



An Amplion for Christmas

For what will undoubtedly be "A Wireless Christmas" the gift of an AMPLION will be appreciated more perhaps than any present the wit of man could devise.

The **RADIOLUX AMPLION** represents an outstanding triumph in the art of Loud Speaker design, being totally different in appearance, in construction, and in results. Louder, clearer, more sensitive and realistic in tone than any contemporary instrument, the **RADIOLUX AMPLION** is a *revelation* in every essential loud speaker quality.

Not only is the spoken word and the song of the vocalist true to life, but instrumental music is almost indistinguishable from the original studio performance. Outwardly resembling the English bracket clock—in itself a standard to the world—the cabinets possess that beauty of form and superlative finish which denote the *masterpiece*.

Obtainable from **AMPLION STOCKISTS**, Radio Dealers or Stores

Patentees and Manufacturers

ALFRED GRAHAM & CO. (E. A. Graham),
 St. Andrew's Works, Crofton Park, LOND^ON, S.E.4
 Demonstrations gladly given during business hours at 25
 Savile Row, London, W.1.; 79 High Street, Clapham, S.W. 4;
 10 Whitworth Street West, Deansgate End, Manchester, and
 101 St Vincent Street, Glasgow.

Made in two sizes
 and various finishes at
 prices from £4 15s.
 The illustration above
 depicts Model R.S.I.M.
 with mahogany cabinet
 and oxidised silver
 "grille." Price 8 gns.

Radiolux AMPLION

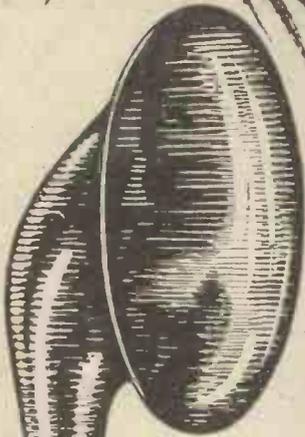
For those inclined
 towards a "trumpet"
 the House of
 Graham continue to
 offer the famous
 "Dragon" range at
 prices from 25/-

FOR · THE · FIRST · TIME · IN · LOUD · SPEAKER
 HISTORY · SCIENCE · AND · ART · GO · HAND · IN · HAND



My two Best Gifts for Xmas!

THE problem of choosing Christmas gifts is easily solved this year, for everyone is keen on radio, and what present could be more appreciated than the famous GECOPHONE Loud Speaker, or an extra pair of GECOPHONE Headphones?



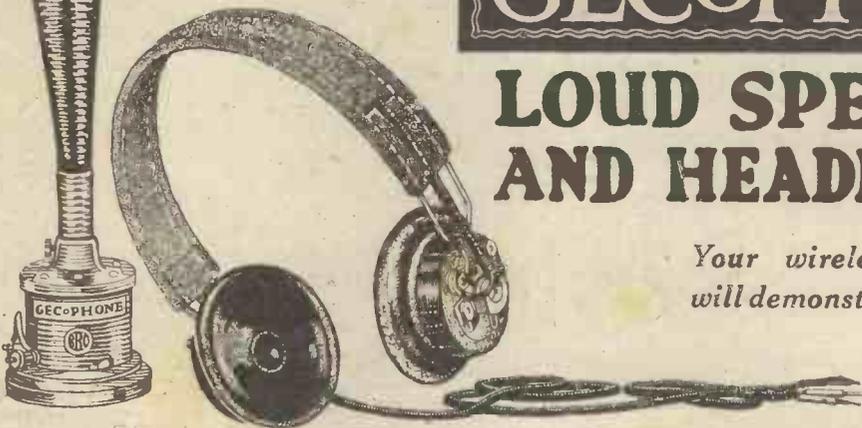
GECOPHONE LOUD SPEAKER. The moulded ebonite horn, together with the efficient electro-magnetic mechanism, ensures perfect reproduction. PRICE £5

GECOPHONE HEADPHONES. Pigskin headbands. No thumbscrews. Large earcaps. Adjustable for perfect comfort. Clear as a bell. PRICE 20/-

GECOPHONE

LOUD SPEAKER AND HEADPHONES

Your wireless dealer will demonstrate them!



GECOPHONE Components are fully described in Booklet BC 3759

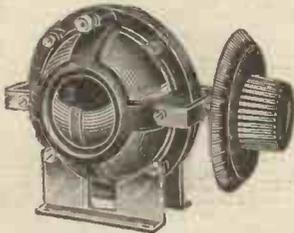


Some Gift Suggestions



IGRANIC "E" Type Audio-Frequency Transformer
(Patent No. 205013).

The latest Igranic model embodying many valuable improvements. It may be relied upon to give extremely high and uniform amplification with a complete absence of distortion.
1-5 ratio for first stage 21/
1-3 ratio for second and subsequent stages and for power amplification 19/6



IGRANIC "F" Type Variometer
(Revd. Design No. 708773).

