown Works, Southampton. See also page 763.

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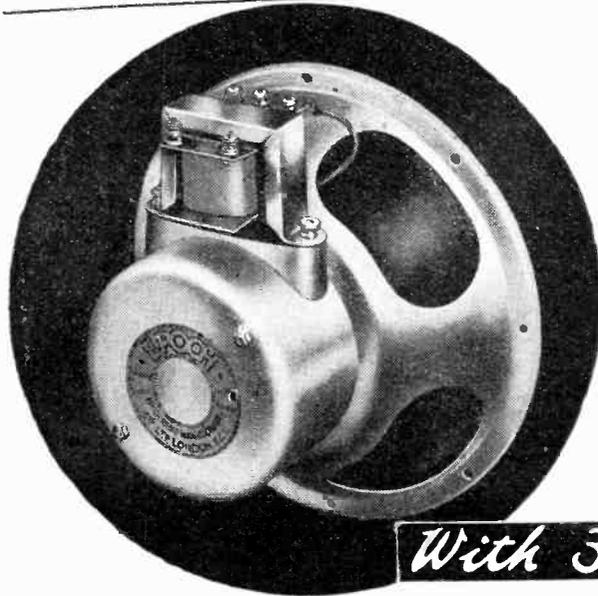
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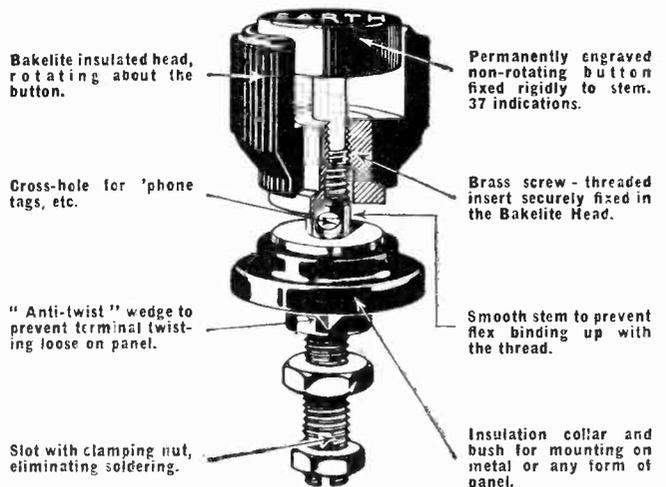
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## MIRROR OF THE B.B.C.

(Continued from page 764.)

Dame Madge Kendall is taking the part of Sarah Siddons for National listeners on Saturday, November 28th.

Dame Kendall, as many people know, is the representative of the family of great actors who gave Mrs. Siddons to the world. Her first and only play broadcast was "Grannie's Juliet," with Lady Tree in 1924, since when this "grand old lady" of the stage has made several striking and successful broadcast appeals and addresses.

## FOR THE LISTENER

(Continued from page 726.)

from the mother. But something in the blood had not forgotten, and probably would never forget.

I remember that the friend with whom I stayed took me one day in a motor-car to visit an English settler who lived in one of the remoter parts of Cape Province. He was no longer a young man; and had been in South Africa for many years; but, before ever he could speak a word to me, he held me long by the hand, and his lips quivered, and tears were in his eyes.

### Veldt, Bush and Backwoods.

Something of this feeling must be common throughout the overseas dominions; and the thought that they will be listening every day to a voice speaking to them from England, about what is going on at home, what people are saying and doing at home, will be very gratifying to countless of our

fellow-countrymen who now share little with us, but still share our blood.

It is a miracle that it should be possible. We are so accustomed to wonders in these days that we can hardly realise how great a miracle it is. That a lonely family on the South African veldt, or in the Australian bush, or among the backwoods of Canada, should be able, at the very moment of its utterance, to hear a home voice giving home news; and to hear it with a warm, living immediacy, as if it were on the very threshold of their homestead!

I do not imagine that anyone living here at home will take serious exception to the carrying out of this plan. We must remember, however, that it will cost money. I see that it has been estimated that the plant will cost £40,000 and that its maintenance, together with the transmission of programmes, will cost a similar sum each year.

### The Money Question.

I take it that it is we who will have to pay for this. It will come out of our licences; out of such part of them as the Government leaves the B.B.C. to pay with.

And this at a time when the B.B.C., like everybody else just now, is trying to reduce expenses. The money which will provide maintenance for the Empire Station at Daventry will mean that there will be so much less for our programmes. I do not think that anyone will grudge it.

I have never heard anybody yet complain that he didn't get his money's worth for his licence; but I do frequently hear complaints that the cost of the various items of the programmes might be over-

hauled to the advantage of the greater number of listeners.

Many listeners are not satisfied that so colossal a sum should be spent annually on the B.B.C. Symphony Orchestra, for example. It does not tickle their fancies very much that this should be one of the finest orchestras in the world. They do not like to see other and more popular parts of the programmes being starved for the sake of this international competition in orchestras!

### Demand for Better Vaudeville.

Music-lovers of the higher-brow quality are certainly getting enough for their money; the stuff provided for them is first-rate; but others who, for instance, use the wireless chiefly for amusement, feel that they are being obliged to put up with what is second-rate.

Eighty per cent of the vaudeville programmes is, not to put too fine a point on it, second-rate; nor is the case much better, if any, with the light music, with the revues and similar shows. It is perhaps a question of lack of funds. Peter is robbed to pay Paul.

A good deal of the drama, and a considerable proportion of the Talks, are second-rate. Speaking generally, the more popular side of the programmes is second-rate. Ought this to be?

At any rate, while everybody will wish success to the Empire Station, the majority of listeners will fervently pray that the finding of the money will not mean the further starving of the "entertainment" side of the programmes. It is not particularly good soup as it is; but as yet it isn't quite skilful.

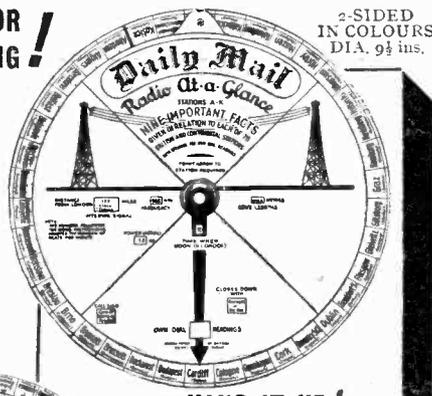
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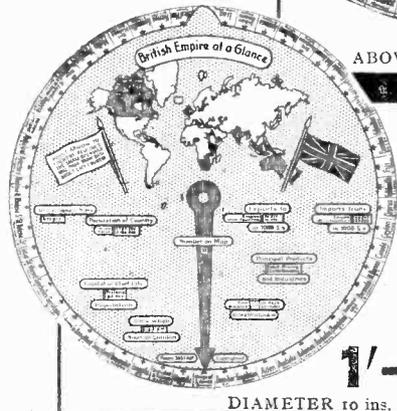
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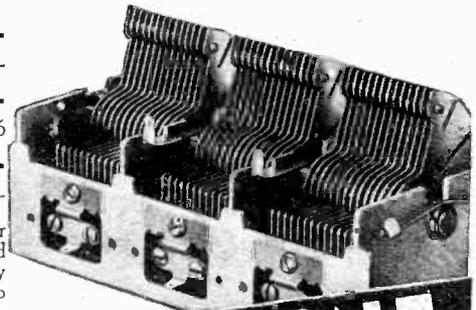
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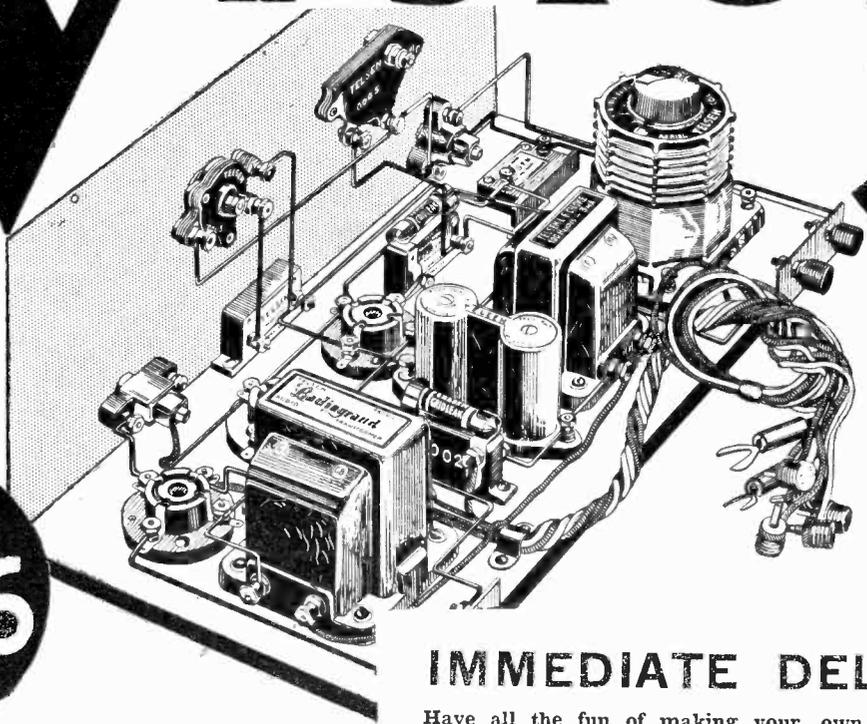
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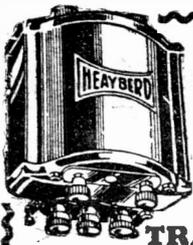
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**TECHNICAL NOTES**

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F. Inst.P.

**Buying a Pick-up.**

IN choosing a pick-up many people are influenced mainly by the question of price and do not pay enough regard to the more important matter of performance. This is really a mistake, because there are now so many good quality pick-ups on the market at a reasonable price that there is no excuse for having a bad one.

I think it is a good principle, in regard to a pick-up (as with a motor-car) to make a careful survey of those of your various friends before coming to a decision. From them you will hear a hundred-and-one little points which you would never learn from the dealer and which you would otherwise have to find out by your own experience.

The same sort of thing applies also in the case of loudspeakers: in fact, pick-ups and loudspeakers are very much in the same category from the point of view of making a choice.

**Varied Characteristics.**

Some pick-ups give too much bass preponderance, others favour the high frequencies, with the result that the reproduction sounds too low- or too high-pitched, as the case may be, instead of being nicely balanced. Some produce a special kind of "surface noise" whilst others are too stiff in the movement, or too free.

Again, some of them will "chatter" badly, which is very objectionable and seems as though the record were suffering in the process. Whether the record actually suffers through a "chattering" pick-up is a matter of opinion; personally, I think it does.

Some types of pick-up obviously bear the mark of the expert, and the various points, both electrical and mechanical, have evidently received proper and skilled attention. Other examples, on the other hand, may best be described as modified telephone ear-pieces with a needle holder secured to the armature.

**Making Adjustments.**

A "noisy" pick-up is a great nuisance, as it has to be covered up when a record is being played. I have known cases where the pick-up gave forth a kind of "reedy" sound on certain notes, for all the world as though it were stripping all the skin off the record!

Sometimes this sort of thing is due to a lack of proper damping in the pick-up, or to want of adjustment, and may not be due to inherent bad design. If so, it is quite possible to remedy the trouble by adjusting the movement, but remember that adjusting a pick-up is in most cases a ticklish job and one that you should not undertake unless you feel confident that you can carry it out properly.

If you think your pick-up requires adjustment, and you do not know how to set about it, far better to take it to some expert

(Continued on next page.)

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**TECHNICAL NOTES**

(Continued from previous page.)

friend (make sure he understands it!) or to return it to the dealer or the makers. A good pick-up is rather like a watch; it wants careful treatment and proper handling if you are to get the best out of it.

**Is Sensitivity Important?**

Many people attach too much importance to the question of sensitivity in a pick-up. It is true that, other things being equal, the greater the sensitivity of the pick-up the less amplification you require after it, which naturally makes it more economical.

But it is possible to push this principle too far. Extreme sensitivity in a pick-up has to be paid for in other ways, even if it economises in valve "juice." The pick-up, if unduly sensitive, is apt to become delicate and to exhibit various caprices.

It is also in danger of developing resonances or peaks, which are worse than anything. A pick-up of good but not extreme sensitivity is, in my opinion, best for all-round use and will be found much more manageable than one which has been tuned-up for the last atom of sensitivity.

**The Needle Armature.**

The so-called "needle armature" pick-up has a good deal to recommend it. The moving system is very light in weight, so that the reaction on the record is very small, and also the needle system is able to respond more faithfully to the record track.

Furthermore, owing to the small restoring force when the armature is displaced from its mean position, there is less chance of peaks or resonances being encountered.

It is now a very general practice to use a volume control of one sort or another with a pick-up, so as to regulate the input to the first valve. A common form of control consists of a potentiometer having a fairly high, but not too high, resistance: about 100,000 ohms is a fairly high value for the resistance, and this may even go as low as 20,000 ohms.

**Earthing and Stability.**

A point of practical importance, which often makes quite a lot of difference to the working of a pick-up, is to earth the case or cover of the pick-up. Of course, if the case is in metallic contact with the arm, and the latter is properly earthed (as it should be), then there is no need to earth the pick-up separately.

You will soon notice whether the pick-up requires to be earthed by bringing your hand close up to it. Sometimes you will get a continuous howl or whistle when the pick-up is not earthed, which, of course, makes it impossible to operate the set until the earth connection is made.

**Magnetic Recording.**

I made a number of tests some time back with the new Stille talking tape machine, as used by the B.B.C. As you probably know, this is a modernised version of the original "telegraphone" of Poulsen; although the principle is the same, the difference between the original and the modern instruments is, of course, enormous.

In the days of the original telegraphone there were no valve amplifiers to aid in impressing the sounds upon the wire or in

(Continued on next page.)

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and Sunday News.

**TECHNICAL NOTES**

(Continued from previous page.)

magnifying them when they were reproduced. Consequently the invention was bound, as you might say, to await the advent of valve amplifiers before it became a commercial possibility.

**Background Noises.**

The modern instrument is certainly a practical success. I have seldom heard anything so wonderful as the recording and immediate reproduction of the voice. The recording is well-nigh perfect; at any rate, as good as, if not better, than the recording of commercial records, and the volume is just anything you like to make it.

Whilst I was recording there happened to be a street musician or a barrel organ (what's the difference?) playing some distance away, so far away that it could be heard only very faintly in the recording room; but in the reproduction, sure enough the organ was there all right. Which shows you how extremely sensitive the instrument is and how it gets all the "background."

**Long Life.**

One of the most interesting points about this instrument, from the purely scientific point of view, is the fact that the magnetic impressions upon the tape do not "run into one another" to any noticeable extent, although to secure this condition it has been found necessary to run the tape at a certain minimum speed, so as to "space out" the impressions sufficiently far apart.

Another very interesting point is that the magnetic impressions are not destroyed by winding the tape naked upon a spool (like a film), or by rough handling, and do not "decay" appreciably with time. All this makes it possible to store these magnetic tape records for long periods in the same way as ordinary commercial records.

**Frames and Capacity.**

Readers often wonder why it is that a frame aerial should receive signals even when in the "zero" position, that is, when "broadside on" to the direction of the incoming waves. According to the simple theory of the action of the frame, the effects in the different parts ought just to balance out in this position, leaving no overall or resultant signal energy to be delivered by the frame.

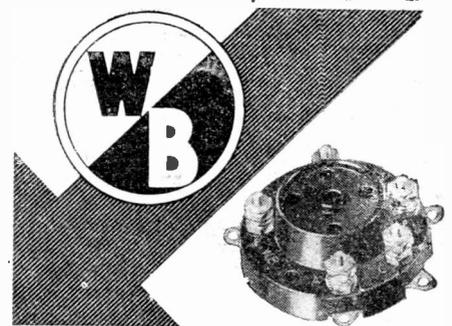
Every one who has used a frame aerial knows, however, that in practice the minimum response is seldom truly zero and the question arises as to how the frame manages to pick up reception in these conditions. There are various causes that contribute to the effect, one of them being the "capacity effect."

One end of the winding on the frame is connected to the grid of the valve, which has very little capacity to earth; the other end, however, is connected to the filament, which in turn means the filament battery and here we have quite a considerable "capacity to earth." This effect upsets the balance referred to above and allows a certain amount of signal current to flow in the frame windings.

This is sometimes explained by saying that the frame acts, to a small extent, as an ordinary line aerial; it is obvious that anything capable of conducting will act to

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

a greater or less extent as an aerial or pick-up of energy if connected in the proper way.

It is unfortunate that the minimum should not be actually zero and in some cases, of course, the minimum reception is not even as small as it might be, so that it becomes correspondingly more difficult to cut out unwanted stations by turning the frame broadside on to them. By the way, in determining the best position or setting for the frame, remember that the "minimum" position is more sharply defined than the maximum position.

#### A Loudspeaker Problem.

It often happens that you want to use the set in one room and have the loud-speaker free to be put in any of perhaps two or three different rooms in the house. Although this is in one sense perfectly simple, there are certain precautions which you should observe in order to get good results.

As a rule, it is not sufficient merely to run twin flex from the set to the position of the speaker in the distant room. The long leads will be in the anode circuit and if there should be a short circuit, from any cause, or even leakage, the results will be very undesirable. Furthermore the leads will almost certainly have a noticeable effect upon the tone and quality of the reproduction.

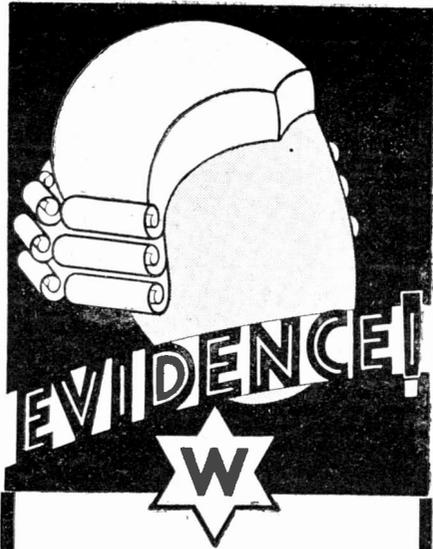
It is much better, in a case like this, to use a filter or transformer output. With such an output device the anode current does not pass through the long extension leads: the only current passing in the leads is the A.C. current due to fluctuations in the anode current, and the dangers mentioned above are entirely avoided.

#### Separation of Leads.

There is another important point with regard to the extension leads: it relates to the electrostatic capacity between the wires. If ordinary twisted electric light flex is used, the two wires are in very close proximity throughout their entire length and are, in fact, arranged in a way that gives, as you see, just about maximum capacity between them.

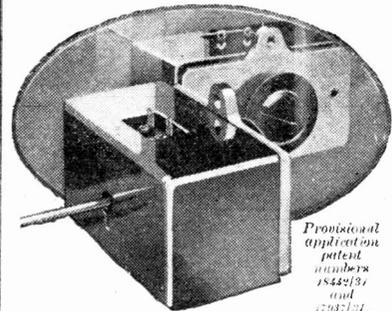
Therefore, it is advisable not to use twin flex for the purpose, because the capacity mentioned may have the effect of suppressing some of the higher notes in the repro-

(Continued on next page.)



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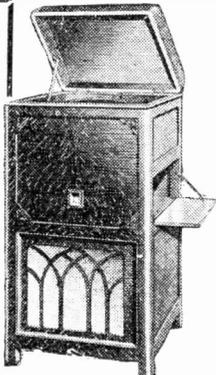
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## MODERN WIRELESS

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## TECHNICAL NOTES

(Continued from previous page.)

duction. It is much better to use ordinary single conductors—bell wire does very well—and to fasten these to the wall, separating them two or three inches apart throughout their length.

You have only to run a pair of leads like this through to any rooms in which you want to use the speaker, completing each pair with a suitable wall plug, and then you can carry the speaker from one room to another and plug in as desired. It is, however, advisable to disconnect all loudspeaker leads from the set except the pair actually in use.

### Reservoir Condensers.

I am often asked whether it is necessary to use a large capacity fixed condenser across the H.T. terminals of a receiver. This question probably arises because you sometimes notice such a condenser used, whilst sometimes a condenser is omitted and naturally beginners are apt to wonder why it should be necessary in some cases and not in others.

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A large fixed condenser of this kind is often referred to as a "reservoir" condenser, and its duty is to store the electricity delivered by the H.T. battery, or whatever it may be, and to supply this to the circuit more smoothly than would otherwise be the case. It is for all the world like a reservoir of water which is so large that when moderate quantities of water are drawn off the "head" of water (representing the pressure) is scarcely affected.

A reservoir condenser of this kind is very useful, for instance, in a case where the H.T. supply consists of a dry battery which is getting run down: such a battery is liable to be variable and to cause all kinds of noises in reception.

### To Prevent Howling.

Another function of this reservoir condenser is to bypass high-frequency currents which otherwise would pass through the high-tension battery and, getting mixed up with the L.F. currents, would be liable to cause instability.

As regards the reason why such condensers are sometimes used and sometimes omitted, this is largely a question of economy in the construction of the receiver. There are some cases where the equivalent of the condenser is provided in some outside component, such as a mains H.T. unit, in which case the condenser across the H.T. terminals is not really necessary.

At the same time you are never likely to do any harm, and will usually do some good, by using such a condenser provided, of course, that you take care that it has been thoroughly tested to withstand a voltage at of least 50 to 100 per cent. greater than that which is likely to be applied to it in use.

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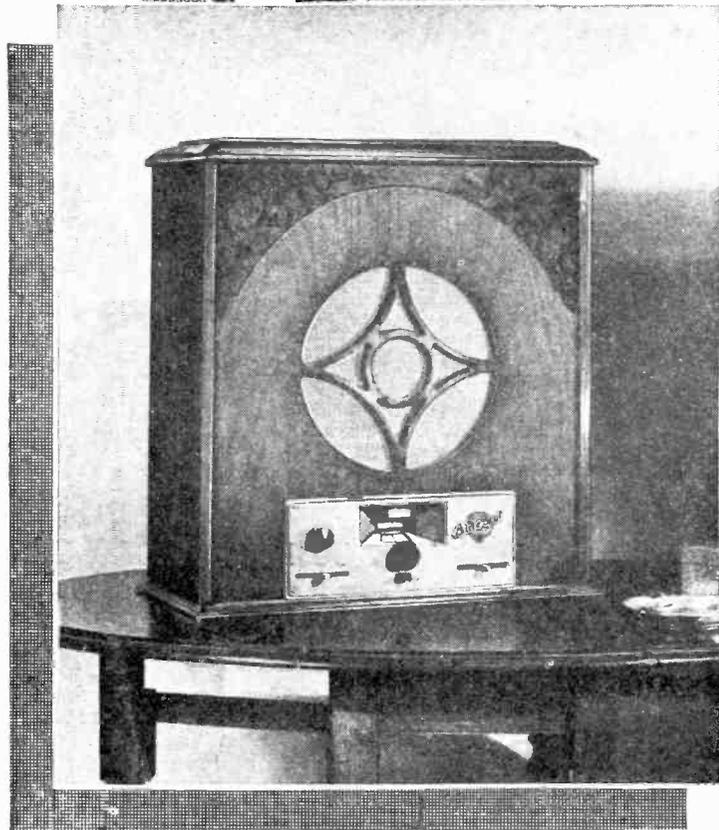
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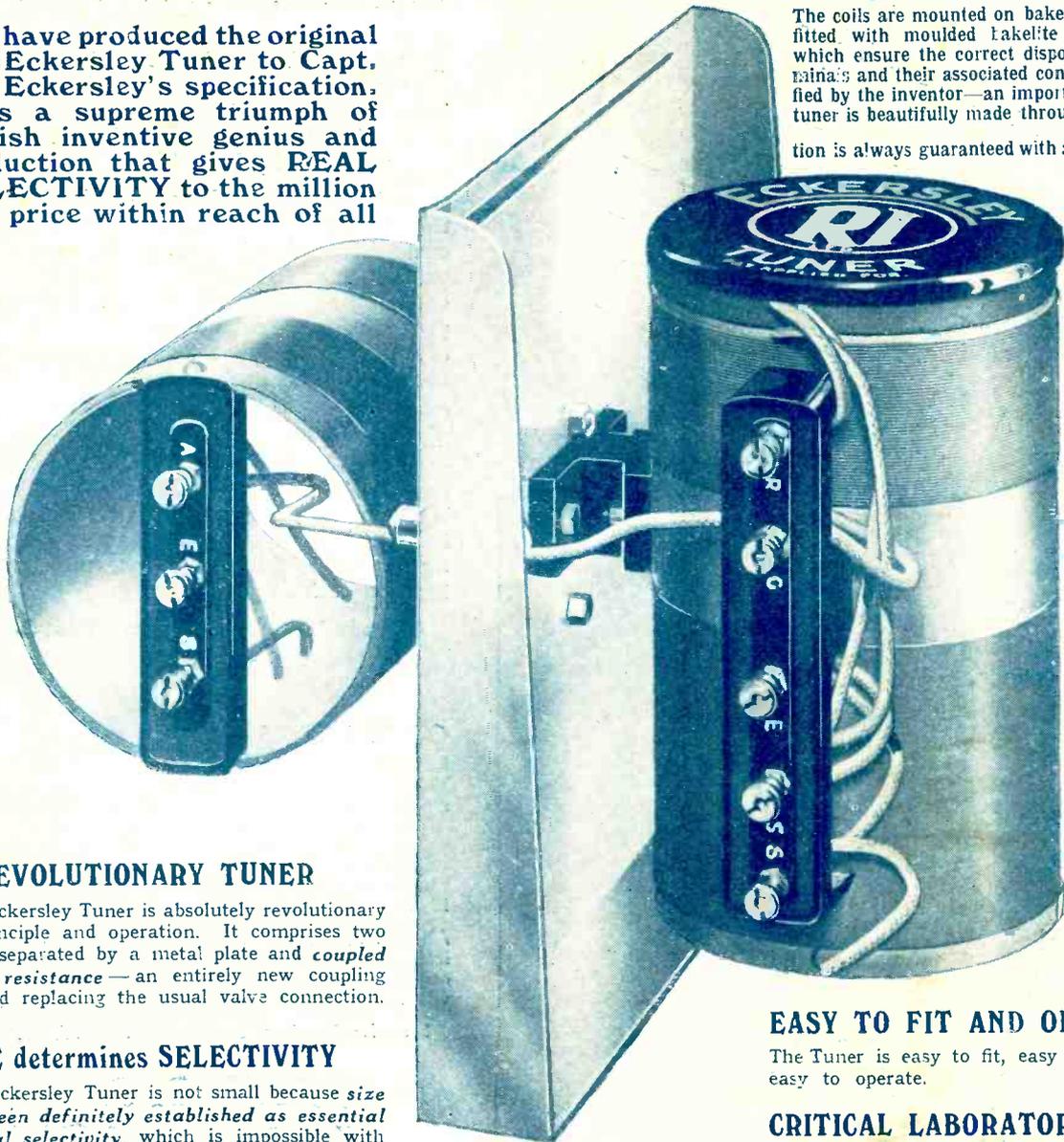
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