

POPULAR WIRELESS WEEKLY, October 18th, 1924.

REGISTERED AT THE G.P.O. AS A NEWSPAPER.

FREE BOOK ON CRYSTAL SETS THIS WEEK.

Popular Wireless

PRICE 3d.

and Wireless Review

EVERY FRIDAY.

No. 125. Vol. VI.

SCIENTIFIC ADVISER: SIR OLIVER LODGE, F.R.S., D.Sc.

October 18th, 1924.



**ANOTHER
MONSTER
ISSUE!**

The Transmitting Plant
at 6 K H, the B.B.C.'s
Hull Relay Station.

SPECIAL FEATURES IN THIS ISSUE.

The Real Thing v. Broadcast.
A Crystal Set for 5 X X.
Sidelights on Wireless.

Building a One-Valve Super.
Remote Filament Control.
Making Card Inductances.

etc., etc., etc.

And a Special

TWO-PAGE MAP OF BROADCASTING STATIONS.

Nine reasons why it pays to use

MARCONI VALVES

MADE AT THE OSRAM LAMP WORKS

1. They have behind them the greatest name in the history of Wireless — Marconi — and all that name implies.

2. They are made at the factory with the greatest experience of lamp and valve manufacture in the British Empire — The Osram Lamp Works.

3. Because their manufacture is directed from the Research Laboratories of The Marconi Co., Ltd. — the most important in the science of wireless — and the Research Laboratories of The G.E.C. Ltd., at Wembley — the largest in the electrical industry of this country.

4. They meet every requirement — "a valve for every purpose."

5. Each valve is subjected to no fewer than eight tests before leaving the factory.

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7. The characteristics of each type are chosen by scientists who are not only Valve Experts, but also experts in the design of Wireless Sets.

8. They are sold in sealed containers — a guarantee that the valve you buy is new.

9. They are manufactured from raw material to finished product by the same British organisation.

Get the
Valve
in the
Purple
Box!



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AMAZING UNSOLICITED TESTIMONY

TUNGSTALITE BLUE LABEL (Regd. No. 447149)
EASILY THE BEST



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Dear Sirs, Please send to me at the above address another Blue Label Crystal for which find 1/6 Postal Order enclosed. Tungstalite Crystals are easily the best for clarity and volume.
 Yours faithfully,
 (Signed) W. E. BURNETT.

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 Victoria Park,
 Bedminster,
 BRISTOL.
 October 4th, 1924.

IT IS ABSOLUTELY THE FINEST CRYSTAL IN EXISTENCE.

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LEEDS—
TUNGSTALITE Ltd.,
 41, CALL LANE, LEEDS
 Phone—Leeds 21375. Grams—Tungslamp Leeds.

Also obtainable at
NEWCASTLE: Messrs. Payne & Hornsby, Ltd., 6, St Andrew's Buildings, Gallowgate, Newcastle-on-Tyne.
MANCHESTER: Messrs. A. Franks, Ltd., Opticians and Wireless Equipment Mfrs., 95 & 97, Deansgate, Manchester.
GLASGOW: Messrs. Robb Bros. (Glasgow), Ltd., 69a, West Nile Street, Glasgow.

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 BEWARE OF FRAUDULENT IMITATIONS!**

A.J.S.

**TWO, THREE and FOUR VALVE
 WIRELESS RECEIVERS**

REVISED PANELS ONLY.		COMPLETE SETS.	
Two Valve ..	£12 0 0	Two Valve ..	£17 10 0
Three Valve ..	£15 17 6	Three Valve ..	£22 5 0
Four Valve ..	£20 5 0	Four Valve ..	£27 5 0

This very handsome Pedestal Cabinet fitted with New Model A. J. S. Four-Valve Receiver, H. and L. Tension Batteries, and A. J. S. Loud Speaker, the horn of which matches the wood, is supplied complete with all accessories ready for use in

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YOUR SETS DESERVE

Here is a new consideration for every set builder. The infinite patience, time and labour which every home constructor puts into his set, deserves something more efficient than the ordinary run of condensers.

Incomparable tuning efficiency is a definite achievement which J.B. Condensers yield to every set builder. In practice the

SQUARE LAW

should always be employed. And for reasons of electrical efficiency, and of precise engineering, combined with the very important consideration of price—see you get the J.B. Square Law.

J.B. Instruments are popularly priced—just a few pence more than the inefficient condensers. Double the cost will purchase an instrument only an equal to J.B. Good buying and good reception therefore indicate that your sets deserve J.B.

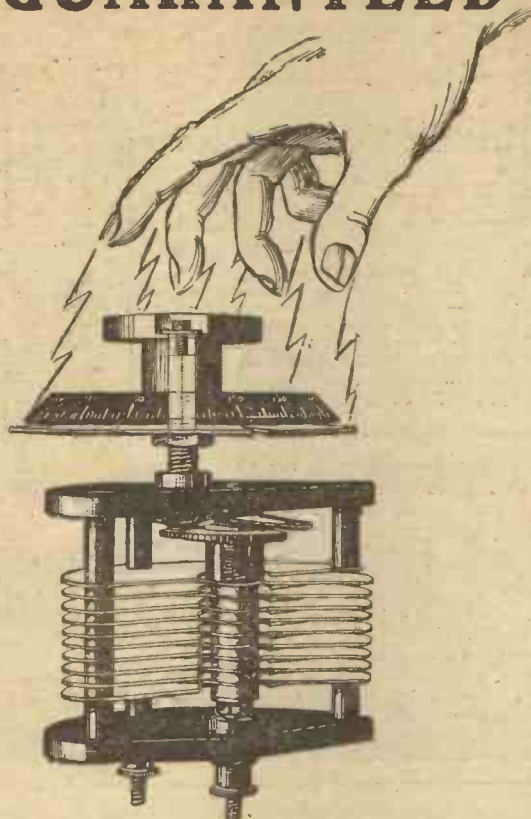
•001 -	9/6	•0025 -	6/9
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J.B. models for every tuning purpose—the J.B. Microdenser, Super All Metal, Standard and Twin with and without Vernier—are obtainable from every dealer or direct from the manufacturers. Post: One, 6d.; Two, 9d.; Three, 1/-.

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The abolition of hand capacity effects is **guaranteed unconditionally** by the makers and money will be refunded if any instrument does not give absolute satisfaction. Get the best out of your set by getting a

'Fulstop' Square Law Principle Condenser

Prices	.C01.....13/6	.0003.....10/3
	.0005.....11/3	.0002..... 9/6

Stocked by most Wireless Dealers, but if you have any difficulty send direct to

J. H. NAYLOR, Ltd., Condenser Works, WIGAN

Fulstop
VARIABLE
CONDENSER



Stella

**"the nearest to
PERFECTION"**
—says a user.

His letter reads:—

"The Loud-speaker received is the nearest to perfection I have ever heard. On Tuesday I did my best to make it distort the speaker's voice and also the music, but found this impossible. I have used various other makes, but can assure you that yours is the nearest to perfection yet placed before the public."



**WEMBLEY
LOUD-SPEAKER**

Portable Miniature, giving perfect results and guaranteed at

22/6

Write for Lists of other Stella Loud-speakers at **35/-** and **70/-**.



STELLA 'PHONES.

These noted light-weights are tested and guaranteed to give perfect and distortionless reception, with maximum comfort. Thousands sold to satisfied customers. Equal to any and cheaper than most other really good 'phones. Carriage paid, or from local dealers.

Per pair **17/6**



WEMBLEY 'PHONES.

Identical diaphragms to "Stella" 'Phones, but lighter construction, and so made that only the earpieces touch the head at sides—a boon to lady listeners, as the hair is not disarranged. Carriage paid, or from all good dealers.

Per pair **14/6**

Buy at Wembley, or from any good Wireless Dealer. If unable to obtain from your local store, write direct to:

STELLA
31-37, Wybert Street,



WORKS,
LONDON, N.W.1.

Telephone: Museum 8390.



The Spirit of Pioneering

THE spirit of Pioneering—that driving force which compelled such men as Cook, Livingstone, Stanley, Scott, and others to write their names boldly in the pages of our national history—has also its counterpart in industry.

There is not one invention that has not been seized upon and improved almost out of recognition because some keen-witted scientist realised that following in the beaten track meant an end to progress.

Take Wireless Valves as an example.

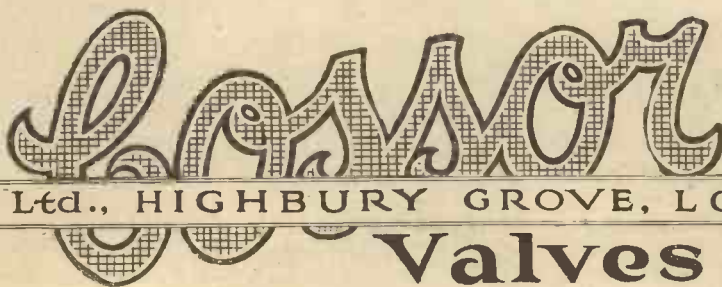
For a considerable period it seemed obvious that the most practical design for the three components of the valve was a long, straight filament operating within a spiral Grid—the whole surrounded by a tubular Anode.

That such a design has the disadvantage of permitting a certain proportion of the electron stream to leak out of each end of the Anode without doing any work is quite apparent. Yet not until the Cossor Valve—with its arched filament and hood-shaped Grid and Anode—

was placed on the market that any serious attempt was made to effect an improvement.

And the same spirit of pioneering is apparent in the clever method of packing Cossor Valves, now being introduced. In future all Cossor Valves will be sold in sealed cartons, and by means of an electrical device the dealer can demonstrate that the filament is intact *without breaking the seal*. This patented method is an exclusive Cossor feature and a definite guarantee that the valve you buy is new and unused.

The new Cossor Dull Emitter—the Wuncell—is fully described in a comprehensive Folder which will be sent post free to any experimenter on receipt of a postcard. Don't invest in a Dull Emitter Valve until you have read about the Wuncell.



Types:

P.1. For Detector and Low-Frequency use 12/6

P.2. (with red top) For H.F. use only 12/6

From all Dealers

A.C. COSSOR, Ltd., Highbury Grove, London, N.5.

Gilbert Ad. 1568

Pilot Panel Service

The Pilot Panel Service explained:

WHEN a man decides to build a good Receiving Set he immediately comes up against the difficulty of a suitable cabinet and the drilling and the engraving of the Panel. Cabinet-making is a skilled man's job and many a perfectly good piece of ebonite has been spoilt by a hole in the wrong position or because it has been incorrectly cut to size.

To eliminate most of the difficulties in Set-building we have instituted the PILOT Panel Service. In future ALL Sets described in all the principal Wireless Magazines, will be available in sets of parts for the Home Constructor with panels ready drilled, tapped and engraved. Two types will be placed on the market—

Type A, following the author's literal specification and using his actual components, and Type B, an adaptation using Peto-Scott guaranteed components. Naturally through standardisation of components and our lower manufacturing costs due to large output, Type B will often show a large saving over Type A.

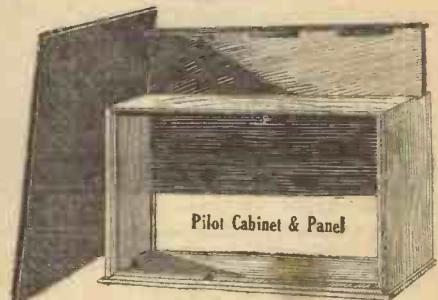
Remember that if our instructions are followed we positively guarantee that all Type B Receivers are the equal in every respect to the more expensive Type A Sets. Our Service Dept. is available for all our customers and will test and rectify errors of construction at a nominal charge. We want all our customers to have the utmost confidence in every Set produced under the PILOT Panel Service.

Five exclusive Pilot advantages:

- 1 Absolutely no previous Wireless skill required—the only tools necessary are a screwdriver and a pair of pliers.
- 2 Every Set when completed is quite the equal in efficiency of the original.
- 3 Provides a high-grade Instrument at the cost only of the components.
- 4 Success guaranteed—failure quite impossible if instructions are followed.
- 5 Every Instrument designed by a recognised expert.

Pilot Panels

Every Wireless Receiver depends for its efficiency upon the panel. Low grade ebonite will prevent any Set from functioning properly. Every PILOT panel is manufactured from the highest grade Post Office ebonite cast accurately to size, matt finished on both sides, and with edges squarely ground. We guarantee every panel to be leak-proof and non-warpage. Each panel engraved with word "PILOT," and supplied carefully packed in sealed wrapper. Standard 1/4-in. thickness throughout.



All these splendid Sets now available

The Transatlantic V (a super 5-valve long distance Receiver).
The S.T. 100 (2-valve).
The 3-valve Dual Receiver.
The Puriflex (4-valve).
The All Concert-de-luxe (3-valve).
The 4-valve Family Receiver, and others.
All these Receiving Sets have been designed by prominent radio engineers and described in various issues of "Modern Wireless."

Write to-day:

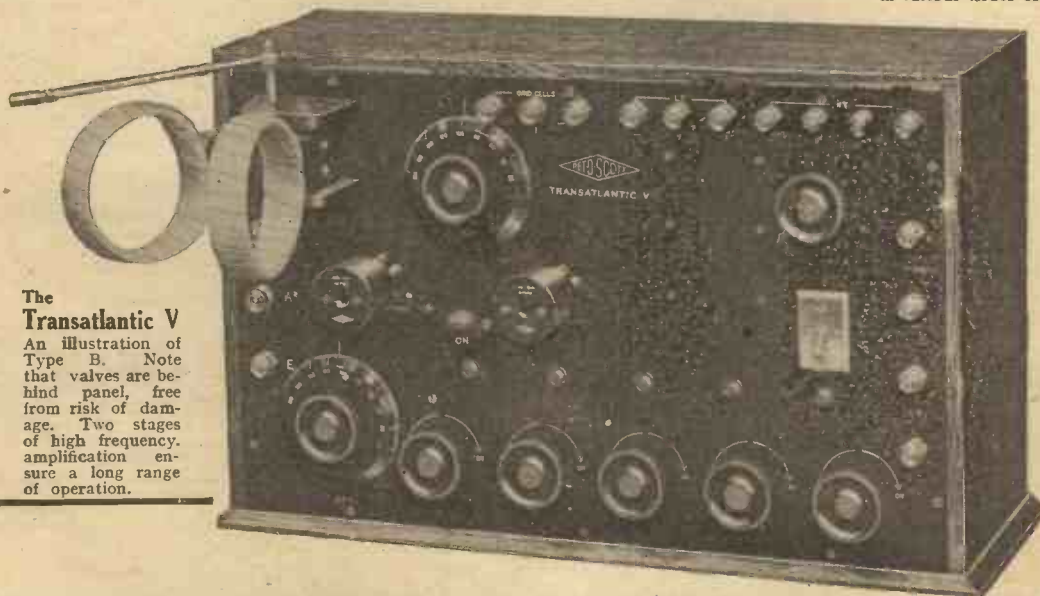
Before building a new Set, be sure you get particulars of the wide range available under the PILOT Scheme. Our literature (free on application) will show you exactly the components you need for any Set and their price. Register your name for a free copy of a large illustrated Folder to be issued immediately.

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The Transatlantic V
An illustration of Type B. Note that valves are behind panel, free from risk of damage. Two stages of high frequency amplification ensure a long range of operation.

POPULAR WIRELESS

AND WIRELESS REVIEW.

October 18th, 1924] THE RADIO WEEKLY WITH THE LARGEST CIRCULATION. [Every Friday, Price 3d.

Technical Editor:
G. V. DOWDING, Grad.I.E.E.

Editor:
NORMAN EDWARDS, M.Inst.R.E., F.R.Q.S.

Scientific Adviser:
Sir OLIVER LODGE, F.R.S.

RADIO NOTES AND NEWS OF THE WEEK.

Next Week's Free Booklet.

YET another booklet will be given away with next week's POPULAR WIRELESS. It is entitled "All About the B.B.C.," and your humble servant is the author—or shall I say "the guilty party"? This is not a technical booklet; it is just a "potted" story of some of the anecdotes, stories, etc., I have collected about the B.B.C. during the last two years, and I hope you will write and tell me whether you like them.

Rome Calling.

THE Marconi broadcasting station at Rome, which has been engaged on tests for some weeks up to now, has commenced a regular broadcasting of programmes. Concerts will be given nightly between 7.30 and 9.30 (Greenwich time). Wave-length, 422 metres.

5 X X Certain.

NEWs that a permanent high power station will be erected within six months caused the winter wireless season to come in with a rush this year. Listeners who had been hovering on the brink of uncertainty immediately "fell" for the new 5 X X, which will be the backbone of the B.B.C.'s organisation, and the last word in high-power broadcasting.

A Great Effort.

CHELMSFORD has proved tremendously successful, but the proposed station to be erected in the Midlands will be on far more ambitious lines than the present 5 X X. During the time that there was no certainty regarding a site, power or wave-length, the B.B.C. were hampered by all sorts of experimental considerations; but the forthcoming installation will not suffer from these limitations, and I hear that the British super-station will embody every latest broadcasting improvement, in an effort to "tell the world."

The Smallest Loud Speaker.

ONE of the exhibits at the Radio World's Fair, New York, was the world's smallest loud speaker. This tiny instrument could easily be concealed in one hand, and when placed upon a large coin it appeared lost in comparison! Nevertheless, it worked quite well, and could be heard distinctly at a distance of ten feet.

Another Continental Station.

TO the new stations that are helping to make the European ether a happy hunting ground must now be added Zurich, which has just started broadcasting on 650 metres. Concerts are being transmitted at 8.30 p.m. daily, and it will be

interesting to see if listeners in the Midlands can receive the Swiss station, which, on the coast, will be hopelessly jammed by shipping.

U.S.A. to S.A.

AFTER experimenting for eight months two wireless amateurs in Johannesburg have received broadcasting direct from Pittsburg, U.S.A. A five-valve

WHAT THEY SAY.

"Broadcasting is the good fairy of the slums. Imagine what it must mean to East London when the Queen's Hall Orchestra floods its foul courts and dark alleys with the majestic strains of the Fifth Symphony."
—Harold Begbie, writing in the "Radio Times."

"It is just a little misleading to suggest that multi-valve sets are responsible to a greater extent for jamming than are more simple sets."

"The most serious offender is undoubtedly the man who uses a single-valve receiver with reaction on to the aerial."
—Frank Phillips, A.M.I.E.E., in a letter to the "Evening News."

"Those who prefer a jazz band to a classical orchestra, or a learned lecture to a vocal solo, must bear in mind that the programme has been drawn to interest people of diverse tastes, and to appeal to the largest possible number of hearers."
—Mr. R. F. Palmer (Uncle Rex), director of the London Station.

Tall as a village spire,
A slender fir-tree set upon the hill
Carries the news—or Chopin—at your will,
Along the fine-drawn wire.

Aerial and telephone,
Batteries, valves (so little for so much),
And half of Europe answers to your touch,
Whispers to you alone.
"Wireless at Night," from "Punch."

"If you are oscillating, listeners for five miles north, south, east, and west of you can hear you, and their reception is affected. This represents an area of approximately seventy-five square miles! I just leave it to you now."
—Uncle Jack Frost in "Wireless Yarns."

THE WEEK'S QUERY.

I want a good 3-valve set suitable for strength and distance, combined with cheapness, economy in cost of running, and freedom from interference. It must be easy to handle, and I should like all the valves to act as dual amplifiers, with switches to cut out the reflex action when desired. Also switches to use 1, 2, 3, or 4 valves, and double reaction is essential. Can you let me have the pictorial diagram by return?

set was in use at the time, and the baseball results were almost as clear as speech from the local station. The distance covered was about 7,200 miles.

Assisting Mariners.

THE new wireless directional station at Niton, Isle of Wight, is being completed with all possible speed, and will probably commence operations before the end of October. Other stations are

contemplated, to assist navigators to find their position during foggy weather; and the excellent services rendered to shipping by similar installations at Fire Island, Nantucket, and the approaches to New York, will soon be available over the world's most crowded waterway.

The Worst Offender?

OSCILLATIONS are breaking out again very badly in the London area, and in some districts listening-in has been a nightmare for the past week or two. Brixton is bad, and Enfield has not been exactly free from trouble, but I think that the most constant and apparently deliberate offender is in the Chadwell Heath area. He generally starts operations about 8 p.m., and when in form he succeeds in absolutely spoiling reception for the rest of the evening.

A Soldier's Farewell.

WHEN General Pershing said farewell to the United States army the other day his speech was broadcast by seventeen different stations to millions of listeners. The object was to ensure that all retired soldiers who wished to hear their chief's good-bye should have a chance of listening-in to the ceremony.

The New Relays.

STOKE-ON-TRENT relay station is due to commence operations on Tuesday, October 21st, and the opening ceremony at the King's Hall will be S.B. to all stations. Three days later Belfast will be officially opened, and before Christmas Dundee and Swansea will follow suit. Then comes the Midland's high-power station, and the B.B.C. will be able to rest upon their laurels—perhaps!

Captain Eckersley's Tour.

WASHINGTON, Pittsburg, Philadelphia and Montreal will all be visited by Captain Eckersley during his stay in America, whither he has gone to investigate American and Canadian methods of broadcasting. In view of his unique position as chief engineer of the world's biggest broadcasting company, he is sure of a cordial welcome, for up to date a pleasing feature of broadcasting is the fact that the methods used in different countries are freely published and compared.

New Services.

THE Austrian Broadcasting Company has formally commenced its services, and elaborate musical programmes are being arranged for the winter. The
(Continued on page 362.)

NOTES AND NEWS.

(Continued from page 361.)

official opening of the Vienna station on October 1st was conducted on lines similar to the British ceremony, and was marked by speeches from the Burgomaster and Chancellor Seipel.

The A.B.C. ?

LONDONERS are already asking if the Austrian Broadcasting Company will call themselves the A.B.C. ? And, if so, what the French high-power station at Lyons is going to do about it ?

A Reminder.

HAVE you had your "reminder" from the Post Office ?

About a fortnight before your licence is due for renewal you will receive a printed notice from the G.P.O. jogging your memory and asking for payment at the nearest post-office.

The New Arrangements.

LICENCES are now available for twelve months, reckoning from the first day of the month of issue.

Formerly any licence taken out in either of the four quarters of the year expired at the beginning of that quarter the following year. The new arrangement has been reached by agreement between the B.B.C. and the Post Office, and it is certainly a great improvement from the listeners' point of view.

An Apology.

WE wish to inform readers of an unfortunate *faux pas* which occurred in the October 4th issue of **POPULAR WIRELESS**. On Page 234 there appeared a diagram of a double dual circuit, and we should like to point out that in this case the circuit is the copyright of Mr. John Scott-Taggart.

We should like to apologise to Mr. Scott-Taggart for the very unfortunate error in reproducing this circuit without acknowledgment to him. Owing to the very numerous circuits sent in to us, it sometimes happens that certain circuits are used for publication in **POPULAR WIRELESS** which are subject to letters copyright and letters patent.

In the case referred to above we were unaware at the time that the circuit was subject to these reservations, and we wish to take this opportunity of paying full credit to Mr. John Scott-Taggart.

5SC's New Staff.

GLASGOW'S removal to new premises is being marked by an increase in the staff, as lately the general administrative work of the station has been steadily increasing. When 5SC's new official has had time to settle down, Mr.

Carruthers will be left free to devote himself to the programmes more completely than has been possible of late.

Australia Calling ?

AHERNE BAY amateur, Mr. R. W. Galpin, claims to have received signals from an amateur in Australia which would be the first time on record of—such a feat. Using a two-valve set, he copied the call "C Q de A 2 A D J." "The signals were weak but easily readable," he said, "despite interference from atmospherics."

5NG's "Great Effort."

THE staff at Nottingham relay station are to be congratulated over the B.B.C.'s Zoo stunt, which was successfully broadcast from 5NG, although at the last minute it was found that 2LO's S.B. to "all stations" did not include the Nottingham relay in that term. The station

for, and the various components and different interesting "gadgets" to be displayed will not only be an eye-opener, but, I am afraid, a pocket-opener as well.

What's in the Wind ?

I NOTICE that ever since Captain Eckersley sailed for America the B.B.C. have been concentrating on transatlantic reception, and there is evidently something in the wind in this direction. As far as the reception goes, results have been excellent on this side, and as I hear that Captain Eckersley is making good progress in America, I can't help thinking that the B.B.C. are preparing a transatlantic treat for listeners.

Twenty-One Transmitters.

ANOTHER transmitter has just been installed at Königswusterhausen (L P), and this brings the total number of sets at the German station up to twenty-one! Included in this are a 20-kilowatt valve transmitter and two 50-kilowatt sets—one a Poulsen Arc and the other an H.F. alternator.

More Crystal Wonders.

A GRAHAM'S TOWN (South Africa) correspondent, Mr. Laurence Krummeck, has sent me some very interesting particulars of good long-distance crystal reception in the Union of South Africa. On a home-made crystal set he distinctly hears Johannesburg's programmes at a distance of 500 miles; and, as might be expected, his circuit is not some tricky affair which nobody else ever thought

of, but just a good old-fashioned single-slider coil, with 'phones and crystal in series across it!

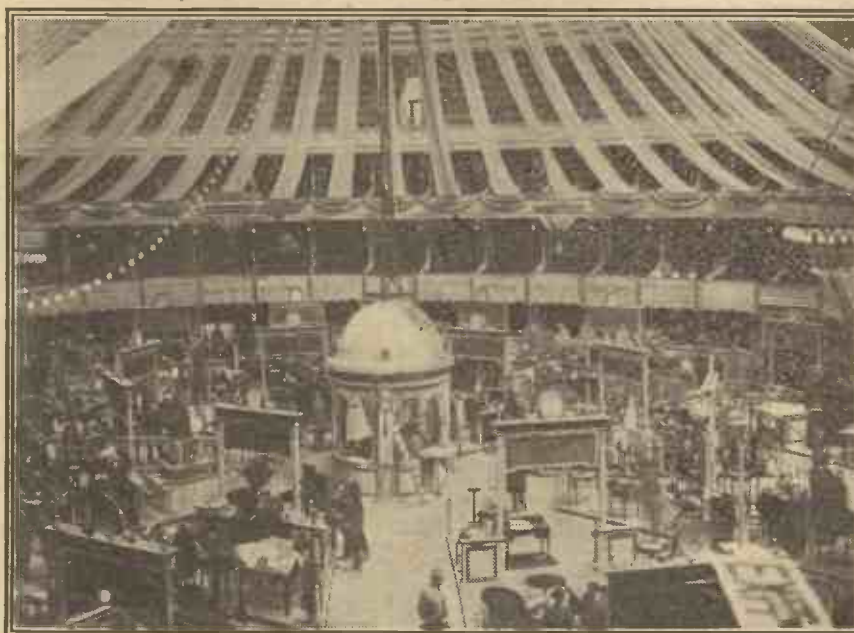
The Mystery Services.

DOZENS of people wrote to ask me about the "mystery" church services which were recently heard all over the country after the B.B.C. had closed down, and which "came over" without announcement or call-sign. All sorts of ingenious explanations were suggested, and many of my correspondents pointed out that clergymen are ardent radio enthusiasts as a class, and one of them might conceive it a duty to broadcast in this way! But people down Cardiff way smiled; they knew that 5WA's aerial was the steeple of the church in question.

5XX.

THERE is every probability that 5XX will continue broadcasting until the new high-power station "takes the air." The site of the latter has not been decided definitely at the time of writing, but will probably be announced before these notes are in print. I shall be very surprised if it is not within five miles of Northampton.

ARIEL.



A panoramic view of the recent N.A.R.M. Wireless Exhibition held at the Albert Hall.

director, Mr. E. Liveing, was determined not to disappoint his keen young audience in this way, so he arranged with his chief engineer, Mr. A. Fielder, to pick up 2LO's broadcast direct by wireless and to re-broadcast the signals. The result was a huge success, and I am glad to add my congratulations to those which poured in to 5NG.

Another Exhibition.

I HEAR that Radio Exhibitions and Wireless Conventions, of 46, Cannon Street, are organising a big and really representative Radio Exhibition for London. The firms which recently exhibited at the Albert Hall were all members of the National Association of Radio Manufacturers (N.A.R.M.), but the new show will be open to the entire British industry, regardless of associations.

Success Assured.

THE Exhibition will be held from November 15th to November 29th at the White City, and Mr. Arthur B. Dale, the organising director, tells me that entries are beyond his utmost expectations, and that success is already assured. The home constructor is specially catered

THE "REAL THING" v. BROADCAST.

THE ART OF REPRODUCTION.

By A. C. SHAW.

(Engineer-in-Charge of 2 L O.)

This informative article by Mr. Shaw will give the reader a good idea of the acoustic problems tackled by the B.B.C. and explains how many broadcasting difficulties have been overcome.

HAVE you ever realised when speaking over the ordinary telephone that it is not always possible to recognise who is speaking, although you may have heard the speaker's voice before, and you may know him quite well?

This simply means that the reproduction is not faithful. In time you would recognise a voice over the 'phone, but it is a doubtful point whether you could tell who was speaking on receiving a first call, even though it be your oldest friend. How does matter broadcast compare in this connection?

I have heard it said, "Oh, that is nothing like it!" meaning, of course, that the reproduction by the microphone of the studio item was bad. Is this an actual fact? Does the transmission by wireless of the human voice, the orchestra, any particular instrument, noises required in dramatic efforts, so alter the production that what is actually received bears no resemblance to that taking place in the studio? Is there any difference between a person's voice in the studio and that heard in a pair of telephones? Does the reception by wireless of the orchestra playing in the studio sound similar to that heard by ear direct? What of noises? Can you easily imagine the street scenes, the seashore or a garden scene simply by noises conveyed to you through the ether?

The Great Test.

Let us look into the matter. Take first the human voice. Imagine a person giving a lecture before the microphone. If he had previously spoken there is no doubt his voice would be recognised. If you did not recognise the voice it would not be because of bad reproduction, but because you had not heard the voice before. I remember on one occasion a talk was being given from the London station, and the speaker's daughter listened to his speech in the Control Room. She listened on headphones, and when questioned as to the likeness to her father's voice, replied that it was "absolutely dad's voice."

But this young lady knew her father's voice well, and also knew that he was talking. So the great test would appear to be, if you recognise the voice and was sure of it without previously being aware that the person was to speak and not having heard the voice "over the wireless" before. Naturally there is a vast difference between thinking you recognise a voice and being sure of it. Would it be possible for a person to say, "Why, that is So-and-so speaking," and know for a certainty that it is that person speaking?

An experience of my own shows this to be possible. I am not often before the microphone except for test purposes, but on one occasion I was required to interrupt the announcer and say about 20 words in disjointed sentences. I said sufficient to be recognised by several friends of mine

who had never heard my voice by wireless before, and certainly did not know I was to speak, as I did not know myself until the evening in question. It was certainly a case of "recognised when first heard."

Perfect, Moderate, or Bad?

So it can safely be asserted that the reproduction of a speaker is always the same, that no difference would be noticed in a person's voice if he spoke to-day and again in a month's time, unless of course he was

were placed too near the microphone, while others less blatant were placed farther away.

At all events, the resultant effect after the necessary dispositions have been made is very good indeed, although the reproduction is not quite so good as in the case of the human voice.

Consider what is being asked of the microphone—to pass on all the different frequencies capable of being given out by musical instruments, and to carry out this duty so well that the difference between the



The studio at 6 K H, the B.B.C.'s Hull relay station.

suffering from the effects of our inclement weather. So that, as far as the voice is concerned, reproduction can be regarded as almost perfect.

Do we get a faithful rendering by the microphone of selections given by an orchestra in the studio? Is the reproduction perfect, moderate, or bad?