The radio enthusiast who will have none but the latest and most efficient components built into his receiver will welcome the Igranic F. Type Variometer. The great feature of this component is in the stator moulding which has been "skeletonised".
The elimination of moulded material results in a very big improvement in efficiency, due to the reduction of self-capacity and to the fact that the clearance between rotor and stator windings is very small.
It is ideal for aerial tuning in either crystal or valve sets receiving B.B.O. Stations. Supplied complete for fixing.
Price (250-600 metres), 12/6.



IGRANIC Telephone Connector
(Pat. No. 223469).

A handsome and useful addition to any set. Provides connection for addition of four pairs of telephones. Automatic in action. Price 8/6

Xmas Gifts that give lasting pleasure —



Whether your friends be mechanically or artistically inclined you could not choose for them better Xmas Gifts than IGRANIC RADIO DEVICES. To the radio enthusiast, the excellent performance and perfect workmanship of all IGRANIC RADIO DEVICES—from a grid-leak to a splendid outfit for building the Igranic Six-valve Super-Heterodyne Receiver—will be a source of lasting pleasure and satisfaction. To your friend who is keenly appreciative of good music artistically rendered, the broadcast concerts which may be so faithfully reproduced by a set built with IGRANIC RADIO DEVICES, will give sheer joy. By either of them your Xmas Gift is sure of a warm welcome and will be an enduring reminder of your friendship and goodwill.

All IGRANIC RADIO DEVICES are built of the best, by the best craftsmen—to give better results.

IGRANIC RADIO DEVICES include :

Honeycomb Duolateral Coils, Variable Condensers, Fixed Condensers, Filament Rheostats, Intervolve Transformers, Variable Grid-Leaks, Variometers, Vario-Couplers, Coil Holders, Potentiometers, Combined Instruments, Vernier Tuning Devices, Switches, Anti-Microphonic, Valve Holders, Stand-off Insulators, etc., etc., and also the IGRANIC Supersonic-Heterodyne Receiver Outfit. All carry the IGRANIC Guarantee.

Write for List Z.897.

IGRANIC Super-Het Receiver Outfit.



149, Queen Victoria St., London.
Works: BEDFORD.



YOU WILL USE THESE



WHENEVER you want to use any components of the type illustrated here, you will find it best to specify Dubilier.

We are the largest condenser firm in the world, and practically every transmitting and receiving set contains some of the well known Dubilier products, which are universally known for their accuracy, reliability and constancy.

The four Dubilier products here illustrated are as follows:—

The Dubilier Duwatcon Variable Condenser is a special design for series-parallel working, giving a complete and uninterrupted tuning range over the whole wave-length band.

0·0007 mfd., 30/-

Type 610 and 620 Mica Condensers, for general use in receiving circuits. Capacities 0·0001-0·015 mfd.

From 3/-

The Dubilier Mansbridge Variometer. This new and convenient Variometer will cover the complete wave-length band up to 5 XX (a fixed condenser value 0·0025 mfd. is used in conjunction with it for the higher wave-lengths).

Price 12/6

The Dubilier Condenser Company (1925) Ltd., manufacture Fixed Mica Condensers, Variable Air Condensers, Anode Resistances, Grid Leaks, the Dubrescon Valve Protector, the Ducon Aerial Adaptor, the Minicap Switch, and the Mansbridge Variometer. The Company are also sole concessionaires for the products of the Mansbridge Condenser Co. Ltd.

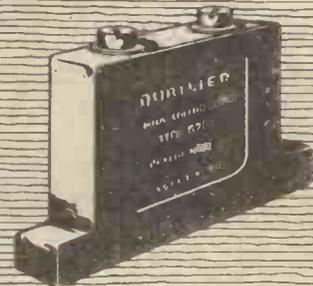
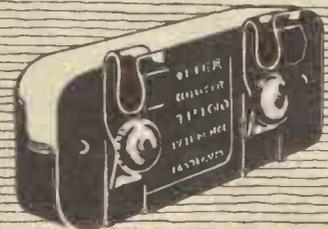
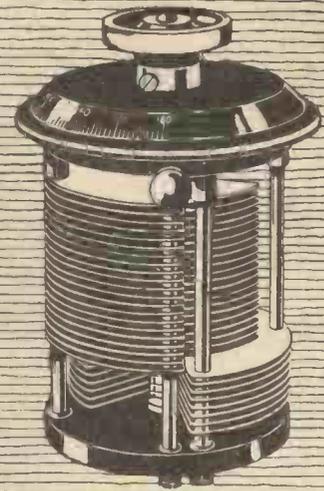
Specify Dubilier

REGISTERED  TRADE MARK

DUBILIER

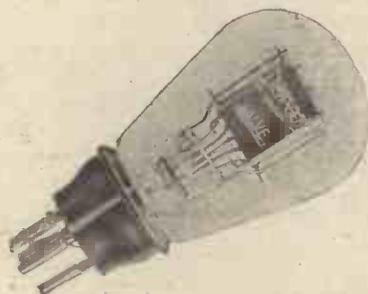
CONDENSER CO (1925) LTD

ADVERT. OF THE DUBILIER CONDENSER CO. (1925) LTD., DUCON WORKS, VICTORIA ROAD, NORTH ACTON, W.3 TELEPHONE: CHISWICK, 2241-2-3.





Your Best Xmas Gift



The Wireless enthusiast of your family will appreciate no gift more than an equipment of **OSRAM VALVES.**

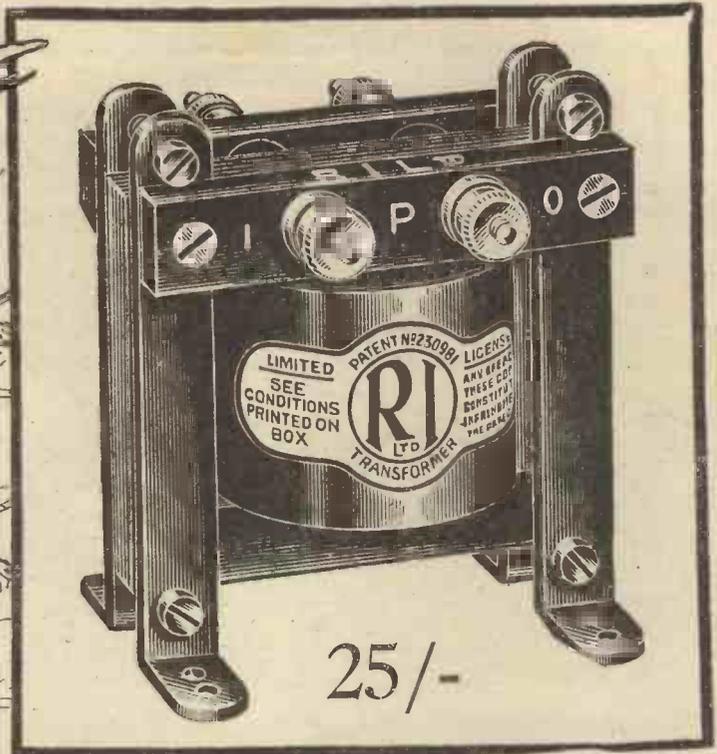
Suggested OSRAM Valve Combinations.

Osram VALVES

Ensure Perfect Radio Reception

	2 valves Det. and L.F.	Price.	3 valves 1 H.F. Det., 1 L.F.	Price.	4 valves 1 H.F. Det., 2 L.F.	Price.
2-volt Accum	D.E.R. D.E.6	14/- 18/6	D.E.R. D.E.R. D.E.6	14/- 14/- 18/6	D.E.R. D.E.R. D.E.6	14/- 14/- 18/6
4-volt Accum	D.E.3 D.E.4	16/6 22/6	D.E.3b D.E.3 D.E.4	16/6 16/6 22/6	D.E.3b D.E.3 D.E.3 D.E.4	16/6 16/6 18/6 22/6
6-volt Accum	R.5v D.E.5	8/- 22/6	D.E.5b R.5v D.E.5	22/6 8/- 22/6	D.E.5b R.5v R.5v D.E.5	22/6 8/- 8/- 22/6

Sold by all leading Wireless Dealers, Electrical Contractors, and Stores.



Purity-of tone

You can't help making comparisons. The song of the nightingale—the perfect reproduction of tonal beauty by the R.I. Transformer—each in its own place whispers perfect loveliness.

This transformer still maintains the position which it has held from the first—that of being the standard form of magnetic coupling which reproduces music and speech in their most natural form

Since this transformer first appeared, it has been followed by numbers of others, some of which, as far as external appearance goes, are obvious imitations of the R.I. Transformer, while others put forward claims of superiority and efficiency which are not borne out in practice. The only test that really counts is that of the actual user.

Take any simple receiving circuit and couple it to an amplifier built with an R.I. Transformer, with any ordinary valve, and you get perfect and pure music or speech. Now take any other transformer on the market and make a similar test. In some cases you will get equally good results, but it will be necessary to use special valves. In other cases you will get inferior results, but in no case will you

get better results, because an inspection of any other transformer will prove beyond doubt that there is nothing in any of them to give purer results unless a totally different principle is employed.

We found, after extensive research, both in our own laboratories and by making use of the results obtained by eminent investigators in the same field, that the only possible way in which the transformer could be improved was in the subdivision of the windings, thereby reducing the capacity. This innovation was hailed as a great advance in the design of the intervalve transformer, and since then nothing has been done to improve it.

One of the most severe tests of an intervalve transformer is its behaviour in reflex circuits. These latter became popular by reason of the fact that they could be used in connection with low-frequency amplifiers, without distortion, if used with an R.I. Transformer. All low-frequency intervalve transformers are not suitable for reflex circuits, neither are they suitable for all types of valves. You can use an R.I. Transformer with practically any valve and any capacity.

Over half-a-million users will confirm this. This is the best proof the public can have of the efficiency and value of a component that has obtained a classic name in the Radio Industry.

Write for the R.I. blue and gold Catalogue, free on application.

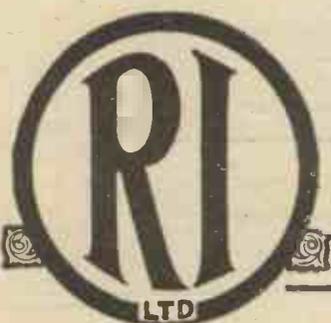
❖ THE MARK OF BETTER RADIO ❖

Advt. R.I. Ltd., 12, Hyde St., New Oxford St., London, W.C.1.

P.C.12



When buying R.I. Transformers see that they are contained in the R.I. standard sealed boxes.



ELECTRON WIRE

THE PERFECT AERIAL

Make Sure of Music and Dancing this Xmas

There is no aerial as good for the amateur or home use as "ELECTRON." It is so simple and at the same time supremely efficient that nothing is quite so suitable for impromptu reception at Christmas and similar occasions. Simply loop it over the pictures—it can even support the decorations, its heavy rubber insulation, taping and braiding absolutely preventing leakage—run it backwards and forwards across the room, or anywhere, anyhow—and you get the results you need.

Try it—then you will know why it is so popular. It is the quality aerial—so simple in use, so efficient in producing envied results—that it immediately made broadcasting popular. Everybody could use Electron Aerial—from the amateur to the most enthusiastic experimenter. Electron Aerial NEVER lets you down. Ask your dealer for ELECTRON WIRE. But you must agree to return it if it does not "prove up" to every claim made for it. If your dealer does not sell ELECTRON WIRE yet, he can get it for you, or we will send it direct to you upon receipt of P.O. or cheque. Cash immediately refunded if dissatisfied.



The **CHEAPEST AERIAL**
and the Best in the World.

100 ft.
1/8
Postage 6d.

Laid double for extending 'Phones, Loud Speaker, etc.	Two 150 feet lengths twisted.	Two 250 feet lengths twisted.
	300ft. 5/-	500ft. 8/-

Carriage Paid.

INDOOR AERIALS.—"Electron" Wire has been used with great success Round the Picture Rail; Round the Cupboard Door; Parallel across the Room; Along the Corridor; Round a Fire Screen, and almost anywhere.

If unobtainable from your local dealer, write direct to us, together with HIS NAME AND ADDRESS, and we will send by return, carriage paid.

There is no risk of Electron Aerial being brought down by wintry gales or Xmas snow. Electron is the ideal indoor aerial.

NEW LONDON ELECTRON WORKS, Ltd.

Te'ep'ones: Grangewood 1408.
(Private Branch Exchange.)
(About 2 miles East of Blackwall Tunnel.)

Dept. No. 19, EAST HAM, LONDON, E.6.
(Members of the B.B.C.)
'Buses 40, 101, 23, 5, 15.

Te'ograms: "Stannum, London."
District Railway: Upton Park Station.



*Save with
Safety*



5 1/2^D

5 1/2^D

Player's
WHITE LABEL
Please!

FULL SIZE. OLD VIRGINIA TOBACCO



Help yourself!

TAKE your choice of any part of the world. With an Ormond Condenser station after station can be tuned in quickly and sharply, no matter how closely the wave lengths approximate. Paris, Madrid, Rome, Breslau—any part of Europe, any part of America. With an Ormond Condenser nothing is simpler. But it must be an ORMOND—the result of 25 years' British manufacturing experience.

Ormond Low - Loss Condensers

SQUARE LAW (Patent applied for.)

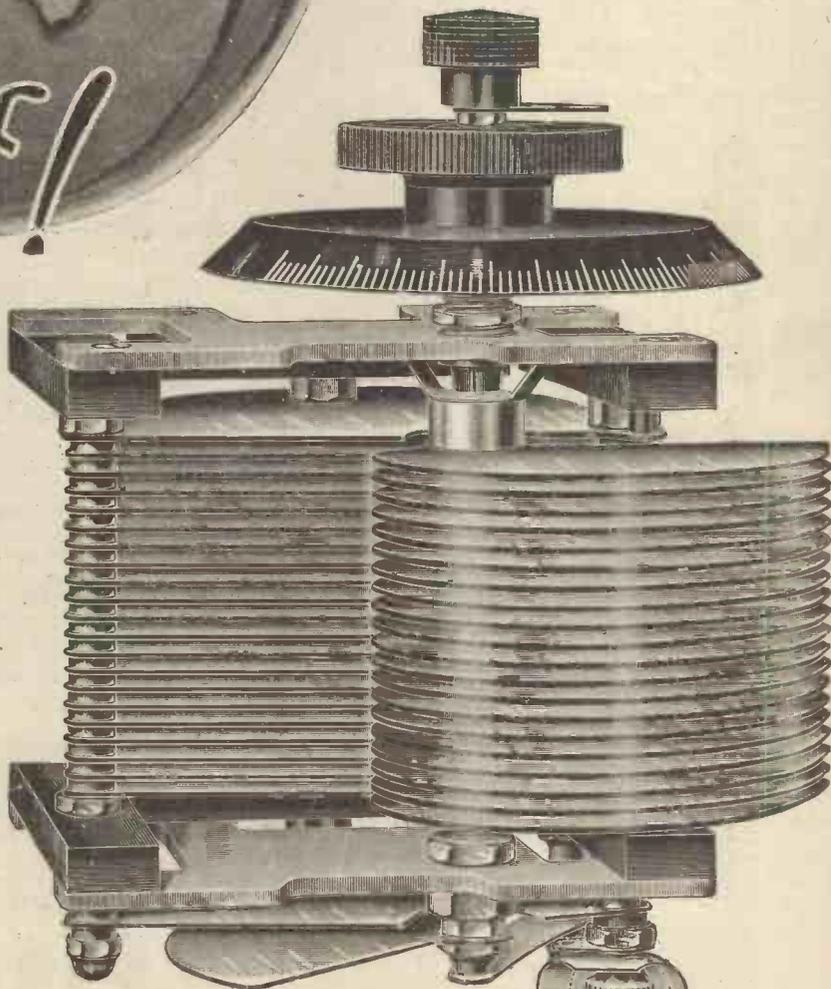
Supplied in the following sizes:

Size.	Price with Vernier.	Price without Vernier.
•00025	8/-	6/6
•0003	9/-	7/6
•0005	9/6	8/-
•001	10/6	9/-

Complete with knob and dial.

We specialise in turning Brass and Steel Screws and Machined Parts and Accessories of all descriptions.

Ask your dealer to show you these Ormond Condensers—the best dealers stock all Ormond products.



199-205, Pentonville Road, King's Cross, London, N.1.

'Phones: Clerkenwell 9344, 5, and 6.
'Grams: "Ormondengi, Kinercross."

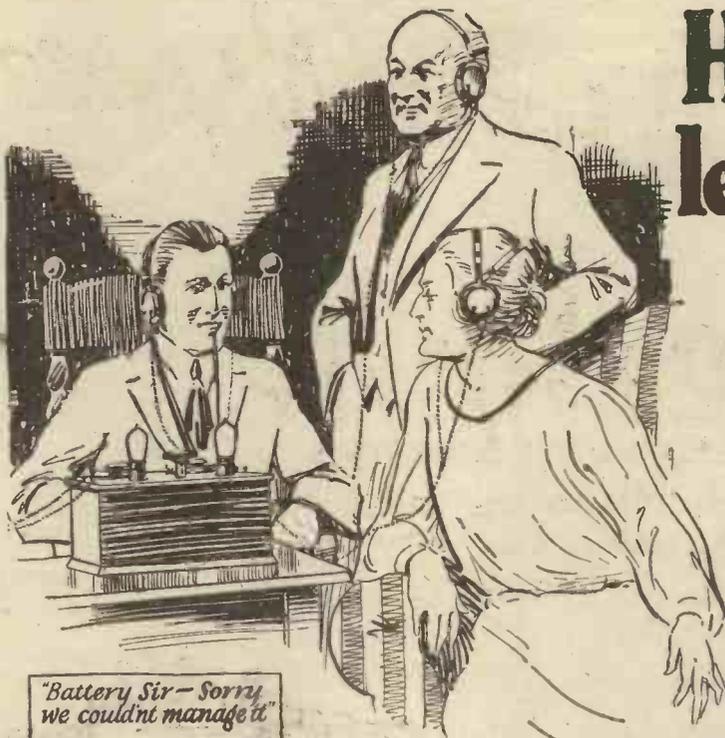
Factory :—Whiskin Street, Clerkenwell, E.C.1.



See the Inspection Label on every Condenser.

25 YEARS' BRITISH MANUFACTURING EXPERIENCE.

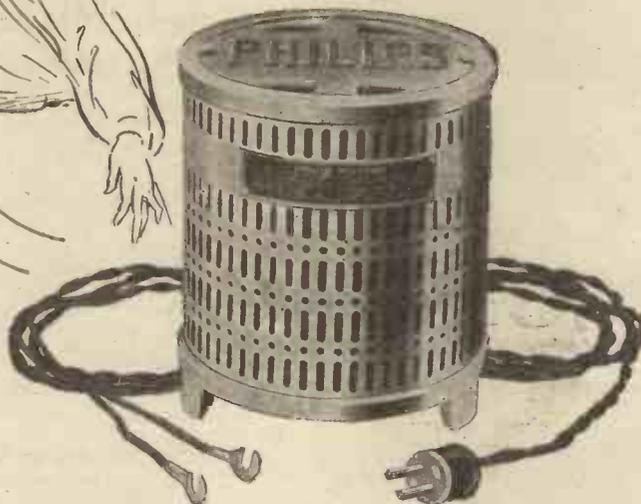
He never gets let down now!



"Battery Sir— Sorry
we couldn't manage it"



"Sorry, the Battery
has run out."



A Feeling of Complete Confidence

He knows how to avoid those disappointing evenings when he had to announce to his friends in the middle of an enjoyable programme, "Sorry; the battery has run out."

He remembers, too, how that meant missing the following evening's programme as well, because he wasn't able to get his batteries charged in time.

To-day, it's all changed. A month with PHILIPS RECTIFIER has given him a feeling of complete confidence that he will never be let down now, and that there is one battery charger that always gives complete satisfaction.

Philips Rectifier works off A.C. supply, requires no supervision, works silently, and automatically regulates the current supply.

There are no objectionable chemicals, no buzzing noises, and you have, in fact, a most reliable battery feeder with an extraordinarily low running cost.

SIMPLE. CONVENIENT. EFFICIENT.

It charges while you sleep.

Write for leaflet P.W., free on application. Trade enquiries invited.

£4.15.0
COMPLETE

PHILIPS RECTIFIER

For every Wireless Purpose

Silvertown

WIRELESS ACCESSORIES

Quality guaranteed by over 50 years' electrical manufacturing experience.



The

SILVERVOX

The "Silvervox" Loud Speaker will reproduce both speech and music without the loss of its original tone and quality. Coils wound to either 120 or 2,000 ohms. The tone arm is a heavy aluminium casting. Total height 20 inches. Size of trumpet 12½ inches diameter.

Price:

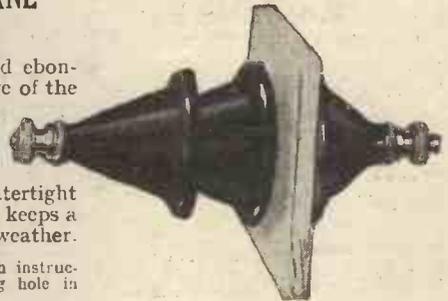
£3 : 10 : 0 each

SILVERTOWN WINDOW-PANE

INSULATORS Regd. No. : 705625
(Patent No. : 233880)

Made of best quality enamel-coated ebonite, these insulators take advantage of the excellent insulating properties of glass, and at the same time avoid losses by keeping the lead-in well away from walls. Rubber rings form a watertight joint against the pane. The cone keeps a portion of the insulator dry in wet weather.

PRICE 4/- each. A special drill with instructions for making hole in glass supplied with each insulator.



SILVERTOWN CONE LEAD-IN

INSULATORS Regd. No. : 705625
(Patent No. : 233880)

Another effective form of insulation, using the cone insulators in conjunction with an ebonite tube passing through a window frame or wall. Electrical efficiency assured.

PRICES from 4/6 each.



AN AID TO ENTHUSIASTS.

We have prepared a logging chart for recording wavelengths, condenser settings, etc., of those stations which require careful calibration to tune in. A copy of this chart, printed on stiff card, with hanger, can be obtained free of charge at any of our Branches or from any high-class dealer.

Makers :

THE SILVERTOWN COMPANY,

106, Cannon Street, London, E.C.4.

Works : Silvertown, E.16.

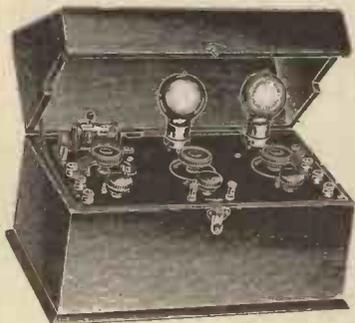
BELFAST : 75, Ann Street.
BIRMINGHAM : 15, Martineau Street.
BRISTOL : 4, Victoria Street.
CARDIFF : Pier Head Chambers, Bute Docks.
DUBLIN : 70, Middle Abbey Street.
GLASGOW : 15, Royal Exchange Square.
LEEDS : 1, New York Road.

LIVERPOOL : 51, Castle Street.
LONDON : 100 and 102, Cannon Street.
MANCHESTER : 16, John Dalton Street.
NEWCASTLE-ON-TYNE : 59, Westgate Road.
PORTSMOUTH : 49, High Street.
SHEFFIELD : 88-90, Queen Street.



For Christmas Wireless— GAMAGE'S

Get your new set on Gamage's extended payment system. Write AT ONCE for particulars. We carry large stocks of Loud Speakers, High Tension Batteries, Valves, Accumulators, etc. Order now in time for Xmas.



CRYSTAL SET WITH 2 VALVE AMPLIFICATION

Self-contained in one cabinet, all the components being of the best quality and mounted on high-grade ebonite panel. Crystal Set only can be used and the valve amplifiers added as required.
Range.—Good Loud Speaker strength up to 20 miles from any main broadcasting station, or 50 miles from Daventry. Cabinet as specified, 2 Power Valves, Mullard DF1, at 22/6, 1 6-volt 30 amp. Accumulator, 1 100-volt H.T. Battery, 1 Grid Battery, Aerial Equipment

£14:5:6

What Crystal DO YOU USE? Do you get the best possible results?—If not you should try **GAMAGE'S PERMANITE**

in the round boxes, carefully packed, complete with Silver Catwhisker, Medium size piece, just the size to larger fit your Crystal Cup

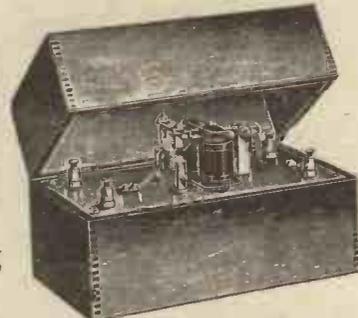
1/6 easily broken on up

Remote Control Switch

This switch has been designed for the control of Wireless Valve Sets from any room in which the loud speaker is used, so that the instrument can be switched "on" or "off" without actually going to the receiver. It is contained in a neat mahogany box in the base of which is the special battery for operating the magnetite. All brass parts are heavily lacquered and the whole instrument is perfectly finished throughout.

PRICE COMPLETE £1:7:6

with special battery. Special combined Press Button and Loud Speaker connection Panel, each 3s. Red and Black flex wire for extensions, 3d.



Super Two Valve Receiver

SPECIFICATION.—This receiver contains all the latest developments incorporated in the Single Valve Set with the addition of one stage of well-designed Low Frequency Amplification for increasing the volume of sound. Provision is made so that one or two valves can be used, and only the very best components and high-grade ebonite Panels are used throughout. The Tuning Range of the set covers all B.B.C. Stations, including 5XX, the Daventry Station, without any extra coils.

Receiver, as specified, Royalty paid, 1 Mullard D3 L.F. Valve, 1 Mullard PM4 Valve, 1 4-volt Accumulator, 1 100-volt H.T. Battery, 1 Grid Bias Battery, 1 pair 'Phones, Aerial Outfit.
Aerial Outfit includes 100-feet Aerial Wire, two Insulators, Lead-in Tube, Lightning Switch, 20-feet Earth Wire.

£13:13



Super Three Valve Receiver

SPECIFICATION.—This receiver has been designed to give Loud Speaker results from main Broadcasting Stations up to 100 miles. The valves employed are one detector and two stages of well-designed Low Frequency Amplification, provision being made for using one or three valves. The finest components only are used throughout, and the whole receiver is designed to give the finest reproduction of music and speech.

Cabinet, as specified, Royalty paid, 1 Mullard D3 L.F. Valve, 2 Mullard PM4 Valves at 22/6, 1 4-volt Accumulator, 1 100-volt H.T. Battery, 1 Grid Bias Battery, 1 pair 'Phones, Aerial Outfit.
Aerial Outfit includes 100-feet Aerial Wire, two Insulators, one Lead-in Tube, Lightning Switch, 20-feet Earth Wire.

£18:5:6

A. W. GAMAGE, Ltd., HOLBORN, LONDON, E.C.1.

City Branch:—BENEFINKS, CHEAPSIDE, E.C.2

Xmas Gifts that last a Year!

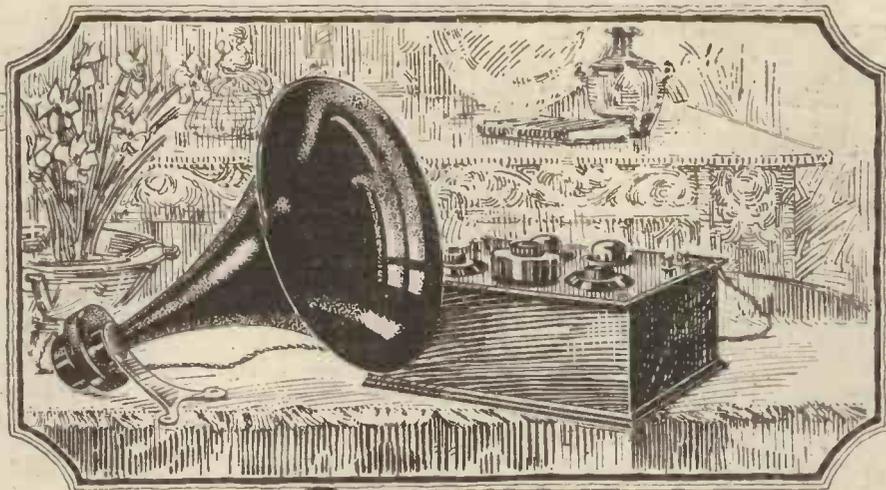
BEAUTIFUL BOOKS FOR CHILDREN OF ALL AGES

Make sure of these splendid Annuals NOW—before it is too late! They are the most popular gift books on the market. All are packed with just the jolly stories, pictures, and COLOURED plates that children love. "TIGER TIM'S," "PLAYBOX," "PUCK," and "WONDERLAND" Annuals are suitable for boys and girls between 5 and 12 years of age. The first two named contain many pages devoted to the adventures of Tiger Tim and the Bruin Boys. The "HOLIDAY" and "SCHOOL-GIRLS' OWN" Annuals are suitable for boys and girls at school, while the "CHAMPION ANNUAL" is for older boys and youths, and is a wonderful budget of adventure stories. All seven books make ideal Christmas gifts. Take this page to your bookseller or newsagent and he will gladly show you these splendid books.

Price 6/- net of all Booksellers and Newsagents.

Buy them TO-DAY





The
**Best Value
 in Radio**

THE combination of the B.T.H. 2 Valve L.F. Receiver and B.T.H. Type C8 Loud Speaker undoubtedly represents the best value in radio. Good loud speaker results are given within 20-30 miles of a B.B.C. main station or 100 miles of Daventry.

	£	s.	d.
B.T.H. 2 Valve L.F. Receiver.....	6	0	0
Royalty.....	1	5	0
B.T.H. Type C8 Loud Speaker.....	1	15	0
TOTAL (less valves and batteries)	9	0	0

The B.T.H. 2 Valve L.F. Receiver

The circuit employed is a detector valve with one stage of L.F. amplification. A neat plug-in aerial and reactance unit covering a range of 300 to 500 metres is provided. A similar unit is available for 1500 to 1800 metres at an extra price of 18/-. The set is contained in a handsomely finished case.

The B.T.H. Type C8 Loud Speaker

This is an efficient but moderately priced instrument. Both body and horn are constructed of chocolate coloured non-resonant material which gives a beautifully mellow tone.

Ask your dealer for a demonstration and for copies of leaflets R.7335 and R.7430

*Insist on B.T.H.
 the Best of All*

B.T.H. RADIO



EFESCA

Regenerative

AERIAL TUNER



The Efesca Regenerative Aerial Tuner is the natural development of the extremely convenient series of Efesca One-Hole Fixing Tapped Coils. It is a specially designed form of Tapped Aerial Coil incorporating Aerial Reaction in a self-contained unit.

Reaction is effected by means of a rotor revolving in a separately wound section of the Aerial Coil, thereby effecting maximum reaction over the whole wave band covered by the coil. Wave-length range 150 to 2,600 metres in conjunction with a .0005 Variable condenser in parallel. Price, complete with Knob, Pointer and Scale; 32/-

Other components in the Efesca Series of One-Hole Fixing Tapped Coils are the H.F. Transformer and Anode Tuner (illustrated here), Aerial Tuner and the H.F. Reactance Coil.

Write for Catalogue No. 559/2 describing and illustrating Efesca Components and Efescaphone Sets.

Ask your wireless Dealer or Electrician to show you.



WHOLESALE ONLY :—
FALK, STADELMANN & Co., Ltd.
 83-93, FARRINGTON ROAD,
 LONDON, E.C.1.

Also at Glasgow, Manchester & Birmingham.

EFESCA
 Popularity
 Competition
£200
 CASH PRIZES

Ask your dealer
 for entry form or
 write direct to
FALK STADELMANN
& CO. LTD.
 83-93 FARRINGTON
 ROAD, LONDON, E.C.1

20/- down buys any of these superb Sets for Xmas

YOU buy your House by deferred payments. You purchase your furniture out of income and perhaps even your motor-car by the same up-to-date methods. Then why not choose a really good Wireless Set and pay for it

as you use it. How much more satisfactory to buy out of income a worth-while Set capable of giving excellent results in preference to something considerably cheaper and less satisfactory.



The 4-Valve Family

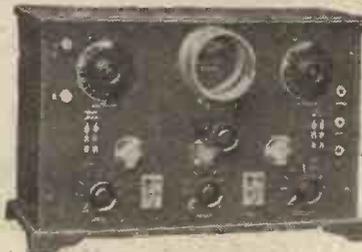
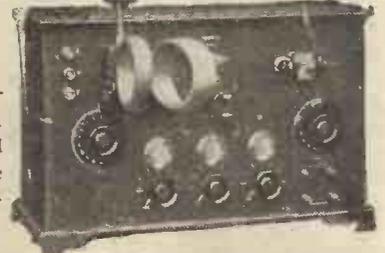
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