To obtain the best results certain stringent dispositions of the orchestra are always necessary, which would seem to suggest that results are not "true to life." The dispositions are necessary, because the whole volume of sound from all the instruments should be concentrated to the face of the microphone, and as it is obviously impossible for all instruments to be at the same distance from the front of the microphone, the whole must be so arranged that the resultant effect is similar to what is heard before passing through the microphone, or technically speaking, that the "balance" of the orchestra is perfect.

There are some instruments that are far more blatant than others, and it would be a very bad rendering if these instruments

real thing and the reproduction is hardly noticeable. There are few things in this world that will not respond to one frequency more than to another, so that when we ask a microphone to render equally well all frequencies, we are asking it to perform a hard task.

B.B.C. Microphones.

The extreme range of frequencies for an ordinary piano is between 27—3,500, and if the microphone can be made so that it will not respond to any of these frequencies more than to others, then we shall be very near perfection. The present-day microphones in use by the B.B.C. are considered to be of a very high order, but even these are subject to extreme temperature changes, and this being so it can hardly be expected to maintain a non-resonant state of efficiency for ever.

Now to consider the reproduction of single instruments. There is no doubt that one can easily recognise instruments when played singly, but there is a difficulty here to overcome before perfect reproduction can be attained. Again, it is a question of frequency.

(Continued on page 364.)

MIDLAND WIRELESS NOTES.

By OUR OWN CORRESPONDENT.

PARTICULARLY popular programmes have been the interesting series of broadcasts which are being carried out from Cannon Hill Park, Birmingham. Here, on every Saturday evening, there is a local concert by the City of Birmingham Police Band, one of the best military bands in the country, and the installation of a microphone in the bandstand has enabled the open-air concert to be broadcast to Midland listeners-in. By arrangement with the Birmingham Watch Committee, the vocal items of the concert have been provided by the station, with the result that several of the local station artistes have appeared at the park, and also two or three, or more, B.B.C. and B.N.O.C. artistes from London. The park audiences have been very large, and on more than one occasion of such an extent that the duration of the concert has had to be curtailed in order that the park may be emptied by official closing-time.

A Radio Romance.

The 5 I T Radio Circle has still found it possible to continue its good work in regard to the supplying of listening apparatus to various of the local hospitals. The latest to benefit has been the Birmingham and Midland Ear and Throat Hospital, which now possesses a crystal set with power amplification for two loud speakers, practically the whole of which apparatus was provided by the profits on the sale of Radio Circle badges and the photographs of the various Uncles and Aunts.

The wireless sets in the various Birmingham institutions, supplied by the 5 I T Radio Circle, are maintained in working order by the services of a voluntary committee of wireless experts, of which Uncle Felix (Commander Alan Pelham, joint assistant station director at 5 I T) is chairman, who pay periodical visits to see that all is well.

Mr. Nigel Dallaway, the solo pianist at 5 I T, recently figured in one of the romances of radio which now and again are made public. Some time ago, after he had played for broadcast a Grieg study, he was asked whether he would play two other special numbers. The request came from a young woman patient at the Wolverhampton General Hospital, and a date was fixed on which he should play. His holidays intervened, but, despite this, he turned up at the studio in Birmingham at the appointed day and played two numbers from Beethoven and Chopin which went over. Midland listeners-in heard them, but few knew that those two items were really intended for an audience of one lying in a hospital bed at Wolverhampton.

About 5 X X.

There has been considerable discussion in Midland wireless circles of late concerning the merits or demerits of the suggestion that when a site for the permanent 5 X X high-power station is sought, the Midlands should be advanced as a far better position than Chelmsford.

The objection to Chelmsford, it is declared, is that its range is not an effective range on all sides, because it serves a large area of sea. Moreover, it is far more likely to be troubled by harmonics and spark transmissions than any station in the Midlands would be. The advantage of a Midland station would be that it would be practically central for the whole country, and comparatively near densely-populated areas in which the joys of crystal set use would be welcomed.

Although there has been no views on the matter expressed by the B.B.C., it is appreciated that the expense of maintaining a land-line—or, rather, an overhead line—from London to Birmingham in order that national events and the best London programmes might be broadcast, were



A very popular "star"—Mr. Willie Rouse.

such a high-power station set up in the Midlands, would be very considerable, while the distance from London to Birmingham would result in far greater distortion than is at present the case with the thirty-mile line between London and Chelmsford.

Progress at 5 I T.

The opinion of the enthusiasts upon these probable difficulties is that the rapid advance of broadcast science will see them overcome, while it would not be too absurd to see the development of the B.B.C. programmes in the future necessitating the maintenance of companies of artistes at some of the provincial stations, and especially at a central high-power station.

Birmingham has contributed some valuable evidence to the discussion which has been waging so long upon the effect upon the prosperity of the theatres and music-halls of broadcasting. Recently, at 5 I T, a repertory company of players was formed under an old actor-manager, Mr. William Macready. Among the early radio plays produced was Ouida's ever-popular "Under Two Flags." This was put over towards the end of June, and within the next few days over a hundred appreciative letters reached Mr. Percy Edgar, the 5 I T station director. A week ago there visited one

of the Birmingham suburban theatres—and a suburb in which there was a fair number of listeners-in—a well-known travelling repertory theatrical company, and within a few days of their arrival they were inundated with letters of request for a particular play. There were five hundred odd letters, and every request was for "Under Two Flags," and the reason given was that they had heard the play over radio, and now they wished to see it staged. It played for a week to crowded houses.

THE "REAL THING" v. BROADCASTING.

(Continued from page 363.)

If the microphone is more sensitive to one particular note than to any other, then it is obvious that that note will be reproduced louder than others. If the microphone has been adjusted correctly in all details (this being a very delicate operation), then it will respond to all frequencies equally well, and the reproduction will be almost perfect. A piano is a very useful instrument for testing for reproduction, for it is perhaps the most difficult of all instruments to reproduce perfectly, and if, when on test, no note sounds more heavy than another, then there should not be much wrong with the reproduction of other items.

Radio "Props."

What of the reproduction of noises? They have been broadcast from time to time with considerable success, and no doubt some of you may think more noise has been put over than anything else. An announcement is not always made informing listeners what the noises are intended to represent. It is left to the imagination of the listener, which I think justifies my assertion that noises made are a very good reproduction of what they are intended to convey.

But are the noises made by an actual representation of what they are supposed to be? Is the rattle of a cup and saucer produced by these articles? I have heard it said that when the above-mentioned things were used in a studio, they sounded more like pieces of metal being thrown at a blacksmith's anvil. Therefore, the actual reproduction in this case was an absolute failure. Is it so in others?

It is in the majority of cases where noises are required, and an attempt is made to put the noise over by an exact representation. But in most cases "props" are used. It is obviously impossible to have an actual representation of what is required in every case. It would surprise many to see how studio noises are produced, and the weird contraptions used for this purpose.

I well remember how, nearly twelve months ago, the difficulty found in obtaining the requisite "works" for the operation of a lift. The first trial was carried out with the aid of a tin can with a hole in the base sliding down the rough surface of a heavily-armoured cable and falling with a crash on to some loose shackles. The result was good, but not quite the thing. No doubt the majority of listeners have heard the final result with regard to the lift, and will admit that it was not bad.

The "Noisy" Department.

In the case of noises we really have "faked" to make the reproduction as perfect as possible, for it is obviously impossible to do otherwise. Nowadays the "noisy department" of the B.B.C. is a specialist's affair, and well may it be, for the reproduction of noises made by actual representations would in a considerable number of cases be disastrous to any play requiring them.

There is another aspect of reproduction that I have not yet touched upon, and that is your receiver, and in particular your telephones.

Are they at all resonant? Do they respond to certain frequencies more than to others? If they do, then it is fairly obvious that you will have conveyed to your ears during an orchestral item some notes more loud than others.

To show exactly what is meant: the fundamental voice frequency is somewhere about 700, but also carrying with it a number of complex frequencies of a much higher frequency. The average "good" telephone has a resonant period at about 1,000, which means that transmissions which include items with frequencies varying from, say, 200 to 3,500 would not be heard as transmitted, because the higher and lower frequencies would not come out at all well.

The same thing applies to the reproduction of the voice, the fundamental frequency being received quite well, but the niceties of the voice—that is, the complex frequencies—being practically all lost. If perfect reproduction is to be obtained at the receiving end, then it is essential that all the different frequencies transmitted should be reproduced by your telephones in their correct relationship with each other, and this cannot be until we have a telephone on the market that is non-resonant.

A CRYSTAL RECEIVER FOR 5 X X.

By OSWALD J. RANKIN.

This article deals with the construction of a straightforward crystal set of low cost and proved efficiency. The set is easy to make and easy to handle.

THE receiver to be described was designed by the writer to be used on the 1,600 metre wave-length of 5 X X, with a single wire aerial about 70 ft. long and 20 ft. high. The most important considerations were: (1) that the receiver would be used on the existing aerial which was very badly screened with trees; (2) that the geographical position of this aerial was roughly 90 miles from Chelmsford, and it was not directional to that

The set was then built up, as shown in the accompanying photographs, and results left nothing to be desired. The receiver is now working regularly with two pairs of "N and K" headphones, suitable wiring being run round rooms, across ceilings, and even to an upstairs room, small terminal blocks being mounted on the walls so that the 'phones can be transferred from one room to another as desired.

ing, but this would not be necessary where a plain cabinet was used.

The panel is preferably inlaid and screwed to two wooden fillets secured to the inside

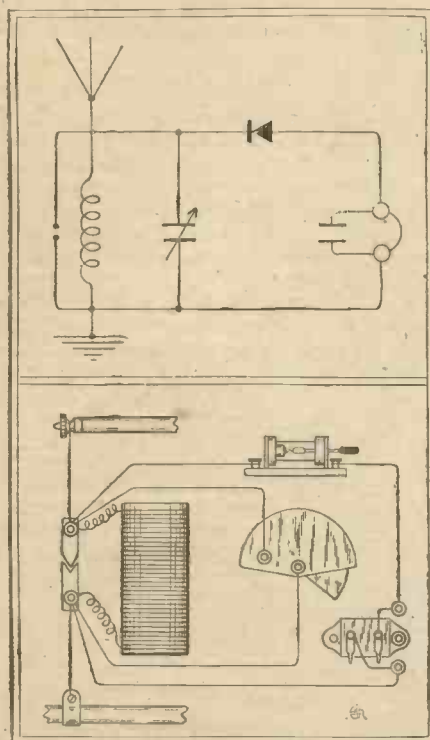


Fig. 1.

station; (3) the receiver must be cheap, compact, simple, and reliable; (4) it must operate two pairs of headphones effectively which (5) must be so arranged to permit the owner to listen-in in either room on the ground floor.

A Problem.

What a problem! And who wouldn't hesitate about tackling the job? Who wouldn't meekly suggest a stage of high-frequency valve amplification? But the prospective owner must have a crystal set or nothing, and so, after carrying out a few simple experiments it was decided to select the simple straight circuit shown in Fig. 1, where a 3 in. diameter cardboard tube is wound with 250 turns of No. 30 D.C.C. wire and shunted with a .0005 mfd. variable condenser to effect the tuning.

The Panel and Cabinet.

The conditions under which this receiver is working is a testimony to its efficiency, and as there are probably many hundreds of country readers anticipating making something really good in the way of a crystal set, it is thought that a brief description of its construction will be of general interest.

Having already described the coil we will now proceed with the panel and cabinet. The panel is cut from $\frac{1}{8}$ in. matted ebonite, and is $7\frac{1}{2}$ in. long by 6 in. wide. This is drilled to take four small wood screws, the aerial and earth terminals, three telephone terminals, the crystal detector, and the variable condenser bush, the approximate setting of the holes being as shown by the position of the mounted components and fittings in the photographs.

There being no room on the panel for an aerial to earth change-over switch, a simple lightning arrester is fitted between the A and E terminals on the under side of the panel, as shown. This consists of two strips of sheet brass about $\frac{1}{2}$ in. wide by $\frac{1}{16}$ in. in thickness, the gap between them being shaped in any way desired, providing it is accurately equal and does not exceed $\frac{1}{16}$ in. in width.

A fixed condenser of .002 mfd. capacity is connected across the two outer 'phone terminals, but this is not essential. The centre 'phone terminal is provided merely to form a metallic connection between the tags of the 'phones when same are connected in series, the fixed condenser (if used) being clamped to its shank under the panel.

When wiring up the panel it will indeed be difficult to make mistakes if the two diagrams are well perused beforehand. If the readers' experience in cabinet making is limited, I would suggest a simple box-like cabinet with the panel mounted on the top, rather than the sloping type of cabinet. In the present arrangement it was necessary to press the coil slightly oval in order to avoid the projecting condenser terminals from making undesirable contact with the wind-

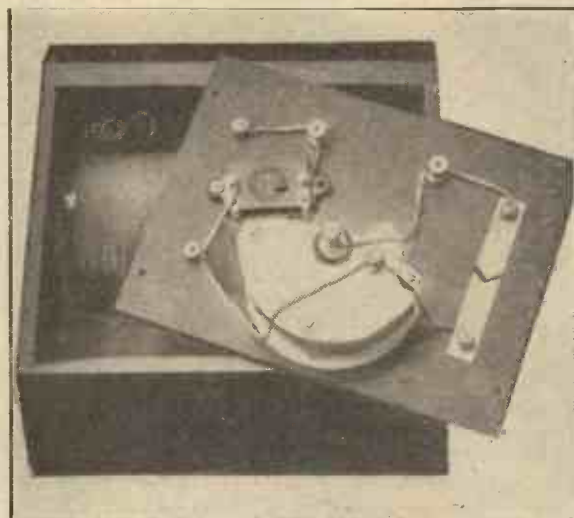


Fig. 2.

walls of the cabinet. Given dimensions of such a cabinet are often confusing, and so it is suggested that the reader should build it up in proportion with the panel, allowing a depth of about 6 in. at the back, this sloping down to $3\frac{1}{2}$ in. at the front.

The Crystal.

The coil is made a tight push-in fit inside the cabinet, the tube being accurately cut after completing the winding. Having placed this in position the two fillets should



Fig. 3.

be fitted and the ends of the winding soldered to the A and E terminals. The panel may then be screwed down, after carrying out a test to ascertain if everything is O.K.

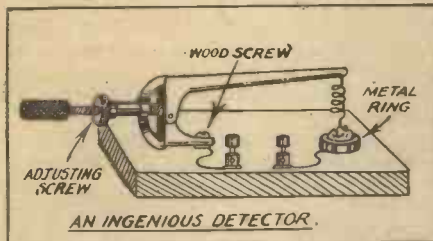
The crystal to be recommended is a good specimen of "Hertzite," with a fine gold wire tentacle, and each pair of 'phones should have a total resistance of 4,000 ohms.

Constructional Notes

Conducted by Dr. J. H. T. ROBERTS, F.Inst.P.

An Ingenious Detector.

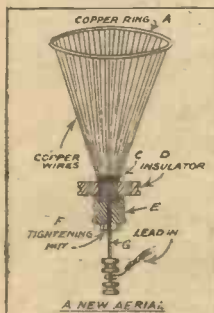
ONE of the simplest and most ingenious forms of crystal detector which I have seen is that illustrated in the accompanying diagram. It consists essentially, as will be seen, of a discarded pair of compasses



which are provided with an adjusting screw. The latter makes an excellent vernier adjuster for the leg of the compass which carries the cat-whisker. In order to adapt the compass for the purpose, one leg should be shortened and a hole drilled through in a direction parallel to the plane of the compasses. The compasses are then secured to a suitable base-board by means of a wood screw passed through this hole. By using a single screw the compass can be rotated slightly so as to bring the cat-whisker over different parts of the crystal. For the crystal cup any small metal container may be used, or even a metal ring such as a section cut from the end of a piece of brass tube about $\frac{1}{2}$ inch in diameter. The other details will easily be seen from the drawing.

A New Aerial.

The aerial shown herewith, which is the invention of A. W. Vincent (Br. Pat. 216981), consists of 100 small-gauge copper wires, 8 inches long; leading from a holder,

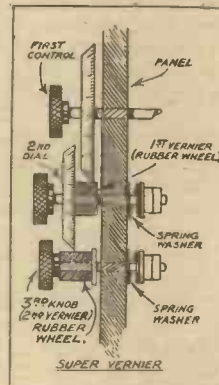


E, through the insulator, D, to which a bracket for fixing is connected. The wires are then spread out in conical formation, as shown, and the ends are secured to a circular copper ring, A, about 7 inches in diameter. The terminal G is fitted at the bottom of the holder E, and to this is connected a cone-shaped member, C. A small nut, F, acts to pull the cone-shaped piece C, hard down against the insulator D, and so secures the wires tightly. The leading-in wire is taken from the terminal G.

Super Vernier.

For fine tuning, a vernier is absolutely essential on the variometer or condenser control, and for extremely fine tuning it is

sometimes desirable to employ even a second vernier on the first. The accompanying figure shows a reader's method by which this can readily be done. It amounts to a system of step-down gears, engaging frictionally. The first dial is directly attached to the condenser shaft in the usual way. The second dial is mounted with its shaft just clear of the edge of the first dial, the large dial overlying the first dial. Beneath the second dial is a small rubber disc, which engages the edge of the first dial, so that the second knob acts as the first vernier in the ordinary way. The third knob then controls a small rubber wheel engaging with the edge of the second dial, and so acting as a second vernier on the first vernier.

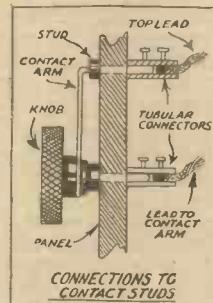


Connections to Contact Studs.

In soldering the connections to contact studs behind the panel, some care is necessary in order not to overheat the ebonite.

The use of solder can be obviated entirely, however, by employing studs which are either tubular or which are drilled axially and provided with a set-screw for securing the connecting wire.

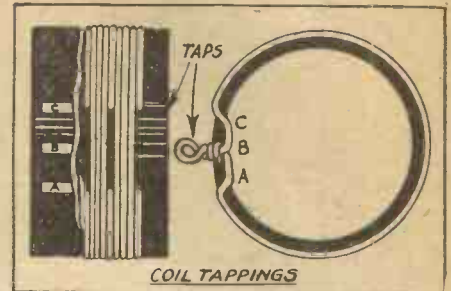
The simplest method is to use a cheesehead screw for the stud, inserted through the panel from the front, and to employ an ordinary tubular connector for securing the wire to the back end of the stud. This method, although of course not so convenient or compact as soldering, is useful in certain cases where the heat of the iron might cause damage. Further, it permits of the studs being readily removed if required.



Coil Tappings.

The figure herewith (from "Radio Digest," U.S.A.) illustrates a simple and very neat method of takingappings from a coil. Ifappings are to be taken every few turns three slots may be used, but if more frequentappings are to be made four slots should be made, and theappings should emerge alternately from the two middle slots. The slots may be $\frac{1}{4}$ inch wide, and

of a length which of course depends upon the length of the windings. The simplest way to make the slots is to cut along the former in the positions the slots are to take



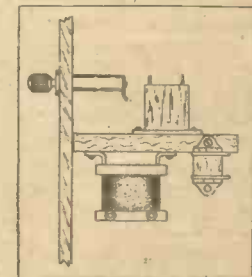
and, using a $\frac{1}{4}$ -inch drill, to drill three or four holes, breaking into each other, for the commencement of the slot. Take now three or four hack-saw blades (sufficient to make up to the width of the slot), and after inserting into the slot as already commenced, bolt them together at the two ends by means of nuts and bolts; the result will be what is equivalent to a hack-saw blade of the same width as the slot. With this simply proceed to saw along the line until the slot is made the required length, repeating the same method for the other slots.

Start the coil by putting the end of wire in through slot A, putting through 4 or 6 inches of wire so as to leave enough for the top, and then bring back out through slot B, and in through slot C, and out through slot B again. This should be done a short distance from the end of the slot, so that when the wire is put through the slot B the last time it can be put through between the other wire and the end of the slot. Pull this up tight and proceed to wind.

Wind on the amount of turns desired to the first tap and cut the wire, allowing 3 or 4 inches for the tap, and put it in through slot C, and out through slot B. This completes one tap. To start the next turns, put the end of the remaining wire through slot A and out through slot B, allowing about 2 inches for twisting, then proceed to the next tap and repeat the entire operation. The end of the coil is fastened in the same manner as the start.

A Panel Shelf.

When building a multi-valve set it is not always convenient to mount all the necessary components on the under side of the panel. Transformers, fixed condensers, etc., are then often mounted on the inside walls of the cabinet, but a much better method of procedure is to attach one or two small wooden shelves to the underside of the panel and mount the components on the faces and around the edges of same, as shown in the sketch.



Two fairly long wood screws support the shelf, their heads being neatly countersunk into the upper face of the panel. In order to avoid undue strain the heavier components, such as L.F. transformers, should be mounted as near up to the panel as possible.

SIDELIGHTS ON WIRELESS.

A NEW SERIES FOR THE AMATEUR. THE QUANTUM THEORY CLEARLY EXPLAINED.

By SIR OLIVER LODGE, F.R.S., D.Sc., LL.D.
(Scientific Adviser to "Popular Wireless.")

For the amateur who wishes to obtain more than an elementary knowledge of wireless, and who is interested in theory, the following article on the Quantum theory—a theory which every serious student of wireless is bound to meet with—will provide a concise and non-technical explanation by one of the world's greatest physicists.

PEOPLE in general have not yet realised how much more important and intelligible the recently introduced physical constant, the *Quantum*, is than the mathematical method of deduction called "Relativity." Relativity in skilled hands is able to yield surprising and interesting results it is true. But then the quantum is able to yield interesting results, too, and in a more simple manner.

Whatever may ultimately turn out to be true about relativity considered as a philosophy, there is no doubt that the introduction of the quantum into physics represents a real though not ultimate fact. That is to say, experience shows that the fact is there; although we have at present no explanation of it. And the elucidation of the structure of the atom, to which the quantum has led, is one of the most extraordinary and illuminating and momentous discoveries in twentieth century physics.

Some Easy Examples.

By aid of the quantum we now know a large amount about what is going on in the interior of an atom, and many details about its vast store of energy.

What, then, is a quantum? It originated in a discovery by Professor Max Planck, of Berlin (beginning in the year 1900, and becoming established more and more strongly during the next twenty years), that radiated energy, in the form of light or X-rays, went about in packets or indivisible units—like cartridges, any one of which represents a store of energy, and any one of which can liberate that energy and produce an effect—but of which no fractions were possible.

Why the radiation emitted by atoms should thus be distributed in packets is not yet known, but we are pretty certain that it has something to do with the internal structure of every atom. And we are now prepared to admit that an unexpected discontinuity running through the whole of atomic science, and therefore essentially through the whole theory of matter, has been discovered.

In regions where continuity had been thought to reign—everything smooth and flowing and continuous and regular—an abrupt discontinuity has made its appearance, replacing the smoothness by a jerk, the flow by a precipitous jump, the continuity by a succession of steps; the only

thing that remains being the regularity. Everything is perfectly regular and law-abiding. Not that the steps are all equal. They constitute a graduated series, but they are perfectly regular and obedient to law. They are represented by whole numbers, and not by fractions.

There is, after all, nothing foreign to our ordinary notions in this recognition of discontinuity—that is to say of units which must be taken as a whole and of which no fractions are permissible. We are familiar with it in coins of the lowest denomination. We are equally familiar with it in a staircase, instead of a slope or inclined plane; we must ascend or descend a step or several steps at a time; we only stumble if we try to take half a step.

A Strawberry and Golf Analogy.

The whole elementary operation of counting involves a recognition of some obvious kind of discontinuity. We can count apples or cherries; and though it is true we can divide them, that is not the way in which they present themselves to our notice: they naturally occur in quanta. So do seeds. And this illustrates different kinds of units. We may count atoms, or we may count the electrons in an atom. So we may count strawberries, or we may count the little yellow seeds upon a strawberry. Both units can be dissected, if we want to, or know how, but both present themselves as natural units.

Again, in games, a discontinuity is fami-

liar. In golf you either make a stroke or you don't. There is no half stroke. And what is called "giving a half" merely means cancelling an opponent's stroke at alternate holes. So again the ball is either in the hole, or not. Its path is continuous up to the end, and then it drops—or else it doesn't. It would be possible to follow the path continuously to the bottom of the hole; the discontinuity is never ultimate; but the end is discontinuous for all practical purposes, and the definiteness is satisfactory.

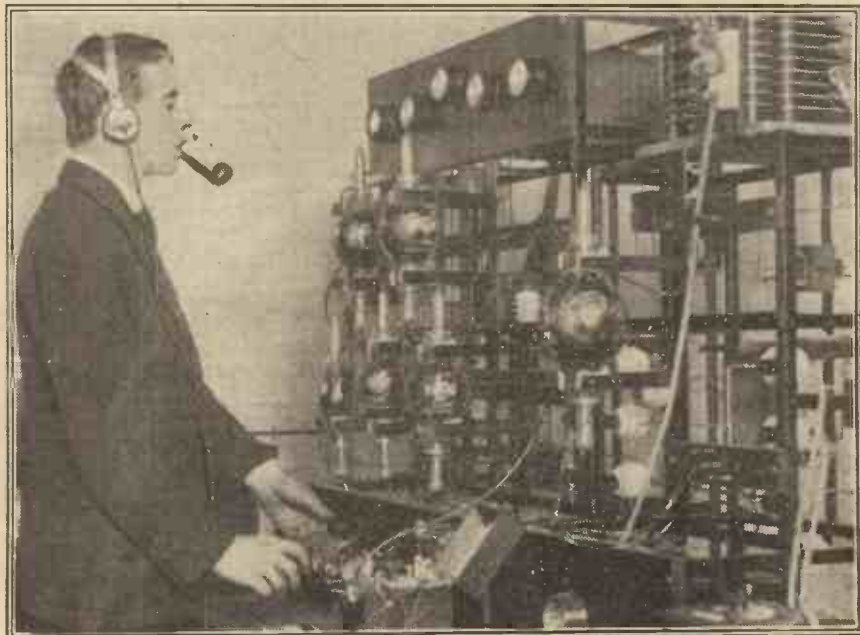
Quanta in Games.

In games on deck, shuffleboard and others, where something slides over chalk-marked boundaries into numbered squares, some convention has to be employed to determine whether the slider is or is not within a certain area; and there may be disputes. In bowls, also, the distances from the jack vary continuously, and may have to be carefully measured. The fall of the balls at cricket gives the required definiteness, and so does an ordinary "catch"; but "leg before" and "stumped" and "run out" are less satisfactory, for they depend on relative positions of a continuously varying and therefore less clearly determinate kind. Most games aim at quanta which can be counted. One cannot gain half a trick at whist. And the net in lawn tennis is intended to introduce an

((Continued on page 368.))



Professor Max Planck.



Mr. H. P. Cook, assistant engineer of the Hull Relay Station, tuning the transmitter.

SIDELIGHTS ON WIRELESS.

(Continued from page 367.)

unmistakable discontinuity, the failure of which is allowed for by an uncounted "let."

The difficulty of exact counting in many cases turns mainly upon what shall be reckoned a unit. To count the pebbles on a gravel walk would be sure to raise a question as to what constitutes a pebble. And a flight of irregular, worn-out steps are not easy to count, for the same reason. But fortunately the atoms of negative electricity are all, so far as we know, exactly alike, and therefore can be counted with accuracy.

Content with Evidence.

Whenever we come across things that can be counted, in the unseen and ultra-microscopic region of Nature, it is a sign that we are on something important and intensely interesting. Hence the electron and the quantum, however they may be ultimately analysed and resolved into entities still more fundamental, dominate modern twentieth century physics. The "quantum" itself is not to be understood as a mere vague discontinuity, like the examples employed to illustrate one of its features; it is a definite and precise natural constant capable of being measured with precision, and it is associated with the angular momentum, also called moment of momentum—a term specially applicable to and suggestive of some kind of fly-wheel—of an electron revolving inside an atom.

Why the angular momentum of a revolving electron inside an atom should have this singular discontinuous numerable quality no one has as yet succeeded in explaining. The fact, discovered by Professor Niels Bohr, of Copenhagen, has to be accepted unexplained.

But then no one has succeeded in explaining why electricity itself, instead of being continuous as used to be thought, should exist in little indivisible particles. And, indeed, it hardly occurs to most physicists that an explanation is wanted; they are usually content to accept the fact on thoroughly substantial evidence.

A Wonderful Speculation.

So it is with the world in general when people contemplate the stars. It probably does not occur to many to consider why matter should be distributed in spherical masses scattered about with immense spaces between them, instead of being aggregated into one great lump under the influence of gravitation. Certainly it is far more interesting to find all these myriads of separate bodies, most of them of the same order of magnitude as the sun, with smaller attendants, on the surface of which we and other discontinuous creatures can live; but only recently has it occurred to Eddington and other astronomers to speculate on the reason for this discontinuity in large scale matter, which may be said roughly to imitate in a gross manner the atomic discontinuities of every visible and microscopic speck.

Bodies may be much smaller than the sun, but then they will not be permanently hot enough to emit much light. On the other

hand, if bodies are much more massive than the sun, then tend to break up. They are not stable; they easily separate into two; and any number of double and even multiple stars are known. When divided, the two components will tend gradually to separate, by reason of tidal action, in a way which is understood, though by no means obvious.

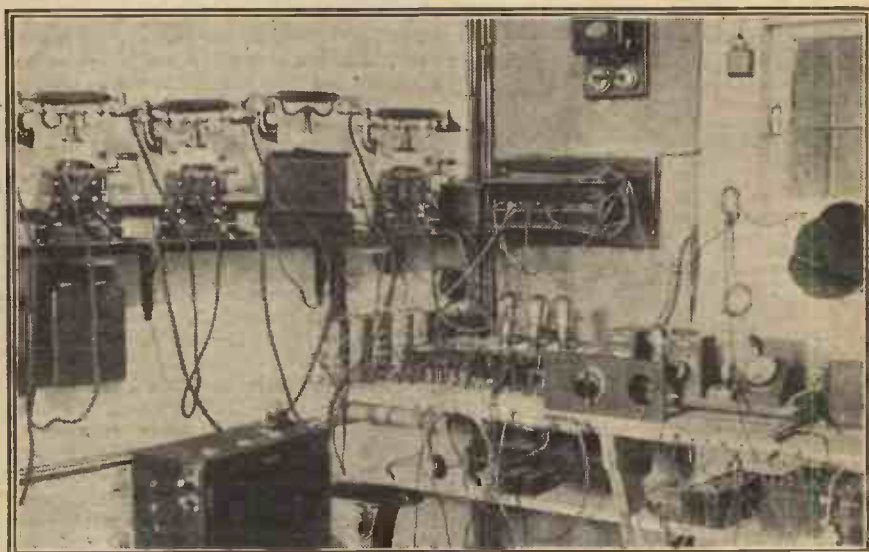
Thomson's Momentous Announcement.

So gravitation does not pull everything together, but indirectly tends to drive things apart. The earth and moon, for instance, are believed, on good evidence, to have once been a single body. But the moon, having budded off, from a now nearly filled-up scar in which the water that has accumulated is called the Pacific Ocean, has gradually receded, in an age-long spiral path; and is still very slowly receding,

work, announced to a joint meeting of the Physics Section of the British Association at Dover, in the presence of a contingent of the corresponding French Association, simultaneously meeting at Boulogne, his isolation or individual detection, in a Crookes' stream of cathode rays, of apparently indivisible corpuscles much smaller than the atoms of matter; or, in other words, he described his experimental realisation of the "atoms of electricity," the existence of which Faraday and Maxwell had more than half suspected, and which had been named in advance "Electrons" by Dr. Johnstone Stoney.

The discovery of these natural electric units has revolutionised the treatment of all departments of electrical science.

A few years before (in 1896), Zeeman of Amsterdam had ascertained that electrons of small mass were the particles which



Another view of the Hull Station—the Control and Amplifier Room.

because of the reaction upon it of the terrestrial tides which it helps to generate. (Briefly, we may explain that the pull of the tidal wave on the moon, as the vast, low, aqueous protuberance is carried forward by the rotation of the earth, tends to accelerate the moon tangentially; and that has the effect of making it go farther away. Retardation, on the other hand, would tend to bring it nearer; for if it were stopped altogether it would merely drop in.)

A dropping towards the centre, in the case of a revolving electron, is actually experienced, and is the chief source of emitted radiation and of bright line spectra. Conversely, absorption of radiation can be the means of removing an electron from an inner to an outer orbit, or even of flinging it away altogether. Radiation is emitted, and seems also to be absorbed, only in quanta.

All photo-electric phenomena (which are rather extraordinary) are regulated by the quantum, and without it are inexplicable. An explanation of photographic activity, and probably of retinal vision, is to be sought along these lines. The sciences, physics, chemistry, and physiology, here meet and interlock.

On September 16th, 1899, Sir J. J. Thomson, summarising in a masterly manner the results of two years previous

radiated energy from an atom; and H. A. Lorentz, the very eminent ex-professor of physics at Leyden, had showed mathematically that assuming the radiating particles to move in an orbit which could be perturbed in a calculable manner by a magnetic field, in accordance with the theory of Larmor and himself about radiation, he was able to predict thereby many detailed phenomena concerning the observed magnetic subdivision of spectral lines and their polarisation; a set of predicted phenomena which Zeeman forthwith confirmed experimentally.

A Revolutionary Theory.

On December 14th, 1900, Professor Max Planck, professor and sometime rector of the University of Berlin, announced to the German Physical Society his revolutionary theory of black-body radiation, which carried with it the discovery of an apparently indivisible unit of radiation energy, strictly proportional to the frequency or vibration period of that radiation; and thus introduced his new universal constant—the ratio of radiation energy to radiation frequency—known as the quantum.

This incipient discovery was consolidated and extended, and made more credible, subsequently, by the finding of Einstein in

(Continued on page 412.)

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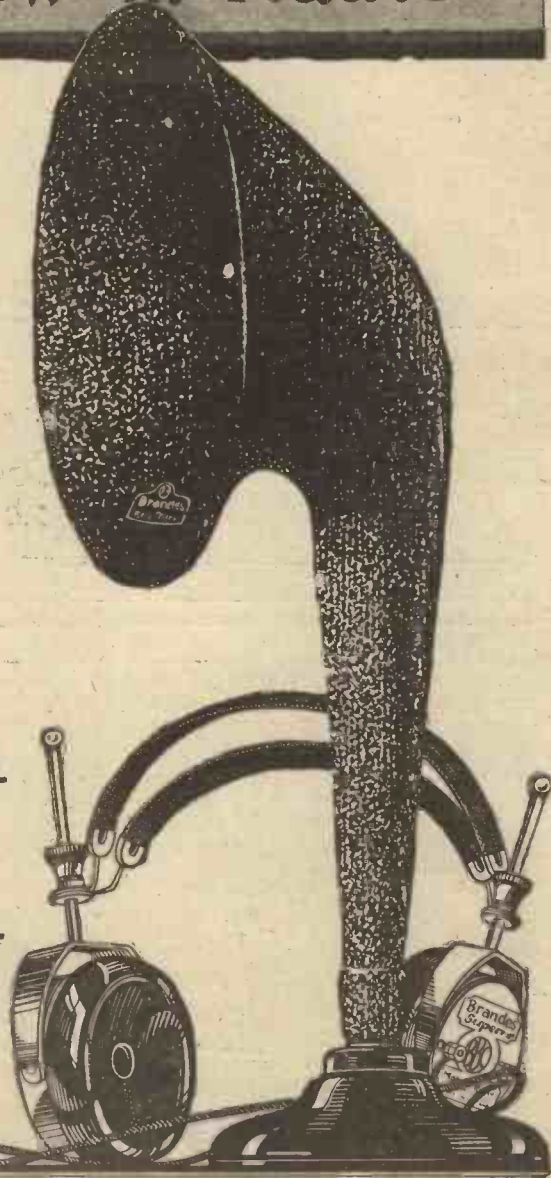
Sweet bell-like notes

which gather intensity and beautifully balanced volume. Not a suspicion of dull tonelessness in the reception given by the "Matched Tone" Headphones. They are guarded from tone-deafness and distortion by the matched receivers. Both are carefully tested with special apparatus for sensitivity and volume so that they are as nearly identical as possible and you hear the same sound in both ears—which means everything. Now take the "Table Talker." It has the same beautiful tone qualities. The horn is carefully matched to the unit to ensure a delightful uniformity of tone with sufficient volume to fill the largest room. Pleasantly simple lines and a neutral brown finish which blends harmoniously with any decorative scheme completes a tasteful and effective addition to your set.

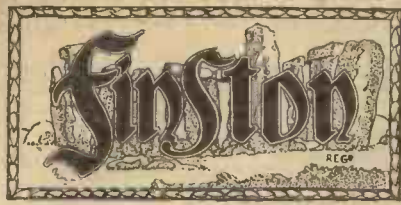
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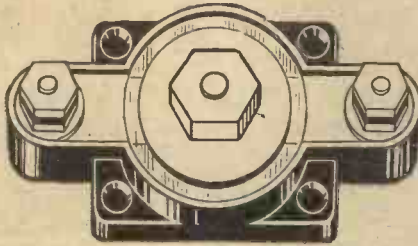


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8. 5 in.,	1,300 to 1,750	1 1/8 "	8. 1/- "
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			10. 1 1/4 "
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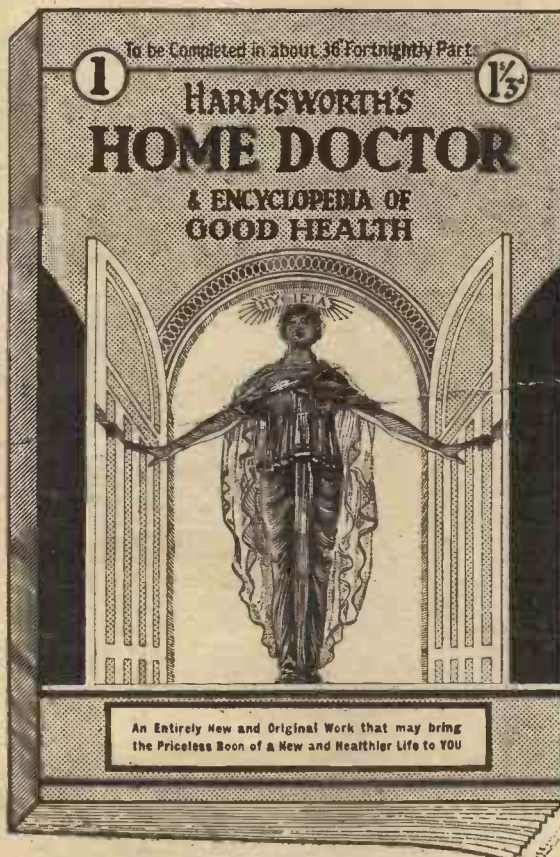
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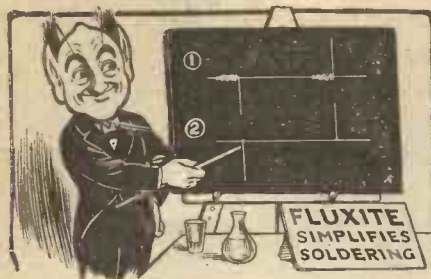
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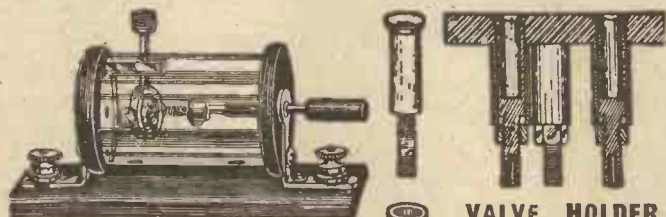
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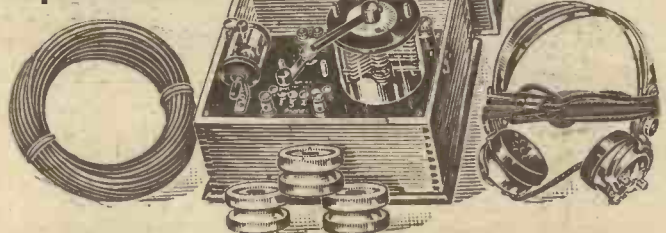
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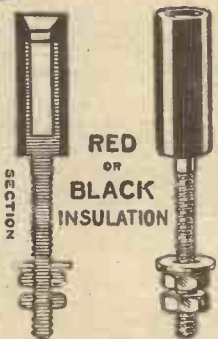


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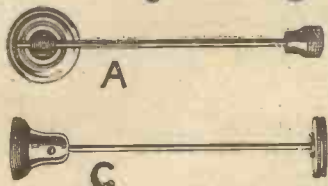
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METHODS OF SWITCHING IN WIRELESS CIRCUITS.

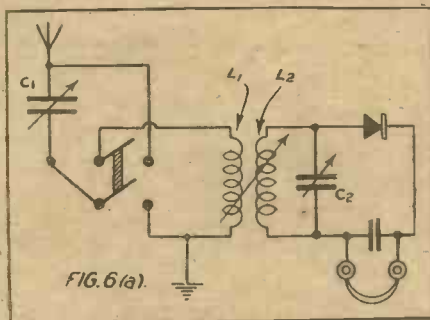
By P. T. BEARD.

This is the second of a series of three articles dealing with a practical branch of wireless work which every constructor will find of value.

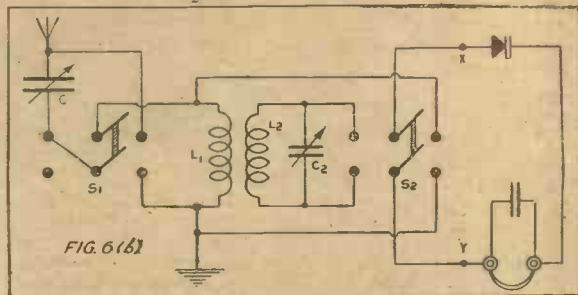
PART II.

Tune Stand-by Switch.

WHERE much jamming from unwanted stations is experienced, and a selective circuit is required, the loose-coupled circuit shown in Fig. 6(a) is usually employed. This consists of a pair of coils, L1 and L2, mounted either in a two-coil holder, or constructed to slide one within the other.



The coil L1 is the aerial coil, with its condenser C1 controlled by its series-parallel switch, and coil L2, with its condenser C2, is the closed circuit coil.



It is not always an easy matter to pick up a transmitting station with this two-coil arrangement, owing to the necessity for tuning both circuits to the wave-length of the station it is desired to receive. Consequently it is an advantage to tune in the station on the aerial coil, L1, alone, and

afterwards change over to bring both coils in circuit and make final adjustments on the closed circuit condenser, C2.

It is an easy matter to tune the closed circuit after the aerial circuit has been tuned separately. Fig. 6(b) shows how the tune-stand-by switch (S2) is connected in the circuit. The upper contact on the right-hand side of the switch is connected to the upper side of the aerial coil, L1, the lower contact on this side being connected to the earth side of L1. The left-hand switch contacts are connected to the upper and lower ends of the closed circuit coil, L2, as shown. The upper switch arm is joined to one side of the crystal, and the lower arm to one side of the telephones.

In the case of a valve receiver the points X and Y in the diagram would be joined to grid of the valve and to low-tension negative respectively. With the switch arms over to the right, the aerial coil L1 is connected directly across the crystal and telephones, making a single circuit crystal receiver. The station required is tuned in with the aerial condenser, C1. It will be noticed that with the switch in this position the closed circuit, L2 and C2, is not in use.

With the switch arms over to the left, the closed circuit coil, L2, is joined across the crystal and telephones, and the only connection between the two coils is by magnetic induction. The station is now tuned in by adjusting the closed circuit condenser C2.

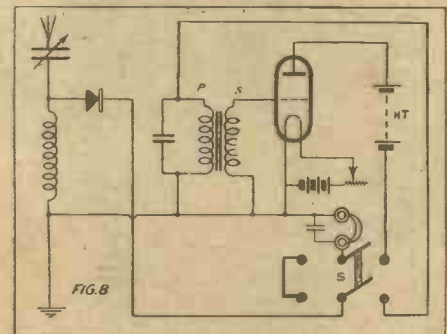
Changing-over Crystals.

It is always advisable to use two crystal detectors in case one should give out during reception. Two crystals and a simple switch enable a new crystal to be switched into circuit very quickly. Fig. 7 shows two methods of connecting the switches. Fig. 7(a) makes use of a simple "on" and "off" switch, and Fig. 7(b) makes use of a double-pole change-over switch. In both cases the switch arm to the right brings in the right-hand crystal, and when over to the left the left-hand crystal is in circuit. In cases where two detectors of the crystal and cat's-whisker type are used, a switch is unnecessary. All that is required is to raise the cat's-whisker from the crystal which is not in use; but this, of course, would only be useful in cases where it was required to test different crystals, and not merely to

have both crystals accurately set ready for use in the event of one becoming out of adjustment.

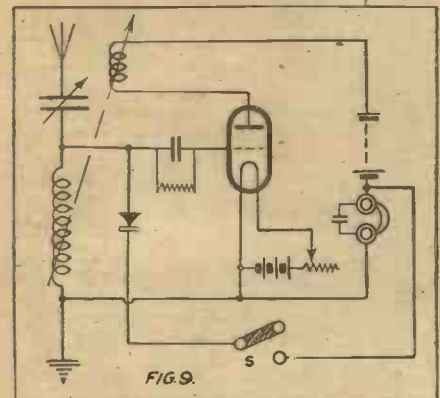
Adding Single Valve Note Magnifier.

When a low-frequency amplifier, or note magnifier, as it is often called, is added to a crystal receiver, a double-pole change-over switch will enable the crystal alone, or the



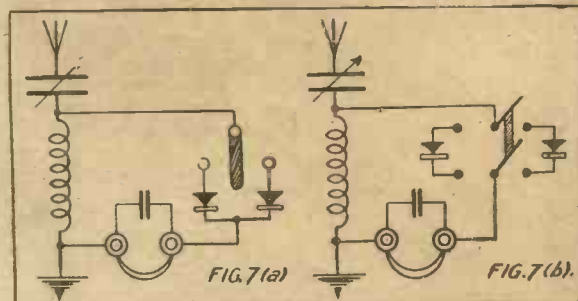
crystal plus amplifier, to be used at will. The diagram (Fig. 8) shows one method of doing this, but it will be noted that no provision is made in the change-over switch for switching off the valve filament current. This will have to be done by means of the filament resistance.

Fig. 8 shows that the earth, one end of the transformer primary, one end of the secondary and low-tension negative are all connected together, while the telephones are connected between this lead and the upper centre connection of the change-over switch marked S. The two left-hand switch contacts are connected together, and a lead



is taken from the crystal to the lower centre switch contact.

The upper and lower right-hand switch contacts are taken to high-tension negative (Continued on page 376.)



Technical Notes

Conducted by
J.H.T. Roberts, D.S., F.Inst.P.

Uses of Potentiometer.

THE three main uses of the potentiometer are discussed in an interesting article in the "Radio News of Canada." The position in which the potentiometer is most

and one of the terminals to the aerial terminal of the receiver, the other terminal of the potentiometer being idle. The resistance of the average potentiometer is from 100 to 500 ohms, about 400 ohms being a common value.

Dry Battery Connectors.

In cases where it is necessary to connect together small dry batteries, either for the anode potential, or for the grid bias, some difficulty is often experienced in finding a connector which will fit on to the brass tab which frequently forms one of the terminals of the small dry battery. A connector suitable for this purpose can, however, readily be made by taking one of the ordinary tubular or barrel connectors and making, by means of a saw-cut, two slots at opposite sides and parallel to the axis, these two slots extending one-half of the length of the connector. The plane of the saw, when making the cut, should be perpendicular to the shaft of the clamping screw at that end of the connector. With the connector altered in this way it is easy to

(Continued on page 415.)



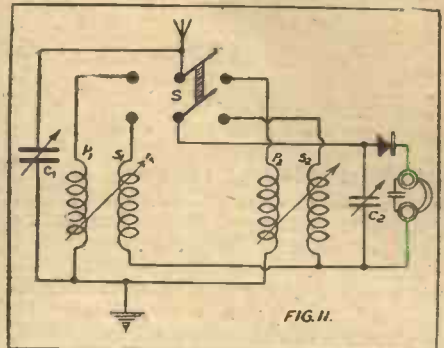
Experimenters testing apparatus on a wireless field day.

frequently employed is in H.F. amplifiers, where it is used to prevent oscillations by controlling the grid voltage of the H.F. valves. When used in this way, the two end terminals of the potentiometer are connected to the two terminals of the filament battery, and the slider is connected to the grid return of the H.F. valves.

A second use for the potentiometer is to vary the plate voltage of soft detector valves. This is accomplished by connecting the negative H.T. to the slider of the potentiometer, and then connecting the resistance coil of the potentiometer across the filament battery. With the potentiometer connected in this way, it is possible to vary the H.T. by 6 volts, assuming the filament battery is a 6-volt battery.

A third use for the potentiometer is to increase the resistance of the aerial, and so to reduce the radiation from regenerative circuits. When the potentiometer is used for this purpose, it is really connected as a rheostat rather than as a potentiometer, for the slider is connected to the aerial,

thus giving a simple crystal circuit. If the switch is thrown over to the right, the telephones are connected in circuit between high-tension negative and low-tension negative, and the crystal is connected to the primary winding of the low-frequency transformer, thus making a crystal circuit followed by a single valve amplifier.



To Use Optional Crystal or Valve Detector.

To enable this to be done, it is hardly necessary to use a switch, although one could be incorporated in circuit if required, as shown in Fig. 9 at S. To use the valve as detector the switch S must be opened, but, of course, the same result would be obtained by raising the cat's-whisker from the crystal, in which case the switch could be dispensed with.

Fig. 10 shows another method of using either crystal or valve as required, but this necessitates changing over the telephones from one pair of terminals to another. With the telephones on the terminals T1, the crystal only is in circuit, and if they are connected to terminals, T2, the valve is in use as detector.

Changing Tuners.

It is often necessary to change over from long to short wave reception or vice versa, and when plug-in coils are used the operation is very simple and does not require switches. But in cases where cylindrical coils—either simple aerial coils or loose-couplers—are used, some means of changing over by switching is necessary. Fig. 11 shows a method of doing this, and in the diagram an aerial coil and a closed circuit coil are used in both tuners.

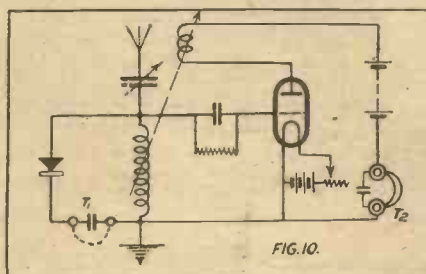
P1 and S1 are the aerial and closed circuit coil respectively of the short-wave tuner, and P2, S2 the coils of the long-wave tuner. S is the change-over switch. It will be seen that the lower ends of both primary coils are connected together and also to earth, and that the aerial is connected to the upper centre switch contact. The aerial tuning condenser, C1, is connected between the aerial and earth. The lower ends of the closed circuit coils, S1 and S2, are joined together and taken to the lower side of the detector circuit, which is shown as a crystal circuit in the diagram.

If a valve is used, this connection would be taken to negative of the low-tension battery. The upper ends of the aerial coils, P1 and P2, are taken to the upper left and right-hand switch contacts, and the upper ends of the closed circuit coils, S1 and S2, are taken to the lower left and right-hand contacts, the lower centre contact being taken to the crystal. If a valve is used, this connection would be taken to the grid leak. The variable condenser, C2, which is required across the closed circuit coil, is joined across the detector circuit as shown.

METHODS OF SWITCHING IN WIRELESS.

(Continued from page 375.)

and to the primary winding of the transformer respectively. With the switch over to the left, the telephones are connected in the circuit between the crystal and earth,



Mainly About Broadcasting

by
The Editor

IN last week's issue of POPULAR WIRELESS I drew the reader's attention to a proposal recently made that the Radio Society of Great Britain should fight a test case with the Post Office on questions relating to the latter's treatment of the wireless amateur, with particular reference to the transmitting amateur.

It appears that the Post Office restrictions have become so stringent that, according to the Radio Society of Great Britain, the rights of the amateur are seriously endangered. The position, in the eyes of the Society, is so serious that the suggestion of fighting a test case has arisen as a natural result. There is no doubt, as I mentioned in last week's POPULAR WIRELESS, that the Post Office restrictions are most irritating and in many cases most uncalled for, but that does not mean that the best way to alleviate the amateur's lot is to fight a test case with the Post Office.

Does the Radio Society of Great Britain realise that, when an amateur makes application for a transmitting licence and asks permission to use more than 10 watts, the Post Office have to refer this application to the Admiralty, the War Office and the Air Force, and that in many cases the Post Office's refusal to grant a licence is due to some objection raised by one of the fighting forces?

The R.S.G.B. and the P.O.

Although these official restrictions emanate from the Post Office, they are in many cases inspired by the Admiralty, the War Office, and the Air Force, and if a test case was fought the Radio Society of Great Britain would not very much improve things, because the three forces I have mentioned would have something to say in the matter, and naturally their point of view would receive most serious consideration. A much better plan would be for the Radio Society of Great Britain to strenuously fight for a round table conference with all those concerned and by hook or by crook come to some understanding, but an understanding based on friendly relations. A test case would practically mean a declaration of war.

It is a great pity that the amateur should receive such unsatisfactory treatment after the very excellent work he has accomplished. I am quite sure that the Post Office and the fighting forces realise how much they owe to the amateur transmitter and the experiments he has made in connection with short-wave work and long-distance transmissions on low power, and I am equally convinced that the authorities will do all they can to assist the R.S.G.B. in obtaining more freedom and a better status for the amateur, but test cases will not help matters at all, especially if they are subsidised from outside sources.

The R.S.G.B. stated that applications for transmitting licences are often refused, even in the cases of experts, whose applications have been proved by the R.S.G.B. Council. Furthermore, the R.S.G.B. make strong objection to the many onerous re-

strictions placed on the present holders of transmitting licences. I am one of the first to admit that some of these restrictions are frankly stupid, especially the restriction forbidding amateurs to call up other amateurs not residing in this country. One has many sympathies with the R.S.G.B., and one certainly appreciates their very good work.

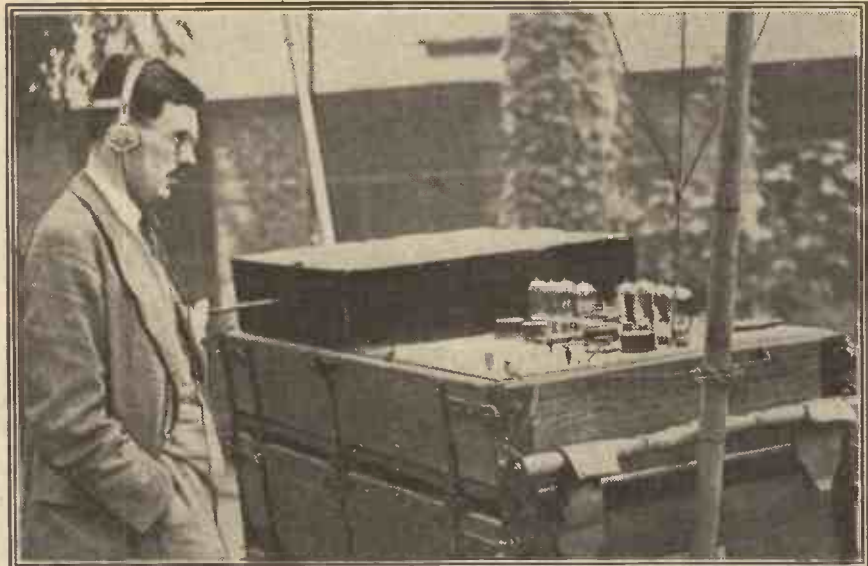
When looking at the whole question, from the point of view of the ultimate benefit for the general amateur, it must be said that the proposed policy of fighting a test case is to be most emphatically deplored and discouraged, as it would ultimately do no good to the position of the wireless amateur in this country.

success may be the first stage towards a regular interchange of messages between British and Australian amateurs.

I am sure every reader of POPULAR WIRELESS will eagerly await the confirmation of Mr. Galpin's reception, and, if it proves satisfactory, will extend to him their most hearty congratulations.

Broadcasting the Zoo.

Recent experiments of broadcasting the Zoo proved so very successful and so very entertaining that the B.B.C. are likely to make much greater use in the near future of their novel "wireless pram." This "wireless pram," I understand, was originally suggested to the B.B.C. by Mr. Leslie



One of the B.B.C. staff and the "wireless pram," used recently in connection with broadcasting the Zoo.

Australia Heard?

It was reported recently in the "Daily Mail" that a wireless amateur living in Herne Bay had picked up the call-sign of an Australian amateur on a two-valve set early one morning, and also that he had logged over forty American stations in the brief space of one hour.

At the time of writing these notes no confirmation of this claim has been given, but if it should prove true the success of Mr. Galpin—that is the name of the Herne Bay amateur—must be a tremendous incentive to other amateurs in this country. If Mr. Galpin did receive this Australian call it certainly constitutes a world's record which will be very hard to beat. At first sight it seems almost incredible that a two-valve set should pick up a signal from such a great distance, and, even if the signal is confirmed, one would naturally be inclined to think it a most extraordinary freak case.

But nevertheless, in these days of rapid progress it never pays to treat such incidents with scepticism or to accept them off-hand as a mere freak of nature. The feat may be repeated, and Mr. Galpin's

G. Mainland, the well-known "L. G. M." of the "Daily Mail" and the popular writer on Zoo topics. It is, I believe, the first wireless pram ever built, and should enable the B.B.C. to indulge in a variety of interesting stunts which will greatly enliven broadcasting this winter. This small portable transmitter can be wheeled about with comparative ease to places generally considered inaccessible to wireless transmitters, and the B.B.C. are to be congratulated on the great success of their efforts and on the very successful results they have obtained with their new "baby."

ANOTHER FREE BOOKLET.

"All about the B.B.C." is the title of another booklet to be given away with next week's "P.W." A special article by Mr. J. C. W. Reith, and several features for the new amateur will be included in next week's enlarged issue.

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BROADCASTING FROM THE ZOO.

By "ARIEL."

THE animals and birds who are resident in the Zoological Gardens were quite surprised and mystified recently when Captain West and his staff made an unexpected visit to their estate. Not only were they mystified, but they were thoroughly annoyed with the intruders for delaying their evening repast, and I noticed that while passing the Mappin Terrace, the home of the white bears, "Sam" showed his annoyance by speaking in a very high tone to his new wife.

This was hardly to be wondered at, considering the weird appearance of Captain West's "wireless pram," which contained little "Mike," the B.B.C.'s new baby, which has been christened by Captain P. P. Eckersley 2 B.B.C.

The pram contained two bamboo poles—about 8 feet apart—the aerial being connected to a small transmitting set of 12 valves. The power of this set was 200 watts, and working on a 100 metre wavelength, the concert given by the chosen artistes was transmitted to another station in the Zoo, from whence it was relayed to 2 L O.

The Wireless Pram.

When the pram was wheeled outside the house of Mrs. Hyena, the keeper produced a bone of rather large dimension, which naturally made her laugh heartily at the prospect of a West-end dinner. The laugh proved so infectious that the engineers could not refrain from joining in too!

After wishing Mrs. Hyena a pleasant afternoon, the pram proceeded to the abode of the Laughing Jackasses, who did not appear to be quite so interested with the callers, but satisfied their request by exercising their vocal cords.

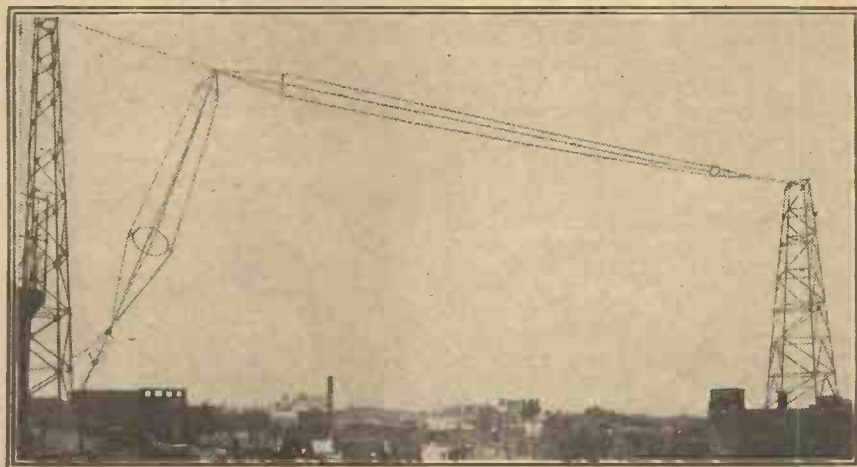
But probably the most exciting part of the programme was that performed by the 15-month-old baby walrus, and her colleagues—the sea-lions. I was warned by Uncle Leslie, who was responsible for this tour, that if by chance the baby's voice broke, while "Mike" was silently looking on, not only would "Mike" pass away, but also anybody who may have been at 2 L O; yet some listeners would have heard, without the aid of 'phones or loud speakers, because she can broadcast her voice over 2½ miles! In fact I was told by a friend who lives at Hampstead, that when old Mr. Walrus was alive, he was able to hear the monster's call for breakfast. My friend also stated that when Mr. Walrus's voice was audible, it was an indication to him that the wind was N.W., and that the weather was likely to be bad.

The B.B.C. have decided that when the baby walrus grows up, they will engage her as The Clerk of the Weather, and will probably consult her as to the weather forecast.

But it so happened that "Mike" was spared on this occasion because baby Walrus proclaimed her juvenile voice.

During the broadcasting of the sea-lions' concert and the baby walrus, many Press photographers had assembled themselves at the foot of the imitation mountain in the

walrus pool. This, however, did not please the residents, who were at the moment entertaining "Mike," and they therefore gave chase. I noticed one photographer in a very bad plight, for he was compelled to climb the "mountain" with his camera as quickly as he possibly could, and it was not until the keeper produced a bucket of fish that he was able to descend—much to the amusement of the spectators.



The Aerial System of the Brussels Broadcasting Station.

At the conclusion of "Mike's" visit to the Zoo, she was wheeled to Uncle Leslie's little hut, where he had been broadcasting interesting stories on the lives of the animals that had graciously responded to the request of the B.B.C. in giving an afternoon's entertainment, and finally taken home to the quietude of 2, Savoy Hill.

A NOVEL FRAME AERIAL.

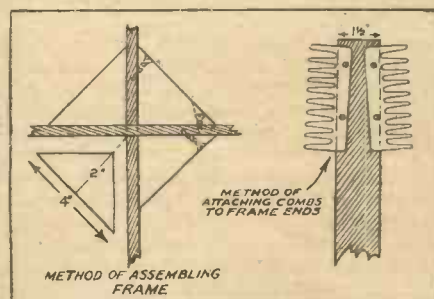
(From a Correspondent.)

THE aerial described in this article is well worth the trouble and time spent on its construction.

It would perhaps be as well, before proceeding further, to write down a list of the materials required. They are as follows:

	£	s.	d.
2 6-ft. lengths of 1½ in. × ½ in. planed wood, cost	1	0	
1 1½-ft. length of 2 in. × 1½ in. planed wood, cost		4	
8 2 in. × 8 in. size wood screws		4	
8 ½ in. × 6 in. size wood screws		2	
8 broad-toothed celluloid combs, each 4½ in. long, at 5d. each	3	4	
3 lb. of 16 S.W.G. line wire at 1s. 6d. per lb.	4	6	
8 insulated hooks at 1½d. each	1	0	
4 yards of electric lighting flex at 4d. per yard	1	4	
2 tie-clips at 3d. each		6	
Total cost	12	6	

The frame itself consists of two pieces of wood 6 ft. by 1½ in. by ½ in., each piece having a slot cut out in its middle ½ in. wide by ½ in. deep, to accommodate the other. When thus fitted together, angle pieces cut from the wood 2 in. by 1½ in. are then fitted into the four corners thus formed, and held in place by the 2 in. by 8 wood screws. The eight combs are then drilled, two holes each, 2 in. apart, and fixed two on each frame arm near to the end. Next, wind on one side of your frame eight turns of the line wire equally spaced over the width of the comb teeth; this will mean that the turns will be about ½ in. apart. Then, on the other side of the frame, wind on six turns of line wire. In this winding the turns will be about ⅝ in. apart.



The remaining hooks may now be screwed into the beams supporting the ceiling of the wireless room, in positions corresponding to those of the hooks in the frame.

"ALL ABOUT THE B.B.C."

Is the title of next week's booklet given away with every copy of "P.W."

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—Judgment	—Self-Confidence
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—Will-Power	—Tact
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—Ideation	—Salesmanship
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It may be a typewriter, an office desk, or a shop counter.

It may be the customs, traditions, and conventions of your profession.

It may be the unchanging routine, the drab monotony, the mechanical regularity of your daily work and habits.

Sooner or later that is the machine which threatens all of us. The months and years roll on; the vision fades; the ambition that once fired us and drove us forward disappears. A network of Habit entangles us: the mechanism of our Business has clutched us in its coils; our Individuality has been surrendered to Routine; we have lost our Initiative, our Freedom of Choice; we have become the slaves of a soulless machine.

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This extract from a letter received from a Pelman Student is typical of thousands of similar communications from men and women who have developed INITIATIVE, CONCENTRATION, OBSERVATION, ORIGINALITY, SELF-CONFIDENCE, JUDGMENT, DECISIVENESS, ORGANISING POWER, PERSONALITY, and other invaluable qualities of mind and character, by means of Pelmanism. And side by side with the development of these qualities have come increases of income to the extent

of 50 per cent, 100 per cent, even of 200 per cent and over, and promotion to positions giving greater scope and wider possibilities.

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Writes a CASHIER.

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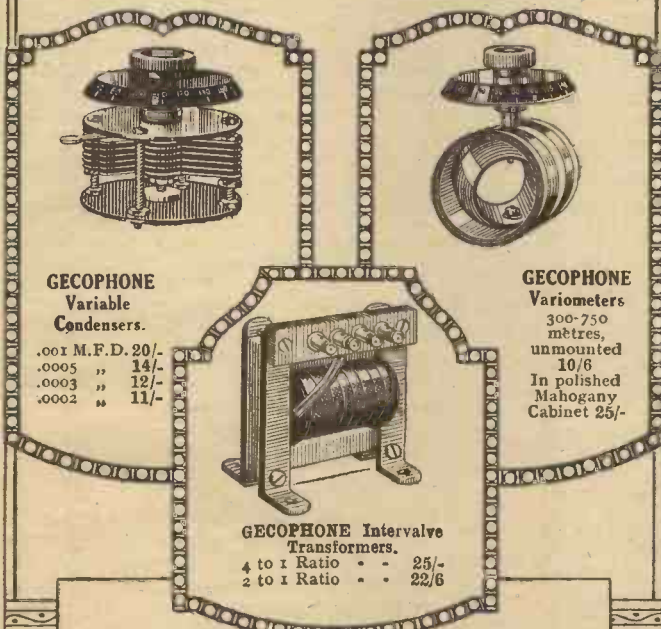
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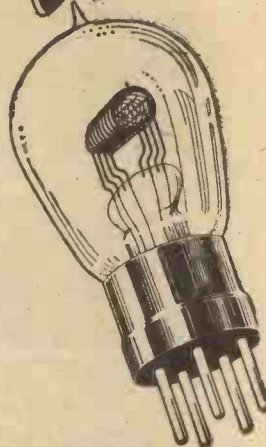
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HOW TO MAKE EFFICIENT CARD INDUCTANCES.

By R. H. COWTAN.

Basket Coils can admittedly be bought cheaply, but they can also be made cheaply. This article will clearly explain how.

THOSE who make their own parts are either experimenters or constructors.

The man with the B.B.C. licence is the man who is satisfied with the results to be secured from the sets especially made for the purpose of receiving the B.B.C. programmes; and there is but little doubt that he is well provided for. If his pocket be

of the plug-in type—and really I cannot think that for general purposes any other type fits the bill so well—there are so many reasonably priced and most efficiently working commercial coils that I would not take the responsibility of recommending any particular make.

For Larger Coils.

However, I am concerned with the making of our own. For best results we believe our experiments teach us, and very few will differ, that the basket type of coil is not easily to be beaten, particularly for the low wave-lengths. Basket coils may be bought cheaply and they may be made cheaply.

So far as actual aerial tuning is concerned, let us have small resistance and low capacity in the coils with a large, say .001, condenser. For anode and reaction, more capacity, if we are to satisfactorily tune with smaller condensers, for ordinary purposes.

For aerial tuning my experience has proved small bell flex (10 by 36) ideal. 350 to 600 metre wave-lengths are catered for by winding 55 turns of this wire on a cardboard, or fibre, former $1\frac{1}{2}$ inches centre, nine slots; the condenser (.001) being in series with the earth for wave-lengths up to about 400 metres, and in parallel beyond this. If cardboard is used for the former it should be cut in the form of a circle with a radius of $2\frac{1}{2}$ inches (Fig. 1), the slots being $\frac{1}{2}$ inch wide, and the former well shellacked and dried before winding is commenced.

Winding, of course, commences at the centre of the former, and in the case of the smaller coils, as the one we are now concerned with, the wire is wound in and out of each slot. For larger coils, say up to 150 turns, the wire should be wound through every other slot—i.e. commencing at No. 1 (Fig. 1), the wire is taken underneath and brought up through slot No. 3, down through No. 5, up through No. 7, down through No. 2, up through No. 4, and so on, until complete. Still larger coils up to 350 turns may be wound in triple spacings, so 1, 4, 7, 3, 6, 2, 5, 1, etc. In this case, however, there should be but seven slots in the former. When the necessary number of turns are wound, bore a small hole through the card former and thread the wire end through, securing with a dab of varnish.

The next process is to mount the coil and, as the writer has already suggested, if coil holders and formers are to be purchased in addition to the wire one has to spend almost as much as would purchase a good commercial coil. Therefore we must devise a cheap and satisfactory method.

The writer has solved the problem by using the following method.

First procure some cardboard, anything but the soft, spongy variety—"coated board," I think, is the correct description of the best class for our purpose. Cut a strip 6 inches long and 1 inch wide (A, Fig. 2) for each coil holder.

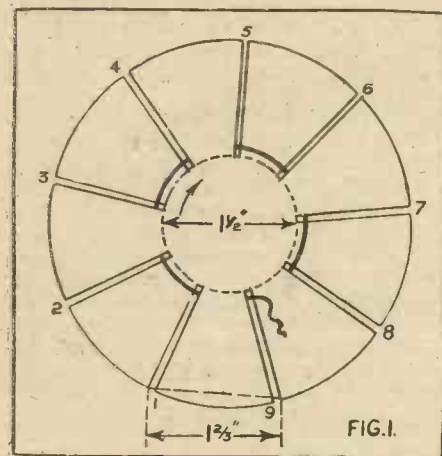
(Cardboard boxes favoured by dress-makers are just the thing for card formers and holders, but be careful how you remove the wife's best dress.)

These strips should be well shellacked, and while they are becoming "tacky" cut some small pieces of scrap ebonite, or gramophone record, into oblongs 1 inch long and $\frac{1}{2}$ inch wide, clean up and bevel with a file and drill two holes, $\frac{1}{4}$ inch centres to take plug and socket to fit standard coil holders (B, Fig. 2). Two similar holes must be drilled in the cardboard strip at C, and the ebonite fixed with a little shellac. Some terminals of the plug-in variety (A B, Fig. 3) should be procured; one terminal, i.e. two halves, is required for each coil mounting.

Important Incidentals.

It may be permitted to digress a little here to describe more fully these apparently little-known terminals, which, when their two halves are pulled apart, become plug and socket of standard size with threads ready cut that they may be secured by nuts to the small oblongs of ebonite we have fitted to our coil holder. First, however, the plug should be lengthened by taking the under half nut (C, Fig. 3) and screwing it on to the thread (D, Fig. 3) before the plug is fitted to the ebonite (A, Fig. 4).

The two half terminals should now be



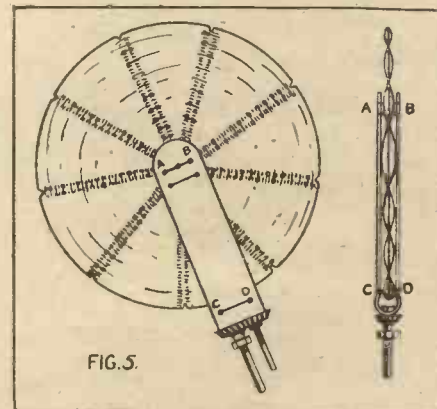
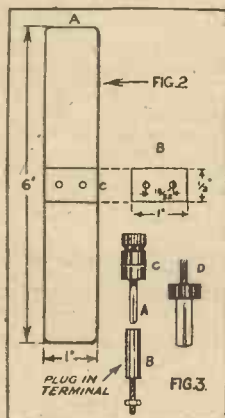
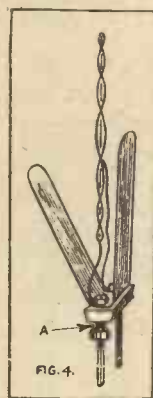
deep enough he may receive every station, transmitting on a wave-length of from 350 to 500 metres, on a loud speaker.

The constructor may be said to be the person who, desiring to secure good results from one or all, stations, prefers the honour and satisfaction of getting his results from his own individual effort. He may buy parts and arrange them, but generally, especially if he can obtain good data, he will choose to build many of his parts.

Best for Aerial Tuning.

The experimenter pure and simple may only desire to put his experiments to certain definite objects, but I imagine, if he is anything like myself, to arrive at certain conclusions from such experiments he will build his own parts; from technical data, from experience, or from the experience of others who voice their results and views through the media of these essential journals whose aim certainly is to encourage and assist.

Inductances are, perhaps, the first thought of every constructor and experimenter; if



fixed with a nut in the holes drilled in our mount, and the ends of the coil fixed to plug and socket either by soldering or between nuts and washers. The card holder is now carefully bent, having been well soaked with shellac and now in a "tacky" condition, as shown in Fig. 4; and if a round

(Continued on page 382.)

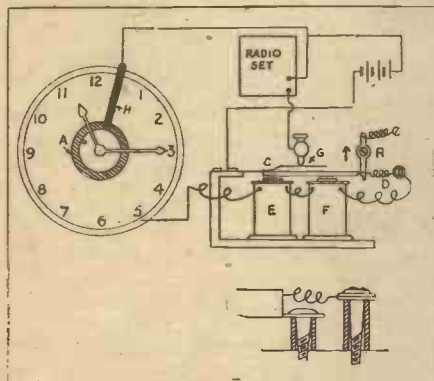
HOW TO MAKE A TIME SWITCH FOR YOUR SET.

By B. F. SHORTT.

In connection with the charging of accumulators the simple time switch described in this article will prove of value to many amateurs. An old alarm clock, an old bell, and one or two "odds and ends" are all the components needed.

AS a great number of broadcasters have acquired the habit of listening-in at night in bed, the accumulator-charging business has made great strides lately. This is due to the fact that most people fall asleep unknowingly, and forget to switch off the filaments, if they are using a valve set. When they wake up next morning, it is to find the low-tension battery run down.

Therefore a description of a time switch, which the writer has used successfully for some time, to automatically switch off the filaments at any desired time may interest those amateur experimenters who like to dabble about with various "gadgets." A glance at the accompanying diagram will show that it is almost self-explanatory. The only apparatus needed is an alarm



clock, an old electric bell movement, and a few odds and ends that nearly every wireless enthusiast possesses. The action of the switch is as follows.

A movable cardboard disc, A, having gummed to it a piece of tinfoil shaped as shown at the shaded portion, is fitted behind the hands of the clock in such a way as to allow of its being turned round. The disc can be set so that the small projecting strip of tinfoil is opposite the hour it is required for the set to be switched off at.

A small piece of springy copper wire is attached to the hour hand so that it makes contact with the projecting strip of tinfoil when it passes over it.

When it does so, a circuit is completed through the electro-magnets, E and F. The armature, C, is attracted, and the ratchet, R, slips in and holds it, thus breaking the filament circuit at G. At the same time the wire connection, D, springs clear on account of its tendency to press outward in the direction of the arrow-head. This manner of connecting is necessary, as any other method will result in the armature merely buzzing instead of breaking the filament circuit.

It will be noticed that the end of the

armature is slightly bevelled in order to maintain this contact until the right moment.

On the clock, the thin strip of brass, H,

NEXT WEEK'S "P.W."

will contain another Free Booklet, "All About the B.B.C.," by "Ariel," and many excellent features for the amateur just commencing to study wireless in theory and practice.

Order your next week's copy NOW.

serves two purposes—to make contact with the tinfoil when the disc is in any position, and also to hold it when set.

HOW TO MAKE CARD INDUCTANCES.

(Continued from page 381.)

stick, as a piece of dowelling, is used to bend them on, the two halves will come round easily and neatly, the coil, of course, being put between the two halves. The holder should now be pressed close to the coil and sewn tight with waxed thread as shown at A B and C D, Fig. 5.

The writer prefers to shellac varnish the whole of the finished coil and holder, and readers are recommended to varnish at least the card holder. When finished, the coil and holder has a neat and workmanlike appearance, and will stand any amount of rough usage. Fig. 5 shows the coil and holder complete.

Where large coils are to be mounted, as, say, one with 350 turns, triple spaced, a round ruler, or walking stick, should be

This connection must be insulated from the clock frame, while the other connection to the clock may be made at any convenient part of the metal, such as one of the legs. This device has several advantages which can be summed up as follows. It in no way interferes with the ordinary working of the clock, no separate batteries are required, the low-tension battery giving the necessary current to work the switch at the right moment, and an impulse of current lasting only a fraction of a second is used.

The method of fixing the disc and the brass strip to the clock will depend on the kind of clock which happens to come handy, but with the usual small tools the amateur should experience no difficulty in rigging up this useful piece of apparatus. All connections must be clean, including the tinfoil and also the point on the hour hand where the copper wire is attached. The ratchet, R, can be cut out of a small piece of $\frac{1}{8}$ in. brass sheet. The diagram shows the manner in which it and the spring contact, D, is mounted.

used to bend the card holder. If good compressed cardboard is used and well soaked and coated with shellac varnish, it will not crack when bending; it should be bent before it hardens, and it will wear like leather. If only soft cardboard is available it may be well soaked in molten paraffin wax and bent while hot, but this method is rather inclined to be messy and the writer prefers the former method.

The anode and reaction coils, except for very low wave-lengths, are, in the writer's opinion, best wound with 28 S.W.G. D.C.C., in preference to heavier gauge wire, unless a large variety of coils are going to be used with large capacity condensers in series.

The following is a tabulation of the coils made and regularly used by the writer with great success; in fact, most commercial coils have been compared, with little or no better results.

Readers should note that 10/36 flex is sold double, so that for coil winding the two wires must be unwound into singles. Two ounces of No. 28 D.C.C. gives just 180 turns on the card-former described.

Wave-length in metres.	Aerial Coil.		001 Condenser.		Anode. 0003.		Reaction.	
	Turns.	Size.	Series.	Parallel.	Turns.	Size.	Turns.	Size.
Under 200	25	10/36 flex	S	-	40	10/36	45	10/36
Over 200				P				
350-420	55	"	S	-	75	28 D.C.C.	50	28 D.C.C.
420-600	"	"	-	P	"	"	75	"
900	125	"	S	-	125	"	100	"
1050	"	"	-	P	150	"	"	"
1780	150	28 D.C.C.	-	P	200	"	100/150	"
2600	250	"	-	P	200	"	200	"

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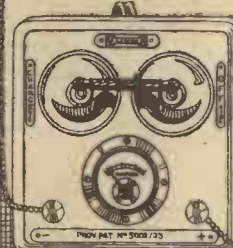
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Artistes of the Aether

By "Ariel"

Some of the artistes who have given you pleasure when listening-in.

IT has long been said that "humour is the salt of life," and though a bad cook may often "over-salt" a dish, yet many a bad B.B.C. programme has been saved by this "saltiness."



Miss Vera Beringer.

The query night was another success, and though I didn't aim for that five guineas, I know I spotted some of the stars. There has been, also, a marked improvement in the concert parties. We are losing the kind of song that someone—wasn't it Pett Ridge?—described as "having three

verses with no meaning, and one verse with two." A new clever little sextet was found in "The Londoners."

Under the direction of Mr. Charles Harris, this clever little band of West-End artistes contrived to give a bill of clean humour, well sung songs and solos. Mr. Harris has had wide concert-hall experience himself, gaining a big repertoire. He believes, also, in giving the best of art, and has gathered round him two good vocalists in Miss Josephine Lamb (soprano) and Mr. Reginald Johnson (baritone), both of Queen's Hall, a brilliant violiniste in Miss Marjorie Bose (London Coliseum), Miss Iris Jay (Palladium), and another capable accompanist in Miss Olive Peake (Queen's Hall).

Wireless Drama.

Judging by the increase of plays in the B.B.C. programmes, it seems as if drama is appreciated, despite the natural depreciation by the loss of action and scenic effects.



Miss Dorothy Howell.

2 I.O. did very well with A. Neil Lyons' Cockney study, "A Penny Bunch," because it had the services of two of the finest character-study actresses on the stage, in the persons of the Misses Esme and Vera Beringer.

Miss Esme Beringer followed up her triumph before the microphone from the week previous, while Miss Vera Beringer was a new-comer to this particular branch of histrionic art. Daughter of two famous

authors and composers, Mr. and Mrs. Oscar Beringer, Miss Vera made her first appearance as a child in her mother's play "Tares," and she was the original Little Lord Fauntleroy in Mrs. Frances Hodgson Burnett's own dramatisation of her book.

Of course, the palm goes to John Henry for his opera, and with such coadjutors as Helena Millais, Gladys Newth, and Robert Chignell, to say nothing of "Blossom," the result was inevitable. 2 L.O., also, later in the week, gave us an old favourite in "The Belle of Brittany," produced for broadcasting purposes and conducted by Mr. L. Stanton Jefferies.

Nature Music.

Cardiff probably forgot the weather report, but gave us fine tone pictures of the forests, the valleys, the heights and lanes. Delius, Debussy, Elgar, Beethoven, and

fame. We can count on Dame Ethel Smyth, though to get first performance of her famous opera, "The Wreckers," she had to look to Germany, Madame Lisa Lehmann, and now for classical work a very young composer indeed in Miss Dorothy Howell, composer and pianist, too.

Born in Birmingham, she soon showed musical talent, and subsequently studied at the Royal Academy, under John B. McEwen, now its principal, for com-



Mr. Anderson Nicol.

position, and with Percy Waller and Tobias Matthay for piano. Her first orchestral work, "Lamia," was performed at one of the Promenade Concerts under the direction of Sir Henry Wood in 1919, at which the writer was present. I remember very distinctly the uproar of real enthusiasm which followed, and the work won the rare distinction of a repeat performance within the week.

Up in the North.

Why the northern stations should produce such excellent singers is not always easy to understand; perhaps their "weather reports" are different. One of the best heard anywhere is the Scottish tenor, Mr. Anderson Nicol. With a repertoire of over eighty works, a reputation for fine work that ranges from the Italian and German opera houses, the London



The "Londoners" Concert Party which performed recently at 2 L.O.

Schubert were some of the composers whose works lent themselves to the scheme, and Miss Astra Desmond the singer. The Manchester programme obtained their "foliage" from the Russians, Tchaikowsky and Glazounov, with Vaughan Williams and Edward German as English representatives, amongst others, and delicious vases of Joyce (The English Waltz King), and Godin.

The British Composer.

Hard and uphill has been the task of many pioneers in music to combat the prejudice against native talent. Sir Henry Wood, Sir Dan Godfrey, Isidore de Lara, Granville Bantock, all have waged war on behalf of the "home-made supply." The fate of the woman composer is harder still, and but few have achieved real and lasting

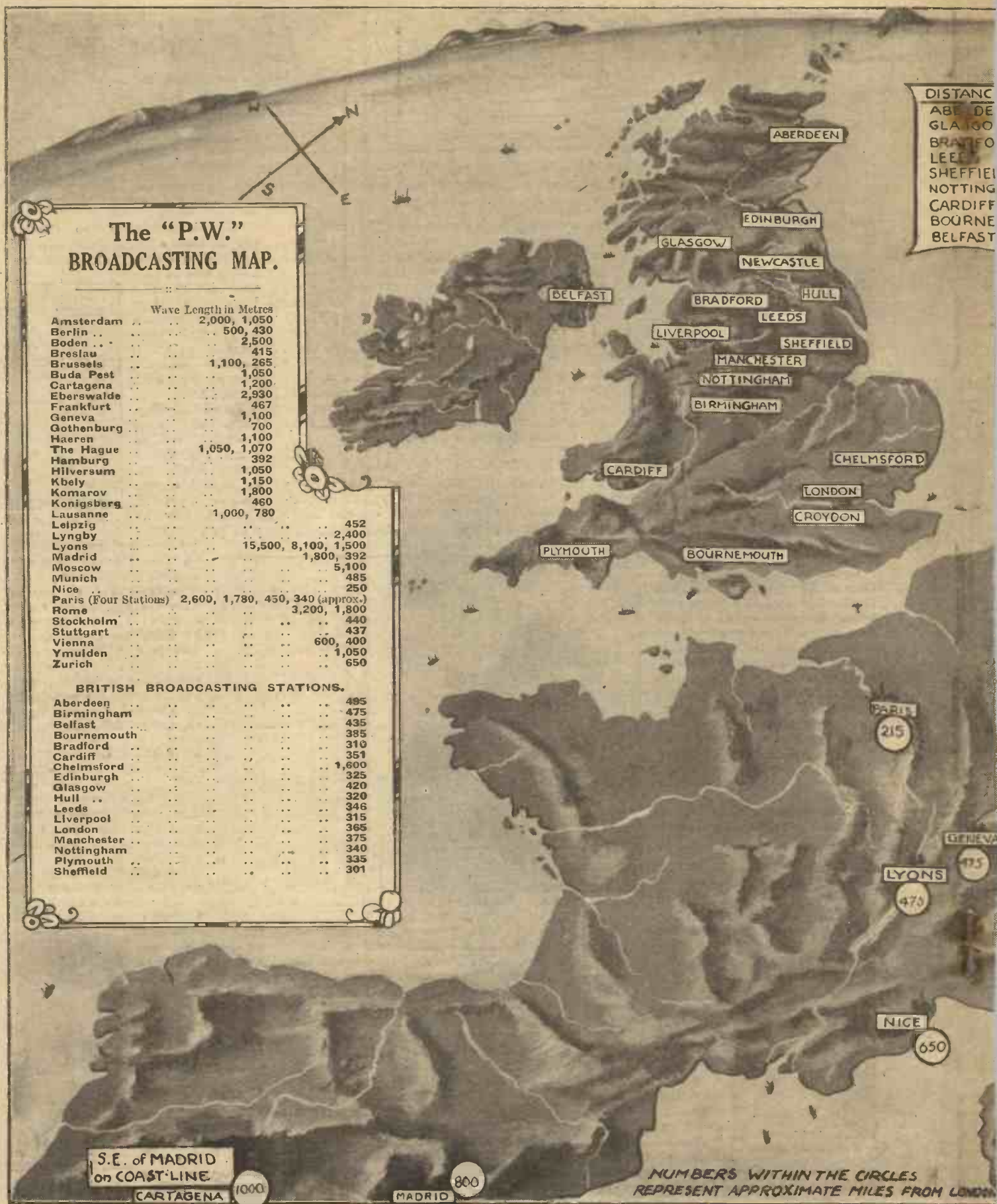
Symphony concerts, oratorio societies and his tours throughout South Africa, Australia, United States, and Canada, it must be extremely difficult to make a choice of his songs.

Aberdeen.

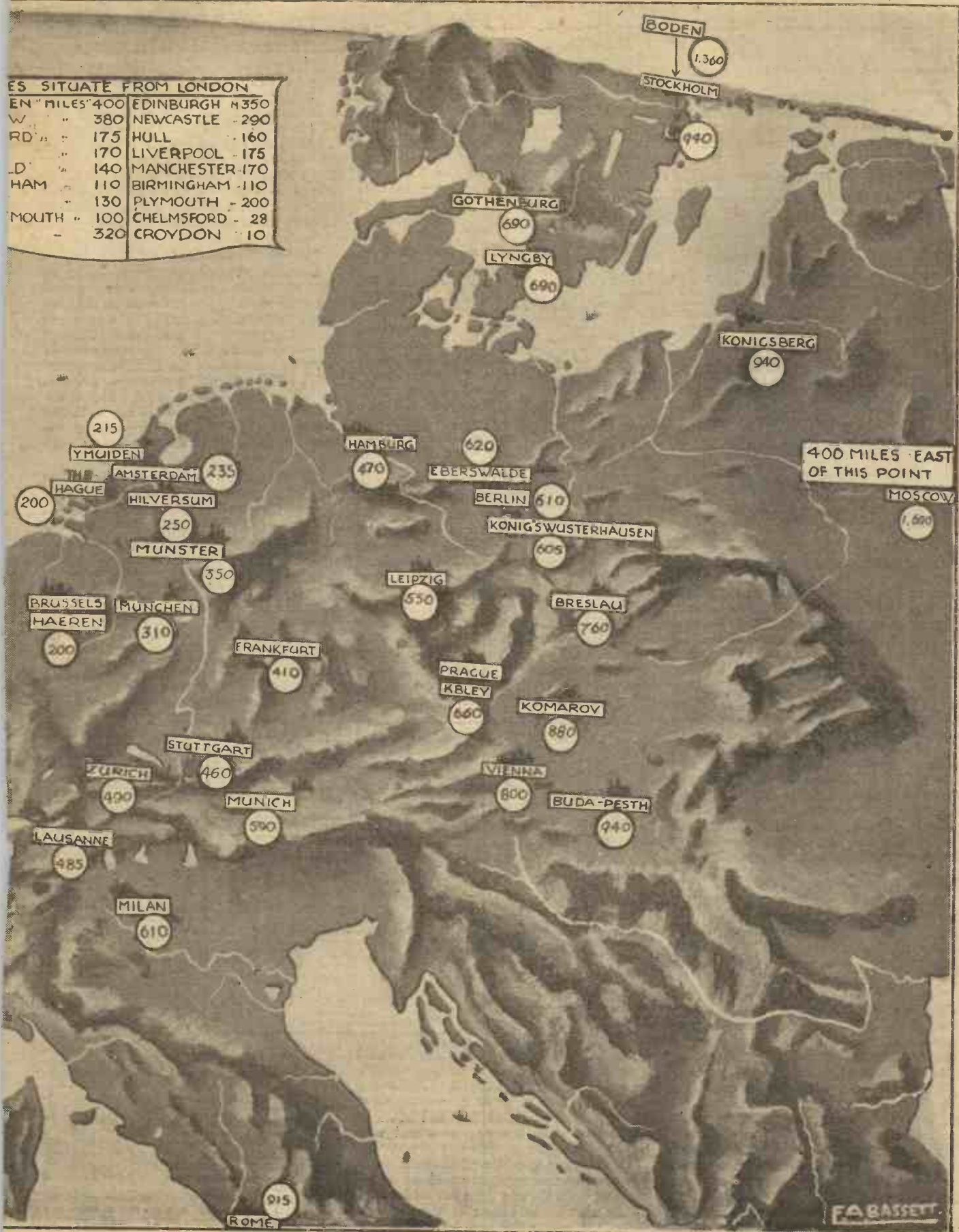
For real "high-brow" music give me Aberdeen every time. Many of the programmes are not things to be undertaken lightly, or listened to in fits and starts, but 2 B.D. certainly takes its work very seriously.



Mr. Laurence Macaulay.



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FABASSETT

REMOTE FILAMENT CONTROL.

By SEXTON O'CONNOR.

ONCE a valve set has been installed at home the demand soon arises for some method of wiring-up the various rooms of the house in such a way that the telephones or loud speaker can be quickly transferred to whatever room is for the

to be simple and reliable in action. It can be constructed at small cost, and calls for no more skill than that required to build a simple receiving set. The only tools required for the job are a drill, a saw, a soldering iron and a file, whilst the actual components are such as can be picked up at any time for a couple of shillings or so on a market stall or in a junk shop.

The principle of the idea is to arrange the main filament switch in the apparatus room, near the actual set, and to control it by means of a "brush contact" located in each room, utilising for this purpose only a momentary current derived from one extra dry cell.

The first requirement is an old alarm clock or other clock motor. Of this only the main-spring and the train of

wheels down to that carrying the seconds hand are really necessary. The balance wheel and lever should be removed, if they are not already missing when the article is obtained. The real essential is some mechanism that can be wound up to make a wheel go round.

The second requirement is a drop indicator or relay such as is used to show in which room an electric bell has been ringing, or to indicate to a telephone operator what

in use. The escape wheel, it may be mentioned, is the last wheel of the train, and has saw-like teeth. The only other wheel that requires handling is the "seconds hand" wheel marked 3 in the diagram.

Four holes are drilled out at equal distances around its rim, and are then plugged with pins, 2, which are left projecting for about an eighth of an inch on the outer side of the wheel. The pins should preferably be of steel, and may with advantage be soldered in order to ensure a tight fit. A moderate-sized needle will do nicely for the job. The wheels are now replaced in their original order, and the clock frame is then screwed down on to a baseboard, 5.

The Relay.

A small piece of ebonite fibre shaped as an oval or "cam," as shown, is now drilled centrally so as to fit tightly on to the projecting spindle, 6. Beneath the cam are arranged two strips which are insulated from one another, and are connected to leads in circuit with the filament accumulator. These form the main filament switch. Normally the contact points at the free ends of the strips do not touch, but as the spindle, 6, turns, the long edge of the cam moves them into contact, and so lights up the valves.

All that remains to be done is to control the cam by some device which will allow the wheel, 3, to turn just one-quarter of a revolution at a time. This is effected by means of the drop indicator, or relay, 10.

Upon the end of the arm, 11, secured to the plate or armature, 13, is soldered a catch, 12, which normally falls into position to hold one of the pins, 2, on the wheel, 3. To do this the electro-magnet is first soldered on to a piece of brass which is then screwed on to the base board, 5. The brass arm, 11, can then be bent until the catch takes hold of one of the pins, 2, and prevents further rotation. As the wheel stops, the cam is adjusted and firmly fixed on its spindle so that the contact strips are pressed together, thus completing the low-tension circuit.

The next time the relay is operated the plate, 13, is attracted and "dropped," and the arm, 11, is momentarily raised to release the caught pin, 2. Immediately afterwards, the arm, 11, drops ready to catch and stop the next oncoming pin, 2, and so on. A momentary current is all that is required to pass through the relay, 10.

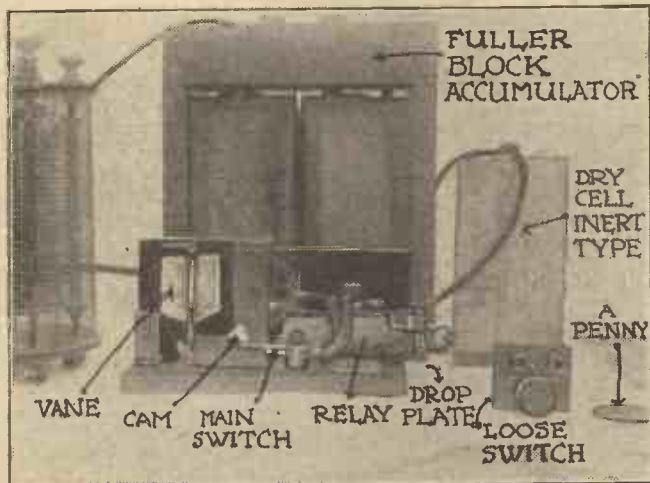
The clock motor does the work of actually making and breaking the circuit. One winding of the clock mainspring is sufficient to turn the juice on and off a thousand times, and a single dry cell or Leclanche cell will outlast many rewindings of the clock.

In wiring-up, three wires are led from the apparatus room to convenient plates as required throughout the house, a switch panel being placed in each room. The local switch is a very simple affair, being merely 1 1/2 in. square ebonite, 1/4 in. thick. It comprises

sockets, 15, to take the loud speaker or telephone leads, X, Y, from the secondary of the 'phone transformer, as shown, and a knob, 16, connected electrically at the back of the panel to the third lead, Z.

The knob carries a metal finger, 17, moving between two end "stop" screws, and brushing over an intermediate screw, which is connected at the back of the panel to one of the leads, X. When the knob is turned from one stop to the other, it momentarily completes a circuit through the dry cell, S, to the electro-magnet, 10. This is sufficient to raise the catch, 12, and allow the clock motor to make or break the circuit of the accumulator.

No disadvantage can arise from using one of the main leads for the pilot circuit, nor is there any objection to running three wires in parallel as these only carry low-frequency currents, which are practically immune from "capacity losses."



moment being occupied. For instance, it is generally convenient to instal the actual set and batteries permanently in one room—more or less out of harm's way—and wire up, say, to the dining and sitting rooms, perhaps also to a bedroom, and in some instances to the kitchen in an optimistic effort to solve the "domestic help" problem.

Such a wiring presents very little difficulty in itself, except for the fact that it is always necessary to turn on the filament current in order to receive, and that it is highly desirable (for economical and other reasons) to turn it off again when "stocks and shares," or "local weather" comes through, or during the frequent intervals when one is requested to "stand by for five minutes, please." The careful man, if he is sufficiently energetic, will rise up and walk out to the rheostat handle on these occasions.

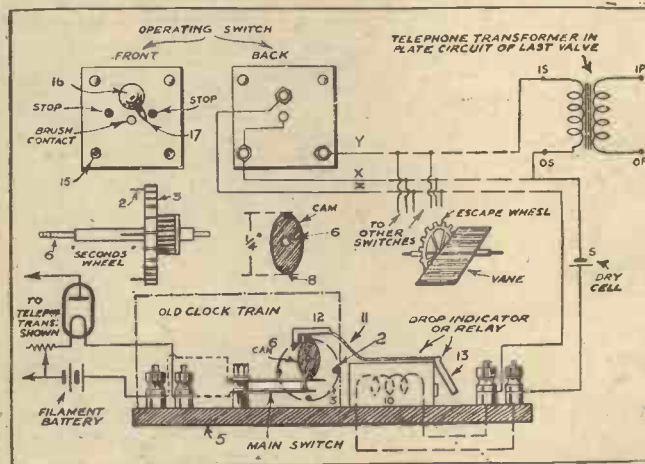
Reliable at Small Cost.

Frequently, however, this proves too heavy a strain after a hard day's work and a good dinner, and then the valves are kept alight until "closing-down" time, the penalty being subsequently paid on the bill for accumulator "juice."

There is, of course, the obvious solution of running the accumulator current through the length of the connecting wires and inserting a control switch in each room. This is, however, very undesirable for many reasons. In the first place it is a waste of good current, and will probably entail the use of an extra cell in order to make up for the voltage drop along the leads.

In the second place there is a distinct risk of "shorting" the accumulator, which is certainly not good for it, quite apart from the possibility of fire starting from the overheated wires.

The arrangement about to be described provides a remote control for the filament which has been proved by actual experience



subscriber has rung up. The only essential here is that there must be an iron core, 10, and a pivoted drop-plate, 13. The actual wiring, as bought, is of no consequence, as it is invariably too fine and must be stripped off and the core re-wound with wire of 24-28 gauge.

Commencing with the clock-work train, the escape wheel must be taken off and a vane of sheet tin or copper foil soldered on to its spindle, as shown in the diagram. This is done for the purpose of damping or slowing-down the speed of rotation when

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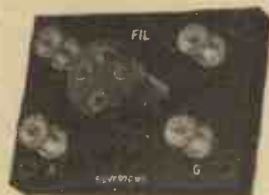


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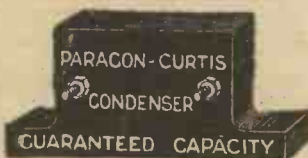
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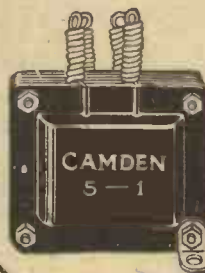
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The Law decides for Ericsson (British) 'Phones

In the High Court of Justice
the sixth day August 1924 between
THE BRITISH I. M. ERICSSON MANUFACTURING CO., LTD.
(Plaintiffs) and OTHERS (Defendants).

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The following is an extract from the Court Order:—

"This Court Doth Order and Adjudge that the Defendants their servants and agents be perpetually restrained from using the name Ericsson as descriptive of or in connection with the sale of Head 'Phones for Wireless Telephony (other than Head 'Phones manufactured by the Plaintiffs) without clearly distinguishing the Head 'Phones so sold from the Head 'Phones manufactured by the Plaintiffs and from selling or offering or advertising for sale any Head 'Phones not manufactured by the Plaintiffs in such manner as to represent or lead to the belief that the Head 'Phones so sold or offered or advertised for sale are of the Plaintiffs' manufacture.

"And it is Ordered that the Defendants do pay to the Plaintiffs their costs of this action" etc.

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WAVES AND STRAYS.

THE MOOR THE MERRIER.

By HIGHAM BURLAC.

Here is another whimsical article from the pen of a very popular contributor to "P.W."

ALL too-long ago—it seems—because the world and wireless were too much with me, I fled to Yorkshire and flung my suitcase into the raftered guest-chamber of an inn set on a moor. On the way north I slept till we had left Huntingdon behind, because I knew the aerials in the backyards would have thinned out by that time. The food at luncheon was wireless. But it was not hairless. There was no wireless set at my inn, though there was a peat fire burning there which they said had burned for over a century. Li—Oh, well, of such pleasant fictions are Love, Life and Letters composed—specially letters from crystal-users.

The Lonely Valve.

In fact, I felt that I had found oblivion and with howls of derision growing ever fainter, the "beam" system, the message from Mars, the echoes of Hyperprism, Captain Eckersley's views, Imperial wireless and the range of 5 X X, all receded to the horizon, where they coalesced into a black dot, which exploded with the noise of a crowing cock, and I awoke to a sparkling, rain-washed world of sky and heather. Presently I went out across the moors and sat me down to smoke. The heather ran in all directions to a skyline as severe and unbroken as a razor's edge; not a tree, not a bush or projection of any kind broke the smoothness of the moor's purple carpet, save a cow near by, who looked as if she must have been dropped from an airship, for she seemed as out of place there as a salmon in a hop-garden.

This lady and I shared a solitude like unto that experienced by the itinerant sword-swallower when the time comes for his passing the hat. And no hint or suggestion of wireless; I was alone with the unspoiled peat-bog and a slightly spoiled cow.

"Now, the Little People of the Heather, as the wise Roger of Lindisfarne saith, 'were wont to make honey'." I began to myself—as Madonnas are said to croon to their babes—and was exactly 186,200 miles away from wireless when I saw *IT*. Now, I do not expect you to believe me, but, if you please, we will take it for granted for the sake of the yarn. Not a yard distant, all four legs in the air—no, not another cow! Do you think I am writing about a ranch? Again!—all four legs in the air—was a real honest-to-goodness, *thermionic valve*.

A Sudden Shock.

It is related that Livingstone, when deep within the intricacies of what he fondly imagined was virgin African jungle, came upon a modern silver fork. It stuck in his gizzard and he was so desperate that he dashed out of camp and wildly discovered a new waterfall, just to show 'em the sort of man he was. So you can imagine my feelings when I found that twelve-and-

sixpenny electron-bottle. I looked suspiciously at Lady Shorthorn, but she selected another cud, with a nonchalant air—she wore the nonchalant air, not the cud—and began to chew it like a Cincinnati stenographer chews gum—anti-clockwise.

What the Ancient Thought.

I picked up the wretched thing—the valve, not the cud. It was not much weathered and the filament was intact. I am not going to make my Editor use his blue pencil by putting down the name of the maker of that valve, but—it was the best on the market. I know that because



Mr. Rogers (left) and Mr. Dowding (at switchboard) in a corner of the "P.W." workshop.

I am a student of advertisements. Well, there it was. I felt like a lover of Nature when he sees the relics of a Cockney picnic-party in his favourite sylvan nook, and I removed myself from the unhallowed spot. Ma Shorthorn must have sensed my anguish, for she arose in sections and ambled off, seeking self-expression in a fictitious milking-time.

Back at my inn, I slunk on to a seat in the smoky taproom and comradied with an ancient bogman with white whiskers round its rim. A quart of ale lubricated his vocal machinery and he uttered. He said:

"Wunnerful thing—this wireless!"

Yea, though we take the wings of a third-class ticket and fly to the uttermost parts of the moor, wireless is either with us or tarries not far behind us. Over the bar was an elegant engraving of the "Marriage of Queen Victoria and Prince Albert." I thought, "What a ripping frame aerial a crinoline would make." To the ancient I grunted:

"Y-yes! What do you know of it?"

"Nowt! But there were a young man here coom six months, wi' one of these machines what you carry with you, like it were a booket. Wunnerful warm, he were. Said he were gawn to pitch out on bog an' hear t' moosic. Coom back all doomp an' owerset, he done. Reckon t' bog sooked oop t' music. Arl alone, her were, 'ceptin' for that there box affair'n his'n. Reet mad, he were an' arl, a mutterin' an' a maumblin'—"

A Wunnerful Thing.

"Ah!" I said. "You will no doubt recall that the genial Don Francisco de Quevado Villegas, in his Second Vision, says, 'Mean souls do naturally breed sad thoughts.' What a rotter he must have been to bring his lash-up into this unsullied—"

"Dawn't naw'm. Happen he coom fra' Bradford. But this mun, what ahm telling, he shooted off fast, pretty near as he coom. Mad he were. Wunnerful thing—this wireless. Ah!"

Then I saw it all. (1) He went mad because, having brought a portable set to the moors, he found no tree whereon to hang his aerial, or (2) the bog took him while he was tuning it, and only the spare valve escaped.

"Well," I reflected, "that's some consolation. The immemorial bog rejects and defeats the modern innovator. I can go back and brood on the immortality of the "Little People of the Heather." So I brooded for three weeks, during which time, I can guarantee, the peat-fire never went out.

Sic Transit.

One evening, shortly after my return to London, Quilby dropped in and asked me to return a valve I had borrowed from him. "You slipped it into the pocket of your raincoat," he said.

And, b'gosh, I had never taken it out, either. It had fallen out, when I spread the coat out upon the Moor, for the heather was wet. *Sic transit*, another fine theory.

TECHNICAL QUERIES.

Readers are requested to turn to the Radiatorial page and read the important announcement concerning the P.W. Free Technical Queries Service.

THEATRELAND AND BROADCASTING.

WHAT THE "STARS" THINK.

By "ARIEL."

NOW that the autumn season is in full swing, it may interest readers to know what many eminent artistes think about that much-discussed problem, broadcasting and the stage.

When Television Comes !

It will be remembered that about this time last year, I interviewed Mme. Pavlova on a subject which seems very alien to her profession, and which she had never before discussed with any journalist. She told me that the music of some of her ballets had already been broadcast, and, she believed, very much enjoyed. But when I spoke to her (in my very bad French) of the possibility of television, and asked her how this would affect the future of dancing, she did not seem to be very much impressed. She replied that it was too far off to be taken seriously, and, in any case, the transmission by such a means of a complete ballet would be very difficult to accomplish with any measure of success.

Remembering this, I went round to Covent Garden last week, where I found Mme. Pavlova rehearsing. I reminded her of my previous visit, and was agreeably surprised to find that she had not forgotten it. She smiled at me, and remarked humorously, "I see you have not yet discovered television !"

Broadcasting Better Music.

I asked Mme. Pavlova if she had any intention of broadcasting the music of her ballets again next season. She answered that she had not thought of doing so. "But," she continued, "one never knows these days what may happen next. It is possible that I may. I do not disapprove of broadcasting—I think it is a very wonderful discovery. Surely, it must do a lot to keep happy the very poor people ?"

"What effect do you think it has upon the theatres ?" I inquired.

"It is difficult for me to say," she replied. "Of course, as far as I am concerned, if it has any effect, it is a good one. People only get the music of my ballets, and they may want to know what the dancing is like. In the other branches of dramatic art much will depend on how the programmes are handled. As long as the play is not spoiled by being transmitted, there is no reason why the theatre should suffer. As far as I can see, it is only necessary for the managers and the broadcasting company to come to some amiable agreement."

From Covent Garden I made my way to the Adelphi Theatre to see Mr. Owen Nares. I put the same debatable question to him, and he told me that on most points he was in agreement with the other eminent people of his profession.

"I think it would be a good idea," he said. "if the broadcasting company were to

appoint a committee which would represent the interests of both parties concerned. It might consist, for instance, of three or four theatrical managers and producers, possibly an electrical engineer, and some members of the programme staff of the B.B.C. The committee would decide what shows were suitable for broadcasting, and the terms in each case. For, like Mr. Cochran, I think that broadcasting rights should be paid for by the B.B.C. ; but this, of course, is a small point, and I understand that the B.B.C. are perfectly willing to pay for what they have."

Fortified by these sound judgments, I took a taxi round to the Palladium, to find out what Miss Nellie Wallace thought of the matter. She was sure, I knew, to offer some original solution of the problem.

earliest possible opportunity to invest in a wireless set. Provided I can purchase it on the convenient system of my friend, Mr. Drago, for he supplies the insurance policy free. Payment ? Oh, dear no ! he doesn't want any payment—Mr. Everyman !"

The Only Terms !

I tried to point out that if she did not pay up her instalments the set would be confiscated.

"Oh, dear no, Mr. Everyman ! As you are a Scotchman, and naturally rather close, let me hasten to add that we will make you a present of it if you cannot pay. And these," continued Miss Wallace with an arch look, "are the only terms I could possibly consider at the moment."

"Would you like to have the 'Whirl of the World' broadcast ?" I inquired.

"I dunno," she replied indifferently.

"But if it were broadcast," I insisted, "do you think you would draw such large audiences to the theatre ?"

"Oh, yes, probably larger ! They have only to hear Billy's celebrated top notes, and they will come round in shoals !"

"Then," I interrupted, "your opinion is that it would have a good effect on the theatre ?"

"My good man," said Miss Wallace with some irritation, hastily donning a jumper,



The Staff at the Hull Station—Mr. Bulov, Mr. Lyne, Mr. Carver, Mr. Howie, and Mr. Page (Station Director).

A Good Intention.

I sought her out between two acts of the revue, and was fortunate in securing a few minutes' talk with this most comical of comedienne. She had apparently scored yet another success, judging by the roars of applause that followed her to her dressing-room. I protest that I had no intention of being anything but serious with Miss Wallace, but it is utterly impossible to keep one's countenance when talking to her.

"Good evening, Miss Wallace," I said, boldly taking the plunge, "what is your opinion of the effects on broadcasting on the theatres ?"

"Indeed," she replied with great solemnity, "I have not yet had an opportunity to consider at any length this weighty and momentous question. Perhaps you could enlighten me."

I replied that it was her opinion I needed, and that my own would hardly carry sufficient weight. But as she continued to look entirely vague, I asked her whether she had ever listened in.

"Yes, of course I have," she replied with dignity, "and it is my intention at the

"if you think you have come round here to get anything serious, you are vastly mistaken. Go along like a good boy, and sit in the front row and watch my next scene. It will be a welcome relief from your brain-splitting problem !"

I wandered rather disconsolately out of the theatre, and the first person I ran into was Mr. Talbot O'Farrell, the famous Irish entertainer. I told him how I had been trying to get serious views upon what I considered a very important question. "Some will not be serious," I complained, "and the rest cannot see that any problem exists."

"But you have gone to the wrong people," he said. "We artistes are the most easy-going people under the sun. We will do anything we are asked to do, and we leave it to the managers to decide the momentous questions connected with the theatre. If they tell us that broadcasting is opposed to our interests, well and good, but if somebody else asks us to broadcast, we are equally willing to comply. If you want a considered judgment, go to some of the managers and producers who take these things to heart."

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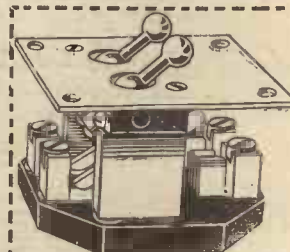
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LOW TENSION +	LOW TENSION -
EARTH	AERIAL

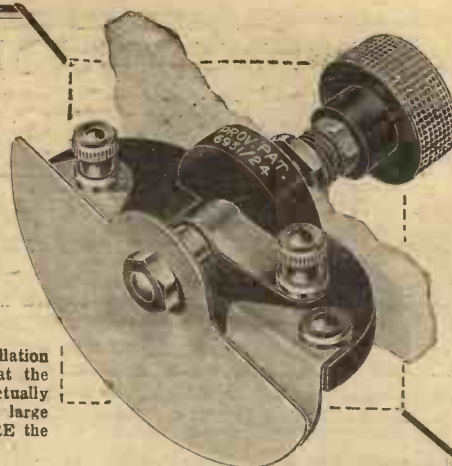
WITH INSTRUCTIONS FOR USE, PRICE 2/-

P. & M. Ltd., 124, Tooley Street, London, S.E. 1.



PRICE
2/6

The use of condensers with large capacities, to a large degree, is the cause of unstable sets. Set builders who are troubled with oscillation should remember that the "COLVERN" actually demonstrates that large tuning condensers ARE the unstable components.



PREVENTION of OSCILLATION

A large capacity condenser moved to a fraction of a degree either side of accuracy heterodynes the incoming signal—the set is consequently beyond control with nothing but screeching and howling. Fit the

"COLVERN" Tuning Condenser

and you will experience what control really is. You will be enabled to tightly couple tuning inductances, employ the fullest reaction, and your set will give its fullest power with selectivity and clearness.

The "COLVERN" should be incorporated in every new set and, most decidedly, fitted to every existing set. Remember, for accurate balancing of tuned circuits the Vernier should not be an attachment to a large condenser—it should be the "COLVERN."

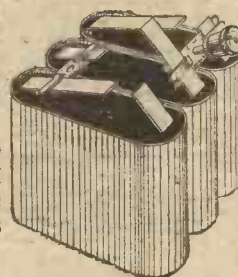
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WE beg to inform the Public that the "C.W." Battery Link is now a fully patented article, and will in future be supplied bearing the Patent No. 217141, instead of the Provisional Patent Number 30923/23.

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The Technical Editor of "Popular Wireless" will be pleased to receive wireless sets and component parts for test. Reports will be published under this heading.

A VERY compact and ingenious crystal set, which involves a method of tuning that will be new to many amateurs, has been placed on the market by Lissen Ltd.

It consists of a one-piece moulded base-board, measuring only 4½ by 3 inches, on which are mounted all the necessary detector fittings, and a socket to take any Lissenagon plug-in coil. The inductance value of the coil is then varied by two metal vanes, which are arranged to slide across the faces of the coil, and controlled by a knob mounted on the same shaft.

On the instrument tested tuning was found to be rather flat, although this was not so noticeable as might have been expected from the extreme simplicity of the set. It is only supplied complete with the appropriate Lissenagon coil or coils to cover the wave-lengths desired.

Amateurs who have experienced the peculiar and elusive fault developed by moisture in L.F. transformers, will be interested in the "Eureka Concert Grand



The "Uncle Tom" crystal set.

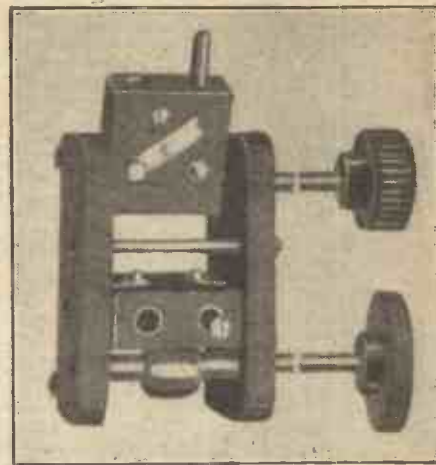
Intervalve Transformers," one of which has been submitted for test by the Portable Utilities Co., Ltd. Enclosed in a cylindrical steel case (mounted on four feet, and carrying its four terminals on an end plate covering a sealed interior), the design is such that dampness cannot penetrate to the windings of the instrument, and this covering also serves to effectively screen the magnetic field. The total weight is not excessive, the instrument turning the scale at about a pound and a quarter.

A comparative test was made by using the Eureka as the first L.F. transformer

in a dual and L.F. circuit, in place of another make of transformer which had been selected for that position. Results with the "Concert Grand Eureka" were excellent. In the amplification of weak signals, its performance was equal to the transformer which it replaced, and in the reproduction of very strong signals it was, if anything, slightly superior. Those who prefer an actual circuit comparison to a laboratory test, will agree that the first stage of a dual and L.F. circuit affords a good test of an L.F. transformer. In this position the Eureka Concert Grand was found to function admirably.

The "Murray" valve holder, which is

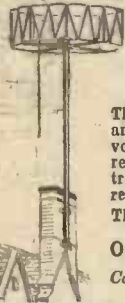
(Continued on page 400.)



This coil holder, by Goswell Engineering Co., is fitted with a reaction reversing switch.

Richardson's VERTEX AERIAL

PATENT No. 216657



The Aerial is the prime source of wireless reception, no matter what type of set is used, it is impossible to get the best out of it unless the aerial is as near perfection as possible.

The patent "VERTEX" is the most efficient aerial yet devised, and hundreds of users can testify that it increases range, volume, purity, and selectivity of reception; is non-directional; reduces or obviates interference from adjacent electric trams, trains, power stations, etc., and has enabled broadcasting to be received where previously it had been found impossible.

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Outdoor, Indoor, and Portable types, £3. 15. 0.

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0003	4/6 " 9d. "	6/6 " "

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Size No. 991.

Size No.	Nominal E.M.F.	No. of cells.	Intermediate connections.	Dimensions overall approx. not including covers.	Price, exclusive of plugs.
990	4 1/2 volts	3	3 volts	2 7/16 x 1 1/8 x 3 ins. high	1s. 3d.
991	9 "	6	4 1/2-6-7 1/2	4 1/2 x 1 1/8 x 3 "	2s. 3d.
832	15 "	11	3-volt steps	9 1/2 x 1 x 3 "	3s. 6d.
929	24 "	16	3 "	6 5/8 x 1 1/4 x 3 "	5s. 6d.

Removable plug terminals, 9d. extra per pair.

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Obtainable from all leading dealers.

*When breathless your struggles
With crystals have left 'ee,
Turn out your old ScrewCups,
And put in a Refly.*

*Terminate
Those Terminal Trials,
Put in a Refly
And be all smiles.*

NEW

A better "Brownie" at the same low price 7/6

Possessing all the best features of the old "Brownie" Crystal Set—and something more—this splendid little Receiver is giving surprising reception results. Note the protected Crystal Detector permitting the finest adjustments to be made and the Loading Bridge enabling you to adapt the set for 5 X X and other long-wave Stations.

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A Money-Back Guarantee with Every Outfit

An Ebonite Base, to fit any model, of substantial and attractive design, is now supplied at an extra cost of 1/6. Just slide the "Brownie" into the hollow centre and fix with the three screws supplied.

IT'S SO MARVELLOUS AND SO SIMPLE
that experts and engineers won't believe it—
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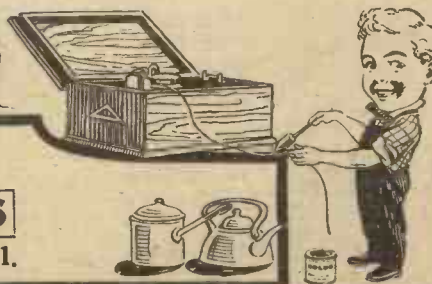
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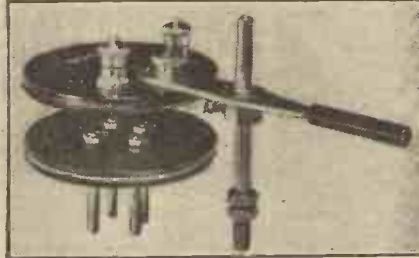
(Continued from page 393.)

shortly to come on the market at 1/3, is one of the most interesting little "gadgets" it has been our pleasure to review. The advantages claimed for it are that no template, nuts, or soldering are required for mounting it on a panel, while it projects from the latter's surface but a matter of $\frac{1}{4}$ in. or so. When in position no brass is visible, and it is impossible to burn out a valve through an accidental contact between the plate and filament points. We have carefully examined the sample sent us, and cannot find any reasons why it should not prove as satisfactory in use as the makers claim. It certainly forms an advance over the use of ugly projecting sockets and even over the usual type of valve holder, which is not a very handsome fitment at the best of times. Prospective constructors would be well advised to ask their dealers to let them examine a "Murray" valve holder.

If it is not too early to do so we predict that the "Uncle Tom" crystal set, which is photographically illustrated on page 398, will be in great demand as a Christmas present this year. It is a speciality of Messrs. J. P. Gowland, of 18, Ellison Place, Newcastle-on-Tyne, and sells at 17/6. We recently had a sample of this interesting novelty submitted to us for test, and discovered it gave results quite equal to those of any medium-priced receiver of conventional design. It is made of a good quality coloured china which is, of course, an excellent insulator. As will be guessed, the hat forms the tuning coil, while the crystal

detector can be clearly located. The "Uncle Tom" is a very suitable ornament for a wireless "den," but it functions really well as a receiver, and should prove popular.

Messrs. Eric J. Lever, of 38, Clerkenwell Green, London, have sent us a range of handy little terminal gadgets, among which are terminals with engraved heads indicating "aerial," "earth," etc. "Trix" Quick Grip



A useful reaction unit, as sold by Messrs. Radiax Ltd.

Terminals, and "Lico" terminal clips, which sell at 2d., 4d., and 9d. each respectively. All are items of distinct utility and should appeal to amateurs desirous of employing neat and adaptable connecting points.

A very interesting piece of apparatus has reached us in the shape of a "Helicoid" aerial, a speciality of the Bristol Motor Co., which retails at 12s. 6d. It consists of a copper spring, normally 3 ft. long and 1 in. in diameter, but it can be stretched to well over five times this length. Such is the springy nature of the hardened copper that, after having been stretched in this manner, it returns to its original shape and length. It is provided with eyes at each end, so that it can be fixed to hooks. It certainly provided us with an interesting hour's experimenting. In the ordinary way,

the makers recommend that it should be suspended between a pole on the roof of a house and a lead-in point, and, erected in a similar manner, quite good results are obtainable. We did not discover that it equalled our ordinary twin aerial, but then we have ample space at our disposal. As an outdoor aerial for people with limited garden-space, it should prove quite useful. As an indoor aerial, pulled out to some 16 ft. and stretched in the form of a V across a room, with a lead to the set from the apex, excellent results are obtained, results far better than those obtained with a straight wire running around the room. We tried it as a frame aerial, and in this capacity, both ends being connected to the set, louder signals were obtainable than with a large 4 ft. frame of conventional type. It was decidedly interesting to note the increase of signal strength that followed when the "Helicoid"



A new "Gecophone" Two-valve receiver.

frame was enlarged by stretching, although, as may be imagined, it was necessary to alter the tuning simultaneously.

What Others Say

AMATEUR WIRELESS, August 1st.

"Simplicity has been the keynote of the C.A.V. Loud Speaker—even when the Loud Speaker is reproducing broadcast with sufficient volume to fill a large hall, there is no trace of mechanical noise, the notes being perfectly mellow."

BROADCASTER, September 1924.

"Under the test, and a very severe test, we have given the Loud Speaker, it came out with flying colours. Specially recommended."

POPULAR WIRELESS, August 2nd.

"The workmanship is solid and sound—no displeasing distortion was noticeable. We can recommend this Loud Speaker to our readers."

WIRELESS AND ALLIED TRADES REVIEW.

"Takes its place in the front rank of really good loud speakers and is, if we may suggest anything, a decided advance on many of the instruments we have come across to date."

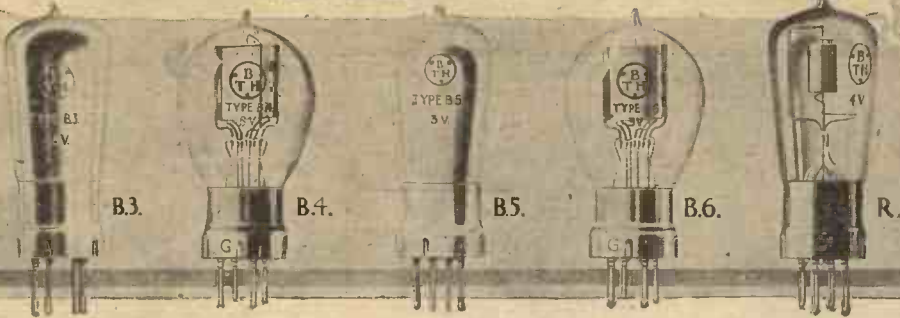
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C.A.V. LOUD-SPEAKER FOLDER

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ACTON VALE, LONDON, W.3



B.T.H. RADIO VALVES



B3 Valve Price 21/-
 Filament Volts.....2 volts.
 Filament Current.....0.35 amps.
 Anode Volts.....20-80 volts.
B4 Valve Price 35/-
 Filament Volts.....6 volts.
 Filament Current.....0.25 amps.
 Anode Volts.....40-100 volts.
B5 Valve Price 25/-
 Filament Volts.....3 volts.
 Filament Current.....0.06 amps.
 Anode Volts.....20-80 volts.
B6 Valve Price 35/-
 Filament Volts.....3 volts.
 Filament Current.....0.12 amps.
 Anode Volts.....60-120 volts.
R Valve Price 12/-
 Filament Volts.....4 volts.
 Filament Current.....0.63 amps.
 Anode Volts.....20-80 volts.

These five B.T.H. Valves meet every possible requirement of the ordinary listener-in and the serious experimenter. The B3, B5 and R Valves can be used in any position, for detection or high or low frequency amplification, while the B4 and B6 Valves are intended primarily for low frequency power amplification.

Be sure your next valve is a B.T.H. Valve. Look for the initials "B.T.H." which are the sign of high quality, and for the silvered bulb which denotes a perfect vacuum.

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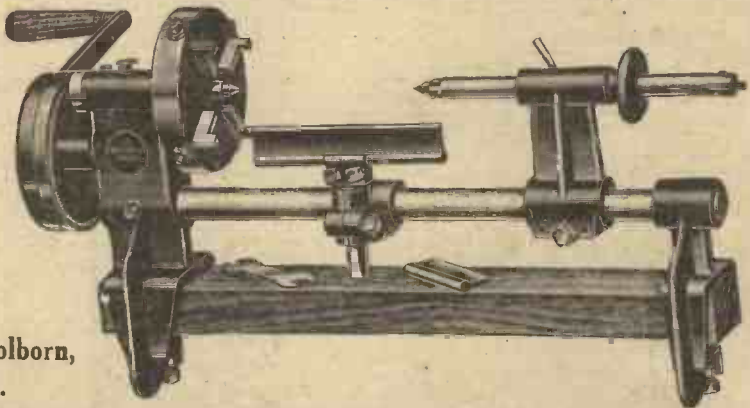


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"We are immensely pleased with the panels supplied, the good effect of which is already felt."

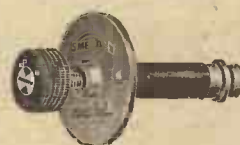
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WATMEL VARIABLE GRID LEAK

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Continuously Variable.
 Silent in operation.
 Constant in any temperature.
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 Each tested and guaranteed.
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 5 to 5 megohms 2/6

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The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts and photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All contributions to be addressed to The Editor, POPULAR WIRELESS and WIRELESS REVIEW, The Fleetway House, Farringdon Street, London, E.C.4. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

Technical queries should be addressed to the Technical Queries Department, and must in all cases be accompanied by a stamped addressed envelope. Not more than two enquiries can be answered in one letter, and telephone calls or personal calls at this office cannot be dealt with. A copy of the questions must be kept as it is not always possible to reproduce the query when replying. Number the questions 1 and 2, and answers will be given under each number.

The Editor desires to direct the attention of his readers to the fact that, as much of the information

given in the columns of this paper is of a technical nature and 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 trader would be well advised to obtain permission of the patentees to use the patents before doing so.

PATENT ADVICE FOR READERS.

The Editor will be very pleased to recommend readers of POPULAR WIRELESS who have any inventions to patent, or who desire advice on patent questions, to our patent agent. Letters dealing with patent questions, if sent to the Editor, will be forwarded to our own patent advisers, where every facility and help will be afforded to readers.

Questions and Answers

"SINGLE-VALVE SINGLE-BATTERY SET."
(Turnham Green).—What are the parts required to build a one-valve "Unidyn" receiver?

The following is a complete list of the parts required:

1 two-way coil holder, 1 variable condenser (-0005), 1 grid condenser (-0003), 1 variable grid leak (-5 to 5 megohms), 1 five-pin, four-electrode valve, 14-volt,

or 6-volt accumulator, 1 filament resistance, 2 Lissenagon coils (75 A.T.L. and 100 for reaction), and 1 phones. A pictorial diagram of the connections was given in Radiatorial last week (No. 122).

S. R. (no address) inquires whether a patent tuner now on the market is suitable for the Unidyn 2-valve set.

The tuner is quite efficient, but we do not like to guarantee that you will obtain good results in the Unidyn with it, as it does not appear to have any provision for reaction coupling. We should therefore recommend you to keep to the specification given in the articles describing the set, though we wish it to be understood that we are not in any way belittling the particular instrument that you mention.

We find that in Unidyn sets even the smallest deviation from the methods of tuning and reaction sometimes results in apparently the most disproportionate variation in results, and so in order to be able to guarantee that the Unidyn will operate successfully provided care is taken in its handling and construction, we advise readers to keep to the directions given. Those who desire to experiment with other components, etc., will find it very interesting, but the average reader and listener should keep to the instructions as nearly as possible.

T. H. L. (Brighton).—With regard to the diagram of the Unidyn Reflex Circuit published in POPULAR WIRELESS of September 13th on page 83, Fig. 2, the L.T. positive does not seem to be connected correctly. Should not the grid leak be connected to it?

Yes; unfortunately the connections from the L.T. positive lead were omitted by the draughtsman. The L.T. positive should be connected to one side of the grid leak and also to both the filament rheostats.

L. W. S. (E.13).—With reference to your publication of a booklet on how to build a valve set using the "P.W." circuit, I shall feel obliged if you could let me have a copy of same, or, if this is not possible, perhaps you could let me know the size of the two basket coils, and whether D.E.R. valves are suitable for this circuit?

(Continued on page 408.)

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Resistance
2000 or 4000
ohms.
same price.



THE FAMOUS SPARTA LOUD SPEAKER

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20/- deposit and your agreement to pay 10/- per month for 8 months if satisfied.

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Established 1918.

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IT consists of 84 strands of fine, hard-drawn phosphor-bronze wire—a special alloy of great strength and DURABILITY. These strands are SPIRALLY wound so that each is AIR-INSULATED. Exhaustive tests prove that it has the LOWEST OHMIC RESISTANCE yet attained. Provides 80% greater SURFACE AREA over 7/22's. Gives 50% greater efficiency over 7/22's when used for receiving; 90% greater efficiency over 7/22's when used for transmitting.



9/6
100 ft.

Mars Aerial Facts

"If you want the very best get the new 'Mars' Aerial. This will give you 35% more power."

This is not our headline. It is a word for word quotation from an article by "Radiostat," the "Sunday Chronicle" wireless expert.

But we claim that if the 'Mars' is rigged up according to instructions you will secure not merely 35% but 50% greater efficiency over 7/22's—or 90% if you use your aerial for transmission. Don't confuse the 'Mars' with any other aerial cable. It is essentially different because it is SPIRALLY wound and this method of winding AIR-INSULATES each of the 84 strands of fine quality phosphor-bronze wire from which it is made.

The 'Mars' gives the lowest ohmic resistance yet attained. It has 80% more surface area than 7/22's. It greatly increases selectivity and at the same time simplifies tuning. This may sound at variance with theory, but it will be found O.K. in practice. Nearly 10,000 'Mars' aeriels were sold during the first

month of its introduction—September. Not one complaint has been received, but we have had hundreds of very cordial testimonials.

It is not our policy to print any testimonials without thorough investigation; but all the evidence received suggests that not only radio beginners but advanced experts also will find that the 'Mars' represents a very considerable contribution to wireless progress.

Each aerial contains 84,000 feet of fine drawn phosphor-bronze wire. The 'Mars' is not a cheap aerial but it is abundantly well worth buying.

To the Trade.

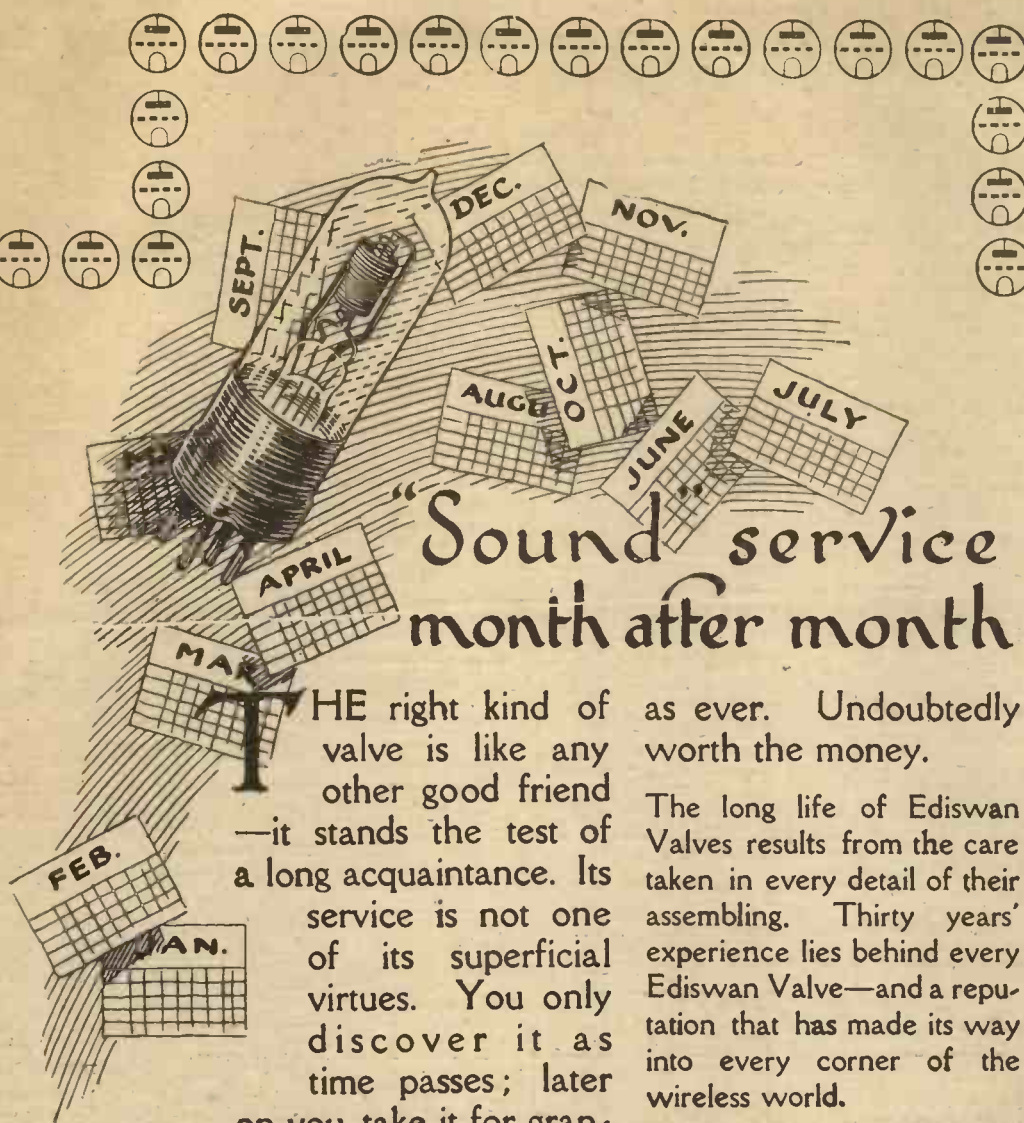
Please order the 'Mars' through your usual wholesaler, but if he cannot supply write direct to us for terms on your letterhead. At present we are 7 days' behind with deliveries, but every effort is being made to get abreast of the demand.

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EDISWAN

VALVES

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

HULLO EVERYBODY!!

LISSEN.

Variable Grid Leak 2/6
Anode Resistance 2/6
Lissen Minor .. 3/6
Lissenstat .. 7/6
Do. Universal .. 10/6
2-way Switch .. 2/9
Series Parallel .. 3/9
T1 Transformers.. 30/-
T2, 25/-; T3, 16/6;
Coils: 25, 4/10; 30, 35,
40, 4/10; 50, 5/-; 60,
5/4; 75, 5/4; 100, 6/9
POST 3d. each.

DUBILIER.

.001, .002, .003, .004,
.005, .006, Fixed, 3/-
.001, .0002, .0003,
.0004, .0005 .. 2/6
Type 577, .01 .. 7/6
Grid Leaks each .. 2/6
Anode Resistance
50,000, 70,000,
80,000, 100,000,
on stand complete 5/6
Minicap Switch .. 8/-
POST 3d. each.

IGRANIC.

Coils: 25, 5/-; 35, 5/-;
50, 5/2; 75, 5/6; 100,
7/-; 150, 7/10; 200,
8/8; 250, 9/-; 300,
9/5; 400, 10/3; 500,
10/6
Fil. Rheostat .. 4/6
Potentiometer .. 7/-
Vernier Rheostat.. 7/6
30-ohm Rheostat. 7/-
POST 3d. each.

STERLING SQUARE LAW CONDENSERS.

with Vernier.
.001 .. 30/-
.0005 .. 25/6
.00025 .. 23/6

EDISON BELL.

.0001 to .0005 Fixed 1/3
.002 to .003 .. 2/-
.001 .. 1/3
.0003 with Grid Leak 2/6
Variometer .. 10/6
Twin Detector .. 5/-
POST 2d. each.

WEST END DEPOT FOR

POLAR; JACKSON
BROS.; R.I.; BURN-
DEPT; GOSWELL
ENG. CO.; SILVER-
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LISSEN; RADIO
PRESS ENVELOPES;
DUBILIER; EDISON
BELL; ETC.

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Ormond .. 2/-
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Extra value do. .. 2/6
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Eureka Concert Grand 30/-
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Silvertown .. 21/-

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Ditto 1100/2000 .. 7/-
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Ditto 900/2000 .. 4/6
Raymond, 300/600 .. 2/8
Others Stocked.

H.T.C.

Special valve holder above
panel .. 1/9
Ditto, for under panel 1/6

POLAR

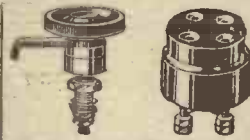
.001 var. Condenser .. 10/6
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.0003 .. 10/6
Micrometer Condenser 5/6
Cam Vernier 2-way
Coil Holder .. 11/-

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Dubilier .. 2/6
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Edison Bell .. 1/6
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Var. Grid Leak .. 2/6
Anode Resistance .. 3/6
BRETWOOD (New Model)
Var. Grid Leak .. 3/-
Anode Resistance .. 3/-
POST 2d. EACH.



This first-class
Switch Arm,
with 12 Studs,
12 Nuts, 12
Washers. By
Post 1/6 set.



Ebonite Valve
Holder, cut
from solid rod,
hand-turned, 8
nuts and wash-
ers. Each, 1/3.

"POWQUIP" L.F.

TRANSFORMERS.

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MANCHESTER 14/11

(similar to R.I.)

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SHROUDED - 18/-

COIL PLUGS.

Single Coil Holder mounted
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with terminals .. 1/4
Ditto, swivel movement .. 1/8
Post Free.

CRYSTAL Post DETECTORS 4d. each



Enclosed glass. As Sketch.
Ebonite Base.

Brass .. 1/-, 1/4, 1/8, 2/-
Nickel .. 1/6, 2/-
Ebonite .. 1/6
Perikon .. 2/3
(With Zincite and Bornite.)

NOTE!

OUR WONDERFUL MICRO-
METER ADJUSTMENT GLASS-
ENCLOSED DETECTOR. WHY
PAY MORE? .. 1/11
POST 6d. each.

"BABY" COIL STANDS (EBONITE)

GRAND VALUE

2-Way, 2/6; by Post, 3/-
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Brass Fittings, Knob Type, on
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EUREKA
WIRE,
KNOB,
AND DIAL
1/11

By Post, 2/3



EDISON BELL Shaped Plug

1/- By Post, 1/3
Also with Base, 1/3
By Post 1/6

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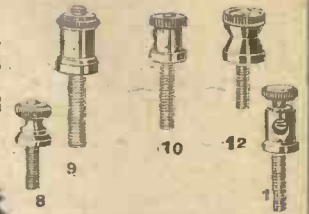
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SILK
WOUND,
Close Coup-
ling. One
Hole Fixing.

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4/11 and 5/11
Post 6d. each.

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Min. Self-Capacity
Set of 5 1/8
By Post 2/- Set



TERMINALS

WITH NUT & WASHER

No. 8 per dozen 1/-
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EBONITE

2 for 1/2
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2 for 1/6
3 Qualities.

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2 for 2/-
2 for 2/8
2 Qualities.

FORMO SHROUDED 18/-

RAYMOND 10/-

By post 10/6.
FORMO
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ONE HOLE FIXING

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0-6
0-15
4/6
each

each
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60v. - 13/6

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3 FEET Lengths

1 inch wide.

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Patent Valve Holder.

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2-Way Cam Vernier

Coil Stand

9/-

3-Way Cam Vernier

Coil Stand

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EBONITE CUT TO SIZE (Highgrade)

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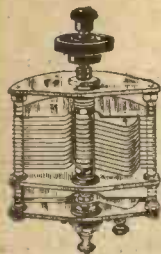
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NEW MODEL

WITH VERNIER	WITHOUT VERNIER
·001 - - 9/3	·001 - - 6/6
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·0003 - - 6/9	·0003 - - 5/-
2 Knobs 1 Dial	·0002 - - 4/8
Post 6d. Set.	Vernier, ·00005 3/9
	With the knob & dial
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SQUARE LAW

Complete with Knob and Dial
With Vernier
·0005 - 7/11 11/6
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VARIABLE CONDENSERS

- Exclusive design
- Triangular fixed vanes
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- Fits in any corner
- Takes up tiniest space
- Capacity guaranteed
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- New one hole fixing method
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- Perfect efficiency
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UNSURPASSED FOR FINE TUNING. Merger and not "INFINITY"

'DE LUXE' MODEL

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POST 6d. SET.

John Blair, Esq.,
Rexall Pharmacy,
says:—
Your Condensers are a
REVELATION to me as a
Dealer. Sept., 1924.

C. Walton, Esq., Andover.
Tested your Condensers on
Merger and not "INFINITY"

9/- TWIN CONDENSER

POST FREE.



Composed of two equal units of ·00025 or ·0003 mfd., operated by one Knob and Dial, thereby enabling you to tune two circuits by one turn of the dial. Can be used in series or parallel. Complete as shown - with aluminium ends. Knob and dial. For Tuned Bridge Circuits.

MANSBRIDGE FIXED CONDENSERS

1 M.F. .. 4/6	Various others Stocked.
2 M.F. .. 5/-	
·25 .. 4/-	
·05 .. 4/6	

T.C.C. (New.)

Delivery very slow from makers.

"RAYMOND'S" FIXED CONDENSERS.

Ebonite Base. ·001, ·0001 to ·0005	1/2
·002 to ·004	1/3
·006	1/6
·01 and ·02	1/9
·05	3/3
POST FREE.	

W. Kennard, Sig. Telegraphist, H.M.S. Leamington, 2nd July, 1924. The Condensers are splendid, and superior to any I have ever seen. Please find repeat order. W. Hale, Esq., 3, Gaye St., Walsall, 30th April, 1924. The last 4 Condensers gave every possible satisfaction—highest quality at extremely low prices. Kindly despatch enclosed further order. E. Shepherd, Esq., 23, Warden Street, Dunedin, 12th May, 1924. Everything came to hand in splendid condition, the quality far exceeding my expectations.

The set used by
Miss Evelyn Laye
in her dressing-room at Daly's is made of Raymond parts.

LOUD SPEAKERS

27/6	JUNIOR AMPLION
42/-	Newest Model
55/-	JUNIOR DE LUXE
	Oak Trumpet
	BABY STERLING
	Splendid Value

VARIOMETERS

RAYMOND
[8/11



FALLON IGRANIC EDISON-BELL

Post free 10/-

ENERGO

H.F. Plug-in Transformers	Post, 2d. each.
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No. 2. 250-700	3/11
No. 3. 450-1200	4/3
No. 4. 900-2000	4/6
No. 5. 1800-3000	4/9
No. 6. 2200-5000	4/11

BRUNET (genuine)

4000 ohm Double	16/6
4000 ohm Single	8/3
2000 ohm Single	7/6
POST FREE.	

From S. H. COULTER, Esq.,

30/9/24. 55, Court Road, Barry Dock.

Condenser to hand this a.m. No wonder you are snowed under with orders! IT IS AN EXCELLENT COMPONENT. Please find repeat order.

JACKSON BROS.

"J.B." VARIABLE CONDENSERS

	Standard	Super.	Microdenser
·001	8/6	9/6	11/6
·00075	8/-	9/-	11/-
·005	7/-	8/-	10/-
·0003	5/9	6/9	8/9
·00025	5/9	6/9	8/9
·0002	5/-	5/6	8/-
·0001	4/9	5/3	7/9
Vernier	4/-	4/6	
	Post 3d. set.		

HIGH GRADE EBONITE

POST PRICES	3/16 in.	1 in.
6 x 6	1/8	2/-
7 x 6	1/8	2/-
8 x 6	2/-	3/-
9 x 6	2/2	3/3
10 x 6	3/-	4/2
12 x 6	3/3	4/2
12 x 9	4/3	5/6
12 x 12	5/6	7/6
14 x 10	5/6	7/6
Cut to Size, 3/16 in. at 1d. square inch.		
Foreign Post extra.		

D.C.C. WIRE POST PRICES

16 D.C.C. 1 lb. - 2/-	20 D.C.C. 1 lb. - 1/3
16 " 1 lb. - 3/8	22 " 1 lb. - 1/4
18 " 1 lb. - 2/3	24 " 1 lb. - 1/6
18 " 1 lb. - 3/9	26 " 1 lb. - 1/8
28 D.C.C. 1 lb. - 1/10	

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FRENCH THOMSON-HOUSTON

4000 ohm Phones	
100 pairs at 12/11	
POST 6d.	

SUNDRIES

Post free

Screw Spade Terminals	doz.	1/-
Pin Screw Terminals	doz.	10d.
Spade Tags	doz.	5d.
Empire Tape, 1 in.	12 yds	9d.
Insulating Sleeving	6 yds.	2/-
Ebonite Knobs, 1 1/2 in. 2 B.A.		6d.
Moulded Knobs 1 1/2 in.	2 for	8d.
Olito 1 in. 2 B.A.	2 for	8d.
Ebonite ex-handles 6 in.		9d.
D.C.C. I.R.C. Bell Wire 10 yds.		1/-
Double Phone Cords, 72 in.		1/11
Porcelain S.P.D.T. Switch		1/11
Ditto D.P.D.T. Switch		2/6
Battery Clips	doz.	10d.
Ebonite Valve Holders	1/3 and 1/-	
Lead-in Wire 4 M/M.	10 yds.	2/6
Lead-in Wire	10 yds.	1/6
Twin Flex	12 yds.	1/11
100 ft. 7/22 Aerial Wire with four insulators		3/6
Nugraving Titles or Scales		8d.
"R.I." Choke Coil		10/-
Nickel Panel Switches, D.P.D.T.		1/5
Ditto, S.P.D.T.		1/2
Insulating Sleeving 3 yds.		1/4
Tinned copper sq., 16 gauge, 15ft.		1/-
Spearpoint Whisker, gold		4d.
Gold Whisker		4d.
Set of 5 (one gold)		6d.
Variometer (250/650)	3/3 and 2/6	
Ditto Ebonite		4/11
Ditto Ball Rotor		6/11
Burndept Detector		5/6
Screw Wander Plugs	pair	6d.
Skinderviken Button, Alumin.		5/-
Seven Twist Drills (H.S.)		1/11
Taps 0, 2, 4, 6 B.A.	set	2/-
Sorbo Ear Pads	pair	1/9
Neutron Crystal		1/8
Blue Tungstallite		1/6
Gecosite (G.E.C.)		1/3
Tumbler Switches (Ebonite)		1/9
Valve Sockets, Plain (nut and washer) doz.		1/-
Sets of Spanners		2/-

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4,000 ohms.
STERLING 4,000 ohms
NEW MODEL .. 25/-
BROWN'S (Featherweight) 25/-
B.T.H. (Wonderful Tone) .. 25/-
BRANDES (Matched Tone) 25/-
GENERAL RADIO .. 20/-

**TELEFUNKEN 4,000 ohms
HEADPHONES**
As light as a Feather .. 17/11

Dr. NESPER HEADPHONES

Genuine Nesper-
phone, 4,000 ohms.
Fitted with adjust-
able diaphragm, de-
tachible receivers,
double leather-
covered head-
springs, long flex-
ible cords, nickel-
plated parts. Very
comfortably fitting
to the head.
**LOOK FOR THE
TRADE MARK.**
4,000 ohms .. 12/6
Post 6d. pair.

GENUINE "N & K"

HEADPHONES
Guard against in-
ferior imitations
which are "clever-
ly" got up to de-
ceive. Make sure of
the genuine article,
the original "N &
K," and avoid dis-
satisfaction. See
that the letters
"N & K"—and no
other—are stamped.
4,000 ohms .. 12/11
6,000 ohms .. 13/3
Post 6d. pair.

BEWARE OF "PATTERN" OFFERED CHEAPLY

ACCUMULATORS

MADE BY WELL-KNOWN
FIRM FOR ME.

2 v. 40 amps. 9/6. By post 10/6
4 v. 40 amps. 16/6. By post 17/6
4 v. 60 amps. 19/6. By post 20/6
4 v. 80 amps. 23/6. By post 24/6
6 v. 60 amps. 27/6. By post 29/-
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UNIVERSAL (FRANCO)

Basket Coil Stand, 2-way

POST FREE 5/9

FRANCO, 2-way (plug-in) .. 12/6

Ditto 3-way .. 17/6

The only GEARED COILHOLDER on the
market.

CHELMSFORD (5 X X)

D.C.C. Basket Coil, complete with
adapter, specially made to use with
650 variometer, 2/6. By post 2/9

LOADING PLUG and Socket .. 9d.

D.C.C. COIL for 5 X X, 1/6. By post 1/9

BRASS FORMER TO MAKE YOUR OWN COILS

DOUBLE, 23 spokes each side.
POST FREE 3/11

POST PRICE TINNED COPPER

18 Round 1 lb. .. 2/6
20 Round, 1 lb. .. 2/6
16 Square, 12 ft. .. 10d.
18 Square, 12 ft. .. 9d.

GUIDE FOR CHELMSFORD

On 1,600 Metres

Aerial Reaction
Coil No. 150 200
Tuned Anode 250 or 300

"SUCCESS" L.F. TRANSFORMER

21/-

"MURRAY"

(Prov. Pat.)

VALVE HOLDERS

High finish. Absolutely Safe.
Low Capacity.
EASILY FIXED.

Exceptionally neat appearance
1/3 POST FREE.

RADIO PRESS TRANSFERS 6d.

By Post 8d.

POST PRICES VARIOMETER 250/600

2/6

Ditto with fixing clips
3/-

EBONITE BALL ROTOR

6/11

ALL KINDS STOCKED
at 2/11 3/6 3/9 4/- 4/6

Leave the selection to me and
you won't be disappointed

VALVES

Cossor P.1 and P.2 12/6

Mullard L.F. & H.F. 12/6

Mullard D. ra 21/-

B.T.H. R.4 - - - 12/6

B.T.H. E.5 '06 - - 25/-

Ediswan A.R. - - 12/6

Ediswan A.R.D.E. 21/-

Ediswan A.R. '06 25/-

Marconi R. and R.5 12/6

Marconi D.E.R. - 21 -

Marconi D.E.3 - 25/-

POST FREE

French "R" - - 6/11

Phillips "R" - - 7/6

French '06 - - 15/11

Post 6d. each

ALL VALVES ON
POST SENT AT
PURCHASER'S RISK.

MYERS VALVES

UNIVERSAL DULL EMITTER

12/6 21/-

POST FREE

PHILLIPS D.E. VALVES

'04 Type 1'5 to 1'8 17/6
each
Post 6d. each.

THORPE K4 VALVES

(5-pin) for UNIDYNE 17/6

THORPE K1 .. 10/-

POST FREE

5-Pin Valve-holder - - 1/6

"OOJAH"

GRAPHITE

Pile Rheostat for D.E.
or R Valves .. 4/-

N. & K. LOUD SPEAKER A LITTLE GEM

21/-

POST 1/-

RADIO PRESS ENVELOPES

No. 1 at 1/6

2, 3, 4 at 2/6

COIL STANDS

Ebonite 2-way with
Extension Handles
Nickel Fittings

3/3

By Post 3/9

Ditto 3-way

4/9

By Post 5/3

CAM-VERNIER

(2-way)

POST FREE 7/6

POLAR (2-way)

11/-

GOSWELL

(see elsewhere)



"R.I."

NEW MODEL

IN SEALED BOX

Don't Buy Otherwise

Post 25/- Free

NEW LISSON LINES

5 Point Switch - 4/-

Auxiliary Res. - - 1/3

Lisson Choke - 10/-

Post Free

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WEEKDAYS
9 to 7.45
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10 to 1**

SWITCHES ON

Porcelain D.P.D.T.	1/7d
Porcelain S.P.D.T.	1/3
Ebonite D.P.D.T.	1/8
Ebonite S.P.D.T.	1/3
Min. Panel D.P.D.T.	1/-
Min. Panel S.P.D.T.	10 1/2d

BATTERIES 4-5

Vulco English 4-5	4d.
-------------------	-----

H.T. BATTERIES.

Best Made 30 v.	4/6
Best Made 60 v.	7/8
Best Made 66 v.	9/-
Ever-ready 66 v.	13/6
Ever-ready 108 v.	22/6
Siemens' "Q" 1-5	3/-
Ever-ready ditto	1/9
B.B.C. 9 volts	3/-
B.B.C. 60 volts	9/6
B.B.C. 36 volts	5/6
B.B.C. 16 volts	2/6

RHEOSTATS.

Small 5 ohms.	1/3
One Hole Fixing	1/3
Ormond	1/9
Ebonite Former	1/6
Ditto and Dial	1/10
Igranite, T.C.B., and all known makes.	

CRYSTAL

DETECTORS, &c.

Enclosed Brass, Large	1/3
Ditto, Nickel or Brass, Large	1/6
Small Brass	9 1/2d
Ebonite, Enclosed	1/-
Mic. Met Type	2/8
Burndep	5/-
Easi-Fix Cups	1d. & 1 1/2d.
Gold Spearpoint	3d.
Neutron Crystal	1/6
Hertzite (Shaw's)	8d. & 1/-
Midite	6d.

VALVES.

Dutch Detector	4/9
Dutch "R"	5/-
Phillips "R"	7/6
French "Metal"	6/11

TOOLS.

Set of Spanners	1/4
Taps, 0, 2, 4, 6 B.A. set	2/-
Small Soldering Irons	8 1/2d.
7-Twist (H.S.) Drills	1/4

MURRAY VALVE HOLDER (Patent) 1/3

Legless Valve Holder,
Solid Ebonite 1/-

EBONITE PARTS.

Good Coil Plugs from 4 1/2d.	
Edison Bell Shaped	1/-
Raymond ditto	10 1/2d.
Basket Adapters	8 1/2d.
Also at 1/- & 1/3	
2-way Coil Stands	2/6
With Extens. Handle	2/11
Also at 3/6, 4/-, 4/6	
3-way	4 3/4, 4/6, 5/-
Goswell Cam Vernier	9/-
France	12/6
Polar	11/-
Also, etc.	
Coil Plug on Stand	1/-
Ditto, Swivel Movement	1/3
Coil Plug and Clips	6 1/2d.

BRASS PARTS.

W.O. or Pillar Terminals	1d.
Small Pillar	4 for 8 1/2d.
'Phone 4 B.A.	1d.
'Phone 2 B.A., 2 for	2 1/2d.
Valve Sockets	4 for 3d.
(Above with Nut Washer)	
Valve Pins and Nuts, 2 a	1d.
Stop Pins and Nuts 2 a	1d.
Plug and Socket	pr. 1d.
Spring Washers	4 a 1d.
Spade Screws	1d.
Pin Screws	2 for 1 1/2d.
Spade Tags	5 a 1d.
Spring Pillar Terminals	2 1/2d.
Nuts, 2, 4, 5, 6 B.A. doz.	2d.
Washers (Brass)	12 a 1d.

VARIOMETERS.

Impregnated Board, Wound D.C.C. and Clips, 200/600 metres	2/6
Very Good Value, Wound D.C.C. and Knob	1/6
Ebonite D.S. Wound, with Ball Rotor and Knob, 200/700 metres	5/11
Ebonite, 200/600	3/11
Raymond Inside Wind- ing	8/11

SUNDRIES.

'Phone Cords (6 feet)	1/5
Nugraving	7 1/2d.
Similar Sets (Titles or Scales)	3d.
Good Knobs	1 1/2d.
Small Knobs, 2014 B.A.	2d.
Studs, Nuts and Washers	
Switch Arms	8d. to 1/-
Copper Foil	ft. 2 1/2d.
18g. Sq. Tin Copper	15 ft. 5d.
16g. Sq. Tin Copper	12 feet 5d.
Round Tin Copper, vari- ous Sizes.	
Insulated Staples	5 a 1d.
Insulated Hooks	4 for 3d.
Rubber Lead in, 30 feet	1/3
7/22 Copper Aerial,	100 ft. 1/10 1/2
Extra Heavy Aerial	
100 ft. 2/- & 2/3	
Good Valve Holders	8d.
H.T.C. in Stock	1/6, 1/9
H.F. Transformers, 300/ 600	2/9
Empire Tape, 1 in.,	
2 yds.	1d.
Ditto, 1 in.	2 yds. 1 1/2d.
6 in. Ebonite Anticap	
Handles	8d.
Battery Clips	2 a 1d.
Skinderviken But- tons (Aluminium)	4/6
Connecticut Switches	1/4
1,000 ohm Bobbins	1/3
2,000 ohm Bobbins	1/8
Sorbo Rubber Ear Caps	pr. 1/4
Adhesive Tape Roll	2 1/2d.
Basket Coils	
Waxless ST100 (2)	1/-
Waxless (5) 200/2,000	set 1/8
Waxed (6), 200/3,600	set 1/8
Waxed (7), 150/3,600	1/11
Chelmsford No. 8	
Tandee	1/- 1/6
Chelmsford, D.C.C.	1/3
1 Complete with Adapter	2/3
(To use with variometer.)	
Allen var. Gd. Lk.	1/3
Allen Anode Res.	1/3
Scales, 0-180, 2d., 3d., 4d.	
Dial and Knob (Ed. Bell)	1/3
Dial (Ebonite)	10d.
Brunet Headphones	14/6
Twin Flex	4 yds. 6d.
D.C.C. Bell Wire, 10 yds.	5d.
(Indiarubber covered)	
Sleeving	yd. 4d.
Wander Plugs	pr. 8d.
Coloured Plugs	each 1 1/2d.
(All screw pattern)	
Electron Aerial	1/3 1/2
Polished Boxes, 8 by 6	3/6

SUNDRIES.

Tungstallite	1/-
Microstat	2/6
Tumbler Switches	1/4
(Ebonite)	
Fibre Strip (for Coils)	3 feet 2 1/2d.
D.C.C. Wire, per 1 lb.	
13 g. 9d. 20 g.	9d
22 g. 10d. 24 g.	1/-
26 g. 1/1 28 g.	1/3
30 g. 1/6 Etc., etc.	
Solder, per stick	2d.
2 Color Flex	yard 2 1/2d.
Shellac	5d.
Battery Box	4/6
(with clips for 36 v.)	
Nickel Pillar Terminals	2d.
Nickel Contact Studs	2 for 1 1/2d.
Nickel Switch Arm	1/-
(one hole fixing)	
Loading Coil and plug	8d.
Gamages Permanite	1/-
Condenser Brushes	6d.

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BEATS ALL
OTHER "ITES." 1/-

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GENUINE STAMPED.

MYERS VALVES.

UNIVERSAL D.E.
12/6 21/-

Strong Valve Template	4d.
Egg Insulators	1d.
Reel ditto	1d.
Thick Rubber Lead-in	per yd. 2d., 3d.
Ribbon Aerial 100 ft.	1/10
Panels Drilled	
Radio Press Envelopes.	
Raymond Fixed Condensers	
'001, '001 to '0005, 10d.	
'002, '003, '004	1/-
'006 1/3; '01 1/9; '02 1/9	
Polar Micrometer	5/6
Condenser	

NO POST ORDERS.

BEST SWITCH ARM.

12 Studs	THE LOT
12 Nuts.	10 1/2d.
12 Washers.	

CRYSTAL CALLERS

DETECTOR. only.

Glass enclosed. Mi-
crometer adjustment. 1/9

BRASS FORMER

(DOUBLE) 23 spokes 2/11
each side.

Make your own coils.
CALLER'S PRICE ONLY.

EXIDE.

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(For '06) 5/-

EBONITE 3/16-in.

CALLERS' PRICES.

6 x 6	1/4
7 x 5	1/4
8 x 6	1/10
9 x 6	2/-
10 x 8	3/-
12 x 6	3/-
12 x 9	4/3
12 x 12	5/6
14 x 10	5/6

CUT TO SIZE 1d. sq. in.
WE STOCK 1-in. EBONITE.

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WIRELESS."

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DR. NESPER (SEE TRADE MARK) 4,000 OHM 'PHONES 12/6

(NOT DR. "ANYTHING!")

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HENRY BUTCHER & Co.

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THURSDAY, November 6th, 1924, at 10.30 a.m.,
large quantities of ex-Government Surplus
WIRELESS and ELECTRICAL ACCESSORIES
and STORES, comprising:
50,000 gross BRASS TERMINALS and SCREWS.
200 prs. HEADPHONES, 500 HEADBANDS, 2,000
SINGLE EAR PHONES.
2,000 SINGLE MICROPHONES, 1,000 2-m.f. CON-
DENERS.
6,000 Crystal Cups, 3,500 Crystals in Cups, 4,000
Gramophone Variolettes.
1,000 PLUGS and JACKS, 50 VOLT METERS, 150
GALVANOMETERS.
LARGE QUANTITY of VALVE and CRYSTAL SETS.
30 MILES ELECTRIC CABLE.
100 10-LINE EXCHANGE SWITCHBOARDS, Etc., Etc.
On view NOVEMBER 5th and MORNING OF SALE.
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The New Empire Ball and Disc Game.
Price 1/11. British Made. Post 4d.
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THE MASTER CRYSTAL.

Get ALL Wave Lengths with the
"G-W" SLIDER
on a Two-Slider Coil Inductance.
There is no Tuning System so efficient
for ALL wave lengths provided you use
a "G-W" Sliders. They make a
BROAD, FIRM contact on ONE wire,
and roll smoothly over them without
scrapping—100 per cent. efficient. 1/- ca.
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Sectional Steel Wireless Masts.
The LIGHTEST, STRONGEST, and CHEAPEST in
the World. Complete with pulley, cleat, wire rope,
strainers, insulators, ground anchors, base plate
and full instructions. A man and boy can erect a
30-ft., 40-ft., 40-ft., 55-ft., 80-ft., 90-ft..
All orders in strict rotation and carriage paid
HAMILTON MAY (Late Lieut. R.N.V.R.),
Doone Cottage, Weybridge, Surrey.

WIRELESS MASTS

50 ft. With Iron Fittings. Sentany 50/-
to house. List 2d. Trade supplied. Amateur
Wireless Service, 33p., Elms Rd., Aldershot.

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This book gives more practical information
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HOW TO RECTIFY, CONNECT AND MAKE
all kinds of wireless apparatus including
crystal and dual amplification
sets, one and two valve amplifiers,
also the latest two, three, and four
valve tuned anode receivers. 160
pages, including 28 diagrams.
SAXON RADIO CO. (DEPT 14), South Shore, BLACKPOOL.

GABINETTS YOU WANT.
PICKETT'S CABINETTS—they're good
value, from 1/6 each, highly polished.
Cabinet (P.W.) Works, Albion Road,
Bexley Heath, S.E. Write for List.

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WITH DULL EMITTER VALVES
Build a Set which requires only ONE Dry
Battery to operate it.

PHILIPS' 4 electrode dull emitter valves,
1.6-1.8 volts, .15 amp. Post free, 30/- each

PHILIPS' 4 electrode bright emitter valves,
3.5 volts, .5 amp. Post free, 12/6 each

Each valve is tested before dispatch and is
guaranteed to give satisfaction. Address:—

E. GEORGE, 112, Bedford Road,
Clapham LONDON, S.W.4.

**RADIOTORIAL
QUESTIONS & ANSWERS.**

(Continued from page 402.)

We regret that no more booklets describing this
set are available for distribution. The last one was
given away several weeks ago, and particulars
cannot be reprinted.

The basket coils for aerial and anode circuits were
of 45 and 70 turns respectively.

The valves named are quite suitable.

H. B. T. (Llandebie, Carmarthen).—I am
living in the country about 17 miles from
Swansea as the crow flies, and have thought I
would like to put up a wireless set this winter.
My intention was to put up a crystal set.
Will you be so kind as to advise me of a good
one? It may be that it is too far for a crystal
set to work when Swansea commences, and it
may be wise to have a set which is convertible
to a valve set. I am afraid I do not under-
stand very much about it yet.

We are afraid that at 17 miles a crystal set will
not be of much use without valve amplification. We
should suggest you build or buy a one-valve reflex
receiver as described in our issue No. 103, or else a
set as advertised in our columns by various firms.

J. R. H. (Nottingham), "Revlex" (Wigan),
W. H. W. (Salford), J. G. N. (Kidderminster),
A. E. C. (Tywardreath), W. H. (Romiley),
G. J. B. (Dublin), R. Y. (Middleton St. George),
Z. L. (Dublin), E. L. (Eastville, Bristol), J. A.
(Runcorn), F. C. P. (Olton), W. L. A. (Wol-
verhampton), W. E. S. R. (Kandy), F. S.
(Ardwick), A. C. N. T. (Newport, Mon.), L. W.
(Wigston), H. S. (Blackrod, near Chorley).

In sending your queries unaccompanied by a
stamped addressed envelope you disregarded the
rules of the Query Department. As the questions
are not of sufficient general interest to answer through
these columns (or else have already been dealt with)
replies can only be sent through the post. For this
purpose a stamped and addressed envelope should be
enclosed.

Foreign readers—whose postage stamps cannot
be used for pre-payment of letters to be posted in
this country—can send "Reply Coupons," which
are obtainable at their local post-offices, and can be
exchanged here for British stamps. The queries
should be repeated, and should in all cases be num-
bered. Replies to each question will then be given
under the appropriate number.

A. R. (Nairobi).—I am using a receiver with
two high-frequency valves, followed by
crystal rectification and a stage of low-fre-
quency amplification. The two high-frequency
circuits are the two tuned anodes, consisting of
home-wound cylindrical coils with .001 con-
densers across them. With this apparatus
I can, practically every night, hear Morse
signals, which I believe are sent out either by
Government wireless stations at Mombasa,
Zanzibar, etc., or ships in or about those
harbours. The distance from here to Mom-
basa is about 325 miles. My principal trouble
is atmospheric. On some days these are so
noisy and continuously persistent that the
regular signals are drowned absolutely, and I
can hear nothing but loud rumbling noises as
if something was tumbling down. Rarely,
however, when these are at their minimum
strength, I can hear the signals very loud in
the 'phones. Is there any way you can sug-
gest for the elimination of these noises? I am
pretty sure that these are not due to any
fault in the receiver, as, as soon as I sever the
aerial connection to the receiver, the noises
automatically stop and I can find no trace of
them. Formerly I was using transformer
coupling between the high-frequency valves,
but the atmospherics were there.

2. When I am using rectification by means
of a valve and grid condenser I find I can
hear the signals even without the use of a grid
leak and that the addition of the grid leak
makes no difference whatever in the strength of
the received signals.

3. Is it not possible to increase the range of
my receiver with the present apparatus, as I

(Continued on page 410.)

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The Long-Life Battery
219-229 SHAFTESBURY AVENUE, W.C.2

EVERYTHING FOR WIRELESS

Send for new bargain list of all components. Head-
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Sets from 19/6; Amplifiers from 42/-; Valve Sets
from 77/6. Direct from actual manufacturers.
TOWNSHENDS, Ltd., Ernest St., Birmingham.

**FOR WIRELESS SETS, MOUNTING
and BOX MAKING USE**

CESTUS
BLACK INSULATING PANELS
(will stand 5,000 volts).

6x6x $\frac{1}{8}$ in. 1/- 12x9x $\frac{1}{8}$ in. 1/8
9x9x $\frac{1}{8}$ in. 1/4 12x12x $\frac{1}{8}$ in. 2/6
All sizes kept in stock. Full size sheet 24x36 in.
from $\frac{1}{4}$ in. up to 1 in. thick.

All orders are despatched by return POST FREE.
CROPLEY ENG. CO., 231/232, Strand,
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Trade Enquiries Invited.

0.6 VALVES FOR 12/6

This genuine offer of TESTED Dutch .06 valves.
1.6 to 2 volts fil., 30-100 volts anode, is open
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24 HOURS' APPROVAL

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ANELOY PRODUCTS (Dept. P25), Eton Works,
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PANELITE.

Will withstand 5,000 volts. Black finish. Will not
fracture. 6x6x $\frac{3}{16}$ in. 1/-; 7x5, 1/1; 8x5, 1/2;
9x5, 1/4; 9x6, 1/6; 10x9, 2/6; 12x10, 2/9;
14x12, 4/-, post paid. Other sizes and thicknesses pro rata.
RADIO PANEL CO. (Dept. "P"),
143, Fetter Lane, London, E.C.4.

A Book Bargain

The Home Radio. How to make and use it.
By Verrill. For those interested in im-
proving their sets or installing more
efficient ones. Published 3/6. Offered,
now, for 1/9, post free. Quote offer 120.

FOYLES, 121, CHARING CROSS ROAD, LONDON.

'PHONES' REWOUND

Resistance and Signal Tested before despatch.
2,000 W., 3/6; 4,000 W., 4/- (Ex-Army, same).
Postage extra. Packing free.
Remagnetising, 1/- New Phone Leads, 1/6 & 2/6.
Transformers Repaired at 1/4 of Original Cost.
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MASTS! MASTS!! MASTS!!!

You must have good ones for distance! SO ONLY
EX-R.A.F. 27-foot Canadian spliced hollow Maple in
2 jointed sections. These masts cost £3-15-0 each
to make. Carriage paid anywhere U.K., 22/6 com-
plete; London area, 21/-. One man can erect.

DON'T MISS THESE!
Steel hollow section masts, socketed and jointed
27' 6" sections, 1/- each, carr. paid 50 feet or over.
Add 1/6 for less. LIMITED QUANTITY ONLY.
Money returned if not approved.
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ST., LONDON, W.1.** Phone: Regent 6487.

STALLOY DIAPHRAGMS from 1 $\frac{1}{2}$ " to 4" by 16ths.
For 'Phones and Loud Speakers from 8d. to 2/- each.
Ear Caps, all sizes, from 1/- to 1/8; Choke Coils,
500-1,000 ohms, 2/3; G.P.O. Transformers, 2/3;
G.P.O. Transmitters, 4/-; Mark 3 Buzzers, 5/6 each;
Spark Caps, 3/-; 5- and 7-way Ebonite Terminal
Boards, 1/- and 1/3; Hot Wire Amp. Meters from
0 to 2 amps., 7/6 each; Milliamp. Meters, 0
to 50 milliamps. and 0 to 500 from 15/- to 30/- each;
Single Ear 'Phones, 2,000 ohms W.D., 6/6 each;
'Phone Units for making up Loud Speakers, 4/3.
(All goods Post Free.)

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"Uncle Tom," Newcastle's First Station Director, Calling "Uncle Tom," of PAYNE & HORNSBY, LTD.

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AERIAL WIRE.—7/22 Stranded Copper, 100 ft., 1/11; 7/25 Stranded Copper, 100 ft., 1/6; 7/22 Stranded Copper, per 50 ft., 1/-; "Electron" Aerial Wire, per 100 ft., 1/8.
ACCUMULATORS.—Fuller's 2 volt 40 amp., in Quonto, 9/6; 2 volt 60, 11/9; 4 volt 40, 18/6; 4 volt 60, 22/6; 6 volt 20, 27/8; 6 volt 60, 33/9.
BRASS RODS.—Screwed 2 B.A., 12 in. lengths, 2/4; Screwed 4 B.A., 12 in. lengths, 2/4.
BRASS ROD, SQUARE.—Cut any length, per 12 in., 3d.
BASE BOARDS.—6 in. by 6 in., 9d.; 9 in. by 6 in., 1/-.
BUZZERS for testing, 2/-.
BUSHES for Condensers and Variometers.—Condenser top bush, 1/4d.; Condenser bottom bush, 1/4d.; Variometer, screwed bush, 2/4d.
BELL WIRE.—Single, 2 yds., 1/4d.; double, 1/4d.
BOXES.—All sizes stocked or made to order.
CATWHISKERS.—Silver, 1d.; Gold, 2d.; Spear-point (Silver), 2d.; Gold Whiskers in tubes, 5d.; Experimenters' Envelopes of 4 & 5 Whiskers, 3d.
CONNECTORS (Brass), useful for many jobs, 1/4d.
COIL HOLDERS.—Single, 9d. to 2/6; 2-way, 3/6; 3/8, 4/6; 4/6, 5/6; 3-way, 4/6; 4/6, 5/6; 5/8. Cam Vernier, 2 Coil Holders, 9/6; Polar Cam Vernier, 11/6; Polar Universal 2 Coil Holder, 10/6; Coil Plugs for attaching Basket Coil to Plug into ordinary 2 or 3 Coil Holder, 7d. 1/6; 1/3; Coil Plugs for making own Coils, Plain Flat Type, 7d.; Wedge Type, 9d., 10d., and 1/6; Fitted with Ebonite Wings, 1/3.
COILS.—Duplex Wireless Coils, per set of 5, 2/6; Duplex Coil, wound to 1,600 metres for Chelmsford, 2/6; Tapped Coils, d.o.o., 20 Tappings, 1/11; Enamel Wound Coils, 6 by 2 1/2, 1/4; O'Keefe, Burne and Igranio Coils always in stock.

DIAPHRAGMS. 2d. and 3d.
DIALS. 1/-.
DIALS AND KNOBS. 1/3.
BAR CAPS for all makes of Phones, 6d. to 1/6.
EMPIRE TAPE. per yd., 1d.
BARTH CLIPS. 4/4d. to 6d.
EBONITE.—Cut to any size, 1 to 1 in., per lb., 3/6.
EBONITE TUBE.—All sizes stocked.
FILAMENT RHEOSTATS.—Velvet Perfecta, 1/6; Ormond, 2/6; Filostat, 2/6; Microstat, 2/9; T.C.B., 30 and 6 ohms, 4/6; Igranio (with Vernier), 7/6; Igranio (Plain), 4/6; Lissarstat Minor, 3/6; Lissarstat Major, 7/6; 30 ohm Special for '06 Valves, 3/3.
FORMERS.—Cardboard, very stout, from 2 in. to 4 in. diameter, 1d. to 4d.
FORMERS, VARIOMETERS, in Black Composition, per pair, 3d.
FLEX.—For Phone Cords H.T. Leads to many other jobs, per yd., 2d.; Red and Black Twisted, per yd., 2d.; Silk Covered, per yd., 1/4d.
GRID LEAKS.—"Dubilier", 2 meg., 2/6; "Lisken", Variable, 2/6; "Watmel", 2/6; "Bretwood", 3/6.
HYDROMETERS (ACID TESTERS), 5/6.
HEADPHONE CORDS. 1/6 and 2/3.
HIGH TENSION BATTERIES.—"Phoenix", M.A.L., S.D.H., 15 volts, 2/9; 30 volts, 5/6; 36 volts, 6/6; 60 volts, 10/6; 90 volts, 16/6; 100 volts, 16/6; Siemens, Ever Ready, etc., in stock.
HIGH FREQUENCY PLUG-IN TRANSFORMERS.—All wave-lengths from 150 to 8,000

metres, prices from 3/9 to 5/6; Leslie McMichael H.F. Transformers, 300 to 600 metres, 7/6; 1,000 to 3,000 metres, 7/6.
INSULATORS.—Large Reel, 1d.; Small Reel, 1d.; Egg Type, 1d.; Shell Type, 1d.; Hook (for indoor use), 1d.
CONDENSERS.—Fixed, All Capacities, .001 to .003 and .0001 to .0005, 8d.; Edison Bell, Fixed Condensers, All Capacities, .002 to .006, 2/6; All Capacities, .001 to .0005, 1/3; "Dubilier", Fixed Condensers, .001 to .006, 3/6; .0001 to .0005, 2/6; "Mansbridge" Condensers, .006, 2/6; .25, 2/9; .5, 3/3; 1 mf., 3/6; 2 mf., 4/6.
CONDENSER SPINDLES.—All sizes, 1/4d. to 4d.
CONDENSERS (Variable).—"Ormond", .001, 8/6; .00075, 7/6; .0005, 6/6; .0003, 5/6; .0002, 5/6; .0001, 4/6; "Vernier", 4/6; Condensers, with "Vernier", .001, 9/6; .0005, 7/6; .0003, 7/6; "Du-Anode" Condensers, .00025, 10/6.
CONTACT STUDS.—5d. per doz., complete with nuts and washers, Nickel, per doz., 1/3.
CONTACT STOPS.—Two for a 1d., complete with nut and washer.
CONDENSER VANES.—6d. per doz.
CRYSTALS.—Small Box Hertzite, 9d.; Large Box Hertzite, 1/6; Midite, 1/6; Tungstallite (Blue Label), 1/6; Geosite, 1/3; Lapisite (Gold Whisker), 6d.; Carborundum, 4d.; Borate, 6d.; Zincite, 9d.; Crystal Cups, patent screw tops, 2/4d.; 3 screw tops, 1/4d.
CRYSTAL SETS.—Excellent results are being obtained on these sets, which are all guaranteed. Square Set, 8/6; Oblong Set, 10/6; Slope Panel, 12/6; "Hawker's" Mark III Set, Maker's Price, 21/6; Our Price, 17/6; "Service Set," splendid value, 30/6, with Variometer, Tuning Plug, 1,600 Meter St.

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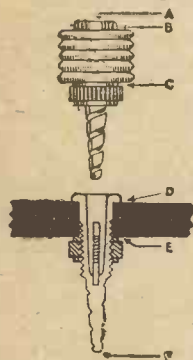
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Solder all your connections
 Where you can't—use CLIX



**CLIX Popularity—
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You can't have efficiency in Radio anywhere unless you have efficient contact everywhere.

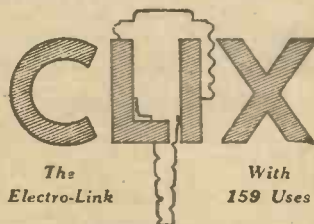
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By virtue of the tapered threaded design of its plug-socket CLIX ensures perfect contact—an obvious improvement on various forms of split-pin plugs, which, however accurately machined, can only permit of a "two-point" contact. Think it out!

CLIX may be wired at points A, B, C, D, or E. F affords an ideal point for soldering when permanent connections are required.

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 CLIX with Locknut 3d.
 CLIX Insulators (6 colours) 1d. each
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RADIOTORIAL QUESTIONS & ANSWERS.

(Continued from page 408.)

have often read of amateurs being able to receive over very long distances with the use of just one valve. I am using a wooden baseboard for the receiver. Can this in any way affect the range of the receiver? The Morse signals I have mentioned above are sent out on a wave-length of about 300 metres, which should go to prove that the wooden baseboard does not allow the radio-frequency currents to leak away across its surface.

1. The atmospherics are incurable, but they can be minimised by the use of a frame aerial, such as was described in "P.W." No. 106.

2. Rectification without a grid leak is possible, but inefficient, and you are apparently using a grid leak which is faulty and which does not leak at all. Try the effect of a new leak, which may be of 2 megohms resistance, or, better still, variable between .5 and 5 megohms.

3. The wooden baseboard is decidedly inefficient and we recommend ebonite. Very long distance reception is only possible under good conditions, and we do not advise the attempt until you have minimised the effect of atmospherics.

W. E. F. (Middlesbrough), D. S. (Northwood), E. A. B. (Swansea), C. D. H. (Lancaster), J. H. B. (Willesden Lane, N.W.6), E. W. (Highbury New Park, N.5), J. S. T. (Milnrow?), B. F. (Sligo), F. B. (Dalston, E.8), S. W. C. (Harlesden, N.W.10), F. C. (Battersea), G. M. (Paignton), H. W. (Lr. Kersal).

In sending your queries unaccompanied by a stamped addressed envelope you disregarded the rules of the Query Department. As the questions are not of sufficient general interest to answer through these columns (or else have already been dealt with) replies can only be sent through the post. For this purpose a stamped and addressed envelope should be enclosed.

Foreign readers—whose postage stamps cannot be used for prepayment of letters to be posted in this country—can send "Reply Coupons," which are obtainable at their local post-offices, and can be exchanged here for British stamps. The queries should be repeated, and should in all cases be numbered. Replies to each question will then be given under the appropriate numeral.

"K D K A HOPEFUL" (Ilfracombe) and B. MILLER (Radlett).—What coils are necessary for aerial and reaction in order to tune down to about 100 metres, for the short-wave American broadcasting stations?

Basket coils are best for the purpose, and these may be specially wound upon formers of about 1 in. centre diameter, having eleven slots.

Number 22 gauge D.C.C. should be used, and for the aerial coil about 15 turns are necessary. The value of the reaction coil varies greatly according to the H.T. valve used, etc., and it may be anything between 10 turns and 100 turns, so that various values must be tried until best results are obtained. In series with the aerial a .0002 condenser is connected, and by using these components connected up in an ordinary straight detector-valve circuit K D K A has been received in this country many times.

It must be clearly understood that such results are freakish, and signals may be quite good one night, and yet there will not be the slightest sign of American stations upon subsequent occasions.

In addition to trying different reaction coils, it may be necessary to vary the size of the aerial coil considerably, to allow for aerials of different size and for the inequalities in the methods of winding and spacing the basket coils.

J. G. (Radlett).—Where can I obtain a copy of "P.W." Nos. 105 and 106, as I am very interested in the Unidyne, and propose constructing a two-valve set on that system?

Back numbers of POPULAR WIRELESS can be obtained for 4d. (post free) upon application to the Amalgamated Press (1922) Ltd., Back Number Dept., Bear Alley, Farringdon Street, E.C.4.

F. L. P. (Clapham Road, S.W.).—What is the cause of a "knocking" noise in my two-valve set? It has developed recently, and is not like a howl or oscillation, but consists of a series of slow and regular knocks, which appear to be unaffected by tuning.

(Continued on page 411.)

MIKRO Ltd.,

The Proprietors and Patentees of the

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and

LOUD SPEAKER CRYSTAL SYSTEM

are now in a position to supply parts to all experimenters who wish to make their own sets.

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32c, GRAVEN STREET, CHARING CROSS, W.C.2.

SKINDERVIKEN MICROPHONE BUTTON, PRICE 5/-

RADIOTORIAL QUESTIONS & ANSWERS.

(Continued from page 410.)

Your grid leak is at fault, and should be replaced in order to cure the trouble. If a fixed leak is desired it should have a resistance of about 2 megohms, but we advise you to fit a good variable leak, which is of great assistance in accurate work on long-distance and weak signals.

J. J. A. (Erdington, Birmingham).—I wish to add a condenser in series with my one-valve set, but am uncertain whether it should be connected between the aerial and aerial terminal, or between the earth and earth terminal. Would this make any difference to signals and does it matter which way round the condenser is connected? i.e., moving plates or fixed plates next to the set itself.

Very often a difference is noticeable on a valve set when the condenser position is reversed, and sometimes one position is decidedly better than the other. In certain cases, and especially on the longer wavelengths, there is a noticeable difference in the signals of a crystal set when the condenser position is altered.

With a valve set it should be noticed that when the series condenser is in the earth-lead the set is insulated from earth, and hand capacity effects are consequently more marked.

The actual condenser connections are also found to affect body capacity, and where fixed metal end-plates are used, it is generally preferable to connect these to earth. If ebonite fixed end-plates are

READERS' QUERIES.

IMPORTANT ANNOUNCEMENT.

Owing to the continued heavy pressure upon the Technical Queries Department a revision of the Rules has become necessary.

Commencing forthwith the number of queries which can be submitted in one letter is reduced from three to two. These two queries should be stated briefly and concisely, and they must relate to genuine technical difficulties.

The Query Department cannot undertake the design of switching arrangements such as can be solved by reference to any good book of circuits; nor can they enter into long theoretical explanations, which can be found by readers in any textbook on wireless.

Diagrams and layout of components should NOT be submitted for wiring-up, but, of course, any particular difficulty which arises can be accompanied by a sketch to illustrate it.

Remember—

(1) DO NOT ASK UNNECESSARY QUESTIONS.

(The queries you raise may be dealt with on the next page, and by raising them again you are only delaying answers to other queries.)

(2) Two questions only are allowed, which should be numbered, and stated as briefly and concisely as possible.

used the usual connection for reducing unwanted capacity effects is when the moving plates are on the "aerial" side, and the condenser itself between aerial and coil.

R. M. B. (Roehampton).—Using a single-valve "straight" set (detector, with reaction), what is the correct number of turns for the reaction coil in order to get best results?

No particular number of turns can be stated as the best value, because results vary under different conditions. If reaction is obtained only when the coils are very closely coupled a rather larger coil should be used for the reaction; and, of course a smaller coil would be necessary where it is difficult to handle reaction, and where the smallest movement of the coil results in oscillation.

T. D. (Clapton, E. 5).—How can I straighten out a sheet of ebonite which has become warped through being stowed away carelessly?

Procure two flat boards of suitable size and warm them thoroughly. Also warm the ebonite—it may be immersed in hot water—and place it between the two boards. Heavy weights should be placed on the top board, and allowed to remain until the ebonite is quite cold.



London Depot:
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Dealers: Write for full details of the Oldham proposition—you are missing a valuable amount of business if you are not stocking Oldham Accumulators.

Hold this new Portable Oldham upside down and the acid cannot spill—

At last here is a non-spillable accumulator that can be carried in the pocket without fear of the acid falling out and spoiling the clothes. Just the accumulator for Dull Emitter Valves. Of small size and light weight it is easily the most economical method of lighting Wecos, Wuncells, 1-volt Oras, and two of them in series are absolutely ideal for the 0.06 amp. type of Valve.

For Dull Emitters

2 volts
10 amp. hrs.
(actual)

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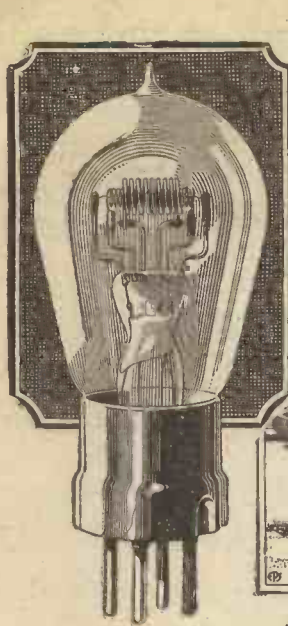
Built from seamless celluloid of the highest grade with substantial terminal knobs, it is a typical Oldham product. Actually it is very similar to the accumulator used in the Oldham Miner's Electric Lamp—the most popular lamp in the country.

Its plates are manufactured under the same special activation process, which has the property of ensuring a longer life and a greater ability to hold

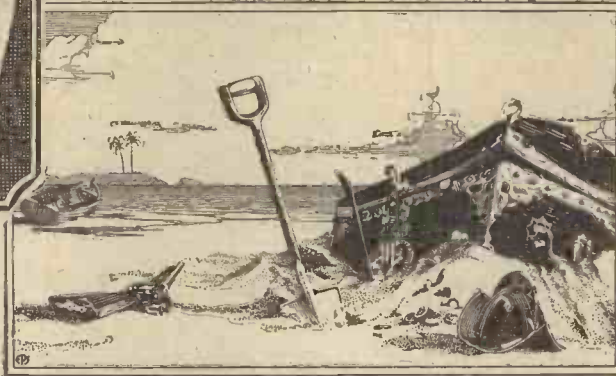
the charge when the accumulator is not in use. Remember that it costs only a few pence to charge it—that the charging can be done in a few hours—and that its absolutely constant output is preferable to any type of dry battery. Bearing these points in mind you will realise that the new Oldham Non-spill Accumulator is just the one for your Dull Emitter Valves.

Oldham & Son Ltd.—Denton Manchester

Gilbert Ad. 1608



Louden



❖ Doubloons !! ❖

10/-

The search for hidden treasure was formerly one of the recognised methods of acquiring wealth.

Unfortunately most of the treasure has now been found, so we have to fall back on the adage "A penny saved is a penny gained," and amass our treasure by not spending it.

The two chief sources of expense in Wireless are the recharging of accumulators and the replacement of valves.

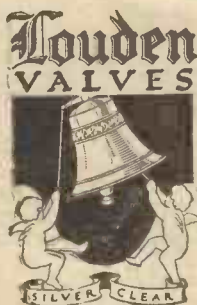
The Louden Valve reduces these to such an extent that, reckoned by the money it saves, it is a fortune in itself.

To begin with the Louden Valve costs only 10/-. It takes only 0.4 ampere in the filament, enabling your accumulators to last twice as long

on one charge as with the ordinary bright filament valve taking 0.75 amp. You have in fact very nearly the advantage of a dull emitter valve at a cost of 10/-!

Finally, the filament enjoys great length of life because the harmful charges which otherwise would continuously bombard it are forced through the spiral anode out of harm's way.

All these advantages are yours when you buy a 10/- Louden Valve, and this takes no account of the Silver Clear reproduction which alone makes the Louden Valve worth twice what is asked for it. Buy Louden Valves for your set to-day and prove the matter for yourself.



The plain Louden for detecting and Low Frequency Amplifying.
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Manufactured throughout in Great Britain. All Loudens are Silver Clear and free from "mush." The current consumption is very low and the life long.

Louden Valves - Silver Clear

SIDELIGHTS ON WIRELESS.

(Continued from page 368).

1907, and of Debye in 1912, that the same unit occurred in many apparently diverse phenomena connected with atoms, such as "atomic heat," and could be applied to the vibration of atoms in general, even in a solid—a discovery which bids fair to revolutionise the treatment of molecular physics generally.

Thus the twentieth century was heralded by these two momentous discoveries—the electron and the quantum—and by the consequent intrusion of an element of discontinuity into all its problems.

It should not be supposed that the idea of ultimate continuity is thereby interfered with or discarded, but it is relegated to an ultimate and not a proximate position. In dealing with masses of matter, as in the old dynamics, continuity reigned and still reigns. For instance, the science of hydrodynamics treats water as a continuous fluid, though we have long known that it had an atomic and therefore discontinuous constitution. But so long as we are dealing with groups of millions of billions of atoms, such as the minutest visible drop must contain, the ultra-microscopic discontinuity does not matter. Gases can be dealt with in either way. Pneumatics considers them in the gross. The kinetic theory deals with the particles individually or statistically.

This Marvellous Universe.

As soon as we study the phenomena of radio-activity, and begin to penetrate into atomic interstices and consider the atoms individually—especially if we analyse the atom into the almost infinitesimally small electrons which compose it, and deal with these atoms of electricity—the older methods of dynamics, though still applicable to a large extent, show signs of incompleteness. They require to be supplemented by a recognition of certain clear evidence of discontinuities—in the form of jumps or steps—which whether or not they are ultimately resolvable into continuous processes, must for a time be dealt with as what they appear to be, and must be recognised as corresponding to some real and genuine property characteristic of such atomic phenomena as we are able to observe. For these atomic phenomena show no obvious sign of continuity with the rest of physics, and prove themselves experimentally to be almost independent of all ordinary physical conditions, such as we summarise under the heads of "temperature" and "pressure," which are statistical terms, only suitable for dealing with matter in the gross. It is when dealing with individual atoms that we encounter discontinuity.

Gradually we are beginning to understand more and more about the mechanism of this marvellous universe; and it is instructive to find the same law and order ruling everywhere—inside the atom and in the remotest depths of space. In so far as there are differences in the region of the infinitely small—in so far as phenomena are found there which are not found in the region of the infinitely great—those differences, of which so far the quantum is chief, are bound to become highly instructive, and are already of exceeding interest. They, and other peculiarities connected with the excessive speeds with which radio-activity has familiarised us, are beginning to dominate twentieth-century physics.

Correspondence

A UNIDYNE-DE-LUXE.

The Editor, POPULAR WIRELESS.

Dear Sir,—Having constructed several of the Unidyne sets described by Messrs. Rogers and Dowding in POPULAR WIRELESS to their original layout, I thought that I would have a "de luxe" model and, having decided on 2 valves, 1 det., 1 L.F., I thought I would try what a different layout would do, with the result seen in the photographs. I had fine



results with the original layout, but with the new arrangement results were 100 per cent. better. The first night I tried it out when our local station was quiet, and during intervals I logged the following stations: Glasgow, Newcastle, Manchester, Birmingham, Cardiff, School of Posts, Paris.

Since then I have had Madrid, Breslau, London, and can tune these stations with ease. My aerial is a twin wire 50 ft. long, 6 ft. spreaders, 22 ft. high. The cabinet is of canary wood (well seasoned) 9 ins. deep by 12 ins. by 12 ins., inside dimensions, stained with dark oak stain eggshell finish. The panel is 12 ins. by 12 ins., and fitted with a tray to slide in and out of cabinet. The four valve legs seen in the centre of panel, and the two switches, are to enable one to convert the set to 1 H.F. and 1 det., if required without any further drilling. The components used are as follows: Vav. condensers, Fallon and Service; fixed condensers, Edison Bell and Dubilier; grid leak, Lissen; filament rheostats, "Filostat"; valves, Thorpe K4; coils, "Tandio" basket; ebonite, Silvertown; transformer, Maxim.

I have incorporated a vernier condenser, which gives finer tuning, and I also have a spare 0003, which fits into the place of the vernier when it is desired to convert the set to H.F.

The results from this set are splendid, and leave nothing to be desired. It gives one the feeling that

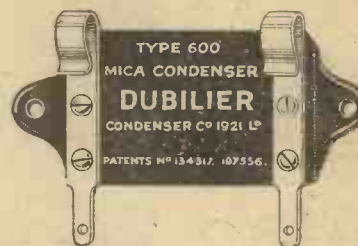


The back of the 2-Valve Unidyne.

it will bring in anything that is being transmitted, and Mr. Rogers and Mr. Dowding are to be congratulated on their great invention. It will pay any amateur to make this set up, and he will never go back to H.T.

I am, yours faithfully, J. P. PHILLIPS.
43, Robert Avenue, Harehills Lane, Leeds.

(Continued on page 414.)



THE EFFICIENT WORKING OF YOUR SET

is dependent almost entirely on its components. The saving of a few pence on a small and apparently unimportant condenser may easily prevent an otherwise efficient set from giving its best results. You yourself have no means of testing the capacity of condensers you buy or of knowing whether their capacity remains constant when in use. Your only safeguard lies in purchasing products which carry the guarantee of a firm with a reputation to maintain.

All Dubilier fixed condensers are guaranteed to be within 15 per cent. of their stated capacity and, where desired, they can be manufactured and guaranteed within still closer limits. The types 600 and 600a, illustrated here, are practically universal among manufacturers of complete sets, whilst experienced home constructors continually assure us that they can feel complete confidence in the working of their sets when—and only when—they have fitted Dubilier Condensers.

See that they are in your set as well.

Type 600 :

For all purposes in connection with receiving apparatus. With or without clips for grid leak. '0001-'0009 mfd., 2/6 each. '001-'006 mfd., 3/- each.

Type 600a.

As Type 600 but for vertical panel mounting. '0001-'0009 mfd., 2/6 each. '001-'006 mfd., 3/- each.



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The Aristocrat of Transformers

THERE can only be two reasons for the exceptional demand for Eureka Transformers. First, that the general wireless public appreciated truthful and frank explanations of the superiority of their design, and secondly—that they have absolutely lived up to their reputation.

Wireless enthusiasts are always quick to show their appreciation of a good component and to recommend it to all their friends.

That is exactly what has happened with the Eureka. It is such an exceptional Transformer—both for volume and purity—that, in spite of its comparatively high price, it has literally fought its way to the top as Britain's best L. F. Transformer.

And well it might—for certainly no other Transformer has such care lavished upon it during every stage of manufacture—no other Transformer has to undergo successfully such relentless testing. In the Eureka works, a staff of experts are actually paid to "find fault"—so zealous of its reputation are its manufacturers.

The secret of its success lies in its unique construction. For instance, its massive windings contain no less than 2½ miles of fine copper wire. Its core is not of stampings, but of a more expensive design which eliminates all possibility of howling. And its coppered steel case offers such a protection against climatic conditions that a Eureka Transformer can be placed below the surface of water, and yet the insulation remains quite unaffected. Obviously the Eureka is built to an ideal and not to a price—for low priced Transformers get volume by reducing the amount of wire around the core, and by employing a high "step-up" ratio between the primary and secondary windings.

For your next Set specify the Eureka—and get the finest Transformer ever made in this country.

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 Ltd., 30, Gordon Street, Glasgow.

Made in two types
Concert Grand .. 30/-
Eureka No. 2 .. 22/6
 (For second stage.)

Gilbert Ad. 1585.

CORRESPONDENCE.

(Continued from page 413.)

ADVENTURES WITH A UNIDYNE REFLEX.

The Editor, POPULAR WIRELESS.

Dear Sir,—In the "P.W." of August 23rd, 1924, there is a brief account of a special reflex set constructed by the writer for portable work. The extraordinary sensitivity of this little set—for it only measures 12 in. by 6 in. by 4 in.—is chiefly due to the elimination of all self-capacity and instability by means of the Unidyne system and carefully spaced coils. It was designed and built to withstand a good deal of rough handling, and during the four months or so it has been in constant use it has given every satisfaction.

When the "Unidyne" principle was invented the set was rewired and four-electrode valves permanently fitted in order to do away with the troublesome H.T. battery, which is generally a great burden when taking the set into the country.

As soon as the alterations were complete it was decided to find out at once whether the set, now H.T.-less, had lost anything of its old efficiency through the absence of the plate battery.

Accordingly we set out for the open country to give the receiver a fair trial. The first place of call was a wood on Epsom Downs, near the famous racecourse; a few yards of thin flex were slung from the car to a neighbouring tree, and a short metal rod thrust into some damp mud for an earth connection.

When the valves were switched on the local station (2 L O) was transmitting the afternoon concert, which came through at very strong loud-speaker strength. On the 'phones, of course, the music was deafening. A slight turn of the anode condenser brought in Cardiff, also very loud. Radio-Belgique (Brussels), which was about two hundred and thirty miles away, was nearly as strong as 2 L O.

After this we moved on to Box Hill, which is, owing to its height and unobstructed position, an excellent spot for wireless reception.

Radio-Paris (our old friend Radiola in a new guise) could be heard comfortably on the 'phones with no aerial at all; the aerial was simply disconnected and the earth wire attached to the aerial terminal. Ten feet of flex brought in Bournemouth without any interference from 2 L O. Aberdeen, over 400 miles distant, was even louder than Bournemouth, though slightly jammed by Newhaven Coast station. After listening for a few minutes to some guttural talk from Vox Haus and Hamburg, we started for home, thoroughly satisfied that the elimination of the H.T. battery had not impaired the efficiency of the set in any way. Indeed, by cutting out scratching noises and other interruptions on the part of the plate battery, it had decidedly improved the quality of our reception. It is well worth the trouble to adapt any kind of portable set to the Unidyne principle, thereby saving the expense, bother and space of the now obsolete high-tension battery.

Yours faithfully,
 G. J. MARCUS.

Firle,
 Langley Park Road,
 Sutton, Surrey.

B.B.C. PROGRAMMES.

The Editor, POPULAR WIRELESS.

Dear Sir,—Regarding views on programmes. I wrote the B.B.C. recently, suggesting that to split up an evening performance—particularly when an entire musical comedy, say, is being broadcast—with the 9.30 News Bulletin and a talk on Bee Keeping, for instance, is incongruous.

The last act, to my mind, is spoiled by this destruction of atmosphere, and makes it impossible for one to settle down and really enjoy an evening concert.

Have the talk by all means, but place it before the concert proper, and leave the news until the conclusion.

The B.B.C. in reply, say that some people "are not able to listen absolutely continuously for a protracted period, and these welcome a short break in a transmission such as the 'Dogs of Devon' (this was just mentioned by me as an example), moreover, the artists themselves appreciate a rest."

"It should be remembered that there are many owners of sets listening whose chief interest is the News Bulletin, and it would hardly be fair to keep them waiting until an unreasonably late hour."

The portions in italics are from the B.B.C.'s reply. Your readers' views on this subject might be of interest, as it undoubtedly needs airing.

By the way, in case you receive complaints regarding 2 Z Y's noisy background (due to his microphone circuit). I wrote them about this also, and am told everything will be all right when the Manchester station moves to new quarters in October, when new apparatus will be installed.

I was agreeably impressed by the obviously individual and careful attention paid to letters by the B.B.C., no less than by their courtesy in replying practically by return.

Yours, etc.,
 E. BOTTOMLEY.

Westholme,
 Mossley,
 Near Manchester.

TECHNICAL NOTES.

(Continued from page 376.)

insert the brass tab of the battery into the slots, securing it there by means of the clamping screw of the connector, the wire lead being secured into the other end of the connector in the usual way.

Vertical Aerials.

What are the advantages of the vertical aerial? This question is discussed in "Radio Digest" (U.S.A.) and two main advantages pointed out are firstly, its sensitivity, and secondly, its small inductance as compared with that of a long horizontal aerial.

"With the vertical aerial, this inductance, and consequent tendency to choked reception, is practically overcome. This can be noticed in connection with the grid leak, which may frequently be discarded. This shows that with a vertical aerial you are using your valves to better advantage and are not under the necessity of drowning them down with so many megohms. The vertical aerial system is obtained by the use of an umbrella aerial or, for peak reception, the balloon aerial. It has been found that the vertical aerial functions just as well with fine wire as with heavy-gauge wire.

"It is remarkable the sensitivity of such an aerial. In comparison with a regular horizontal aerial 100 ft. long and 30 ft. high, the vertical aerial, which was 200 ft. high, was estimated to be five times as sensitive as the horizontal one."

Whilst we do not quite agree with some of the remarks quoted above, they may be of interest to readers who are fond of experimenting with different types of aerial.

Paper Loud Speaker.

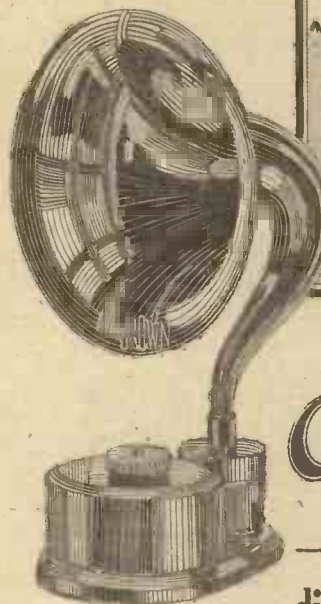
The new "Primax" loud speaker, which has been on the market for some time in America and also on the Continent, is quickly making its way in this country. In some respects it resembles the parchment cone gramophone reproducer which made its appearance a few years ago, and we believe was manufactured by the Pathé Co. In the "Primax" loud speaker, there is no horn or trumpet of the ordinary kind, but instead, the vibratory member of the reproducer is connected to the centre of the large disc or circular sheet of special paper, which is radially pleated. At the rim the paper is flattened out and gripped in a circular beading or edge of metal. The result is that the paper diaphragm, whilst very light in weight, is appreciably rigid and, furthermore, it has very little tendency to resonate to particular tones. Or perhaps a better way of expressing it is to say that its resonant frequency is far below the frequencies which it is required to reproduce. The comparatively large area of the paper diaphragm enables it to set into vibration a volume of air comparable with that which is operated upon by the conventional horn, and there is the further advantage that the projection of sound from the "Primax" diaphragm is, for practical purposes, uniform in all directions. On test, this instrument gave quite a good and fairly loud reproduction in a moderate sized room.

New Indoor Aerial.

I see that a new kind of indoor aerial, suitable for the ubiquitous "flat dweller"

(Continued on page 416.)

This Map shows the effective working areas of the Crystavox—the only Loud Speaker in the world capable of operating direct from a Crystal Receiver. If you live within any of the circles—and if your Crystal Set will respond to the simple test described below—you can use a Crystavox Loud Speaker.



Exhibited at our Stand
at the Albert Hall
Exhibition.



CRYSTAVOX

—the only Loud Speaker working
direct from a Crystal Receiver

THOSE fortunately living within easy range of a B.B.C. station require nothing more than a good Crystal Set and a Crystavox. In return they will receive all the pleasures of Broadcasting at an absurdly low price—a few shillings every six months or so for the replacement of a small dry battery.

Nothing more to buy—compare it with a Valve Set with the constant replacement of valves, accumulators to be recharged, and the uncertainty as to whether it will break down at the critical moment. But every Crystal Set won't work a Crystavox—they differ considerably in sensitivity, and local conditions vary, too. Apply this test: hold the phones 12 inches from the ears—if signals can still be heard then the Crystavox can be relied upon to fill the whole room with its delightfully mellow tone.

If you would know more about its capabilities ask your dealer for a free copy of a new Crystavox Folder, or if his supply is exhausted, we will send you one direct.

From all Dealers,
or can be demon-
strated at the fol-
lowing Showrooms:

19, Mortimer St., W.1.

15, Moorfields,
Liverpool.

67, High Street,
Southampton.

£6 - 15 - 0

S. G. BROWN Ltd.—Victoria Rd., N. Acton, W.3

Gilbert Ad. 1575.



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PATENTS—TRADEMARKS. Advice, Handbook and Cons. free.—**B. T. KING, C.I.M.E. Regd. Patent Agent (G.B., U.S.A. & Canada), 146a, Queen Victoria St., E.C.4.** 'Phone Central 682. 33 yrs. exp.

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NEW MARVEL CIRCUIT

The new two-valve "Marvel" Circuit without grid leak or grid condenser, easily constructed, eradicates all fizzing and outside noises. Diagrams with full particulars, post free 1/3. Model and Wireless Coy., Palmerston Arcade, Southsea.

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Have you seen the only Automatic 'Phone Board, 5/6. All fittings Nickel Plated. No special adapters necessary. Leaflets from **EONS WIRELESS SUPPLY CO., 7, Featherstone Bldgs., High Holborn, W.C.1.** 'Phone: Chancery 7381.

THE NATURAL CRYSTAL

ETHITA

TRADE MARK

IS SECOND TO NONE.

Sample tubes, 1/- post free, from **A. J. CONWAY, 36, Greenwood Road, London, E.8.** "Free Sample to the Trade." 'Phone: Dalston 4936. (Sole Wholesale Agent for Props.: Bright Co., London, N.8.).

PLEASE be sure to mention **POPULAR**

WIRELESS when communicating with

:: :: Advertisers :: ::

THANKS!

TECHNICAL NOTES.

(Continued from page 415.)

is available on the market; it consists of a large sheet of copper foil, suspended from a hook on the wall by means of two cylindrical rods or rollers, one at the upper and one at the lower edge, after the fashion of a map or picture. This new aerial, goes by the name of the "Area" indoor aerial, and inquiries with respect to the same should be addressed to Dr. Round, 19, Crescent Wood, Sydenham Hill, S.E.26.

Wireless Weather.

It is often complained by the anonymous "man in the street" that the transmission of wireless waves is playing havoc with the weather, and that it is responsible for the unusually heavy rainfall which has been experienced during the past few months, not only in this country, but in many other parts of the world.

A well-known American meteorologist, Professor J. MacBall, has given reasons substantiating this view, and predicts that so long as the ether is in a constant state of turmoil with wireless transmissions and disturbances from electrical machinery and so on, little hope of improvement in weather conditions can be entertained.

Panel Shielding.

I saw an advertisement in one of the German papers the other day for what was described as a "liquid metal" for painting on to the back of the panel, after the set is complete, and which cuts out body capacity and "brings in music clear and sweet," the operation by which these very desirable advantages are secured being "done in five minutes." The same advertisement referred also to liquid "spaghetti" which can also be applied after completion of the set.

"HARMSWORTH'S HOME DOCTOR."

THIS week sees the publication of a new fortnightly part work, "Harmsworth's Home Doctor." It is to be a complete encyclopedia of good health, and will contain the last word of medical knowledge. Part I is beautifully printed and richly illustrated. Sir Clifford Allbutt, K.C.B., Dr. C. W. Saleeby, and Sir D'Arcy Power, K.B.E., F.R.C.S., contribute the special introductory articles, and a First Aid Card, which should prove invaluable in all emergencies in the home, is presented with each copy. Absolutely complete and authoritative, "Harmsworth's Home Doctor" is a work of first-rate importance. It is to be completed in about 36 fortnightly parts at 1s. 3d. per part. The first part is now on sale. A copy should be in every home.

CUT OUT CATWHISKERS

use instead the famous New Improved

CATSEYE

Price 2/6

FIXED DETECTOR

Connect up and listen-in in comfort at once. No waiting. No adjusting. Order from your dealer, or send P.O. 2/6 and 14d. stamp to—

COMREX CO. (Dept. 3), 119, Fleet St., E.C.4.

'PHONE REPAIR SERVICE

ALL MAKES and Ex-Army 'Phones rewound. 4,000 ohms, 4/6 per pair; 8,000 ohms, 1/- extra. Postage, 6d. Remagnetizing, 1/- per pair. Transformers rewound, any ratio, from 5/-.

The H.R.P., 46, St. Mary's Road, Leyton, E.10.

AS GOOD AS A VALVE

A pure natural crystal from South America. Very fine facets. Super-sensitive, needs modification on reflex sets. Absence of howls and whines. No prolonged and painful searching for a point. Ideal in reflex sets, makes an ordinary crystal set almost like a valve.

1/6 each, post free, 3 for 4/-
Every piece tested and guaranteed.

B.L. THATCHER, 178, Nelson Rd., Horsey, N.8.

THE "EXTRACON"

The fixed condenser that is variable. A new invention which gives wonderful results. Guaranteed. Prov. Patent. With full instructions, post free 2/3.

John Walker & Co., 28, The Grove, Vauxhall, S.W.8.

ENGRAVING

PANELS IN LARGE OR SMALL QUANTITIES ENGRAVED BY
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THE MASTER ONE-VALVE SET

Has received all B.B.C. and CONTINENTAL STATIONS. Loud Speaker results possible. Simple to operate. Marvellous range and power. **43/-** including B.B.C. Coils, Plus Royalty. (Genuinely worth £4).

Buy the World's Best NOW. Numerous letters of appreciation arriving from all parts of the country.

SATISFACTION ASSURED!
WORLD'S WIRELESS STORES, WALLINGTON

HEADPHONE REPAIRS.

Rewound, re-magnetised and readjusted. Lowest prices quoted on receipt of telephones. Delivery three days.—**THE VARLEY MAGNET CO., London, S.E.18.** 'Phone 888-9 Woolwich. Est. 26 years.

25/- FOR 17/6.

This is what you get when purchasing our British 'Phones at 17/6, 2-way coil holders, 4/6; 3-way 5/6. Send for Bargain List P. to **EONS WIRELESS SUPPLY CO., 7, Featherstone Bldgs., High Holborn, W.C.1.**

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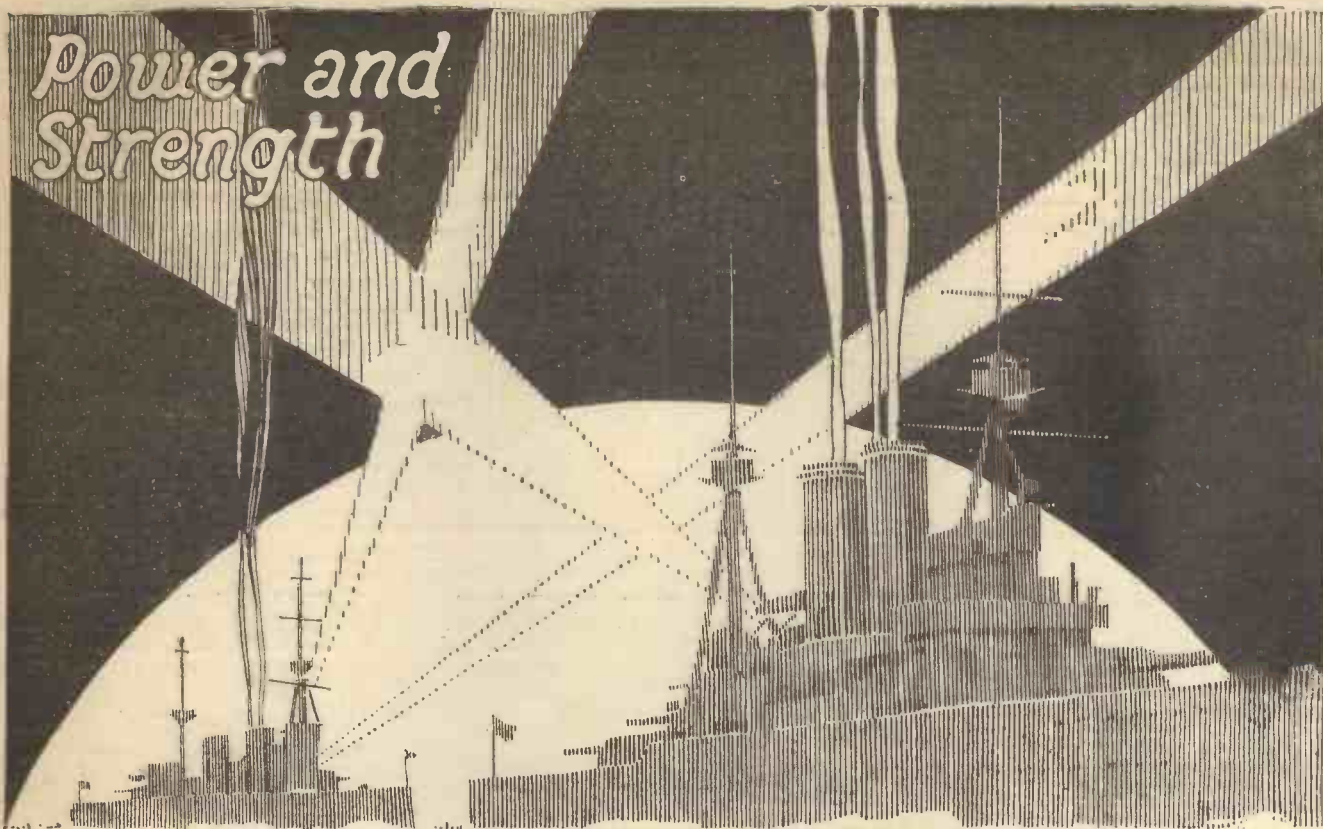
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These wonderful valves have been designed for the wireless amateur who requires something better than general purpose valves.

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Note the colour distinguishing rings :

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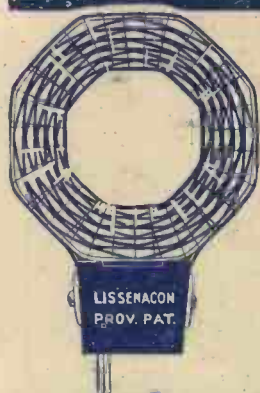
Write for leaflet M 8 and avoid accidents to your valves by asking your dealer for the Mullard safety disc: it is free. If your dealer cannot supply you send us his name and address and we will send him safety discs for distribution.

Mullard

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LISSENIUM. Peculiar efficiency in COILS—



IF YOU EVER WANT COILS WHICH INTENSIFY TUNING—USE LISSENIUM COILS.

LISSENIUM TUNING CHART.

Note the Intermediate Coils, 30, 40 and 60.

TABLE 1. Wavelength range when used as Primary Coils with Standard P.M.G. Aerial and '001 mfd. condenser in parallel.			TABLE 2. Wavelength range when used as Secondary Coils with '001 mfd. con- denser in parallel.		
No. of Coil	Minimum Wavelength	Maximum Wavelength	Minimum Wavelength	Maximum Wavelength	PRICE
25	185	350	100	325	4/10
30	235	440	130	425	4/10
35	285	530	160	490	4/10
40	360	675	200	635	4/10
50	480	850	250	800	5/-
60	500	950	295	900	5/4
75	600	1,300	350	1,100	5/4
100	820	1,700	500	1,550	8/6
150	965	2,300	700	2,150	7/7
200	1,885	3,200	925	3,000	8/5
250	2,300	3,800	1,100	3,600	8/9
300	2,500	4,600	1,400	4,300	9/2

In the UNIDYNE circuit no high tension supply is used. It is obvious, therefore, how essential it is to apply every fraction of energy available. It was found by the inventors of this circuit that LISSENIUM COILS WERE THE ONLY COILS WHICH COULD BE SUCCESSFULLY USED.

In the same way in conjunction with the principle of EDDY CURRENT TUNING employed in the new LISSENIUM CRYSTAL SET, LISSENIUM COILS ARE PECULIARLY EFFICIENT. No other coils give the same results.

BUILDING UP BIG SIGNAL VOLTAGE—

With a new Crystal Set

All tuning is accomplished roughly in one of two ways—namely:—

1. By varying the inductance, or
2. By varying the capacity in the tuned circuit.

The maximum energy transferred from the aerial to the audio frequency circuit depends largely upon the losses in the circuit. When it is remembered that the effective capacity of the average aerial and earth system is about '0003 mfd. (and a long aerial is almost invariably used with a crystal set) and that this capacity is shunted directly across the aerial and earth terminals of the receiver, it can be seen that if condenser capacity is added, or a high self-capacity is present in the inductance itself, the signal voltage is likely to be appreciably diminished.

In the new LISSENIUM CRYSTAL SET, therefore, there has been introduced a form of tuning which, while providing the means of suitably varying the wavelength range does so without added capacity and in combination with an inductance which is peculiarly efficient with the form of tuning employed.

Tuning is achieved by moving a metal plate in relation to the inductance (a LISSENIUM coil), and although the moving plate is entirely unconnected with the electrical circuit, its influence is effectively applied through the medium of the magnetic field created.

By using the appropriate LISSENIUM coil the set can be used for as many stations as there are, or as many more as come along. To receive London and Chelmsford, two coils would be needed—to change over from one station to the other, take one LISSENIUM coil out and plug the other one in.

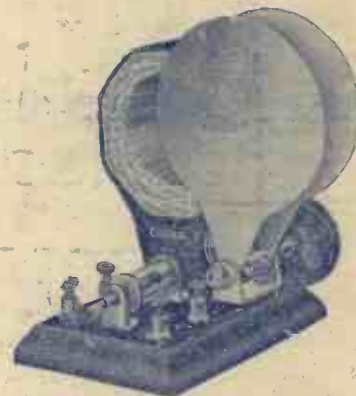
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Price of No. 50 LISSENIUM coil
(covers 300 to 350 metres on this receiver) 4/10

Price of No. 60 LISSENIUM coil
(covers 350 to 400 metres on this receiver) 5/-

Price of No. 75 LISSENIUM coil
covers 400 to 500 metres on this receiver 5/4

Price of No. 250 coil for CHELMS-
FORD 8/9

NOTE.—One LISSENIUM coil must be ordered with each set—the receiver will not be sold without a coil because it yields much greater efficiency when these coils are used.

In this LISSENIUM Crystal Set there is no paper—no cardboard—no loose contacts—no loose wires—the whole is an instrument throughout—robust—and THE MOST EFFICIENT CRYSTAL SET MADE—WITH THE MOST EFFICIENT INDUCTANCE.

THIS IS THE NEW CRYSTAL SET PROMISED IN OUR ANNOUNCEMENT OF AUGUST 6th LAST—and now ready for delivery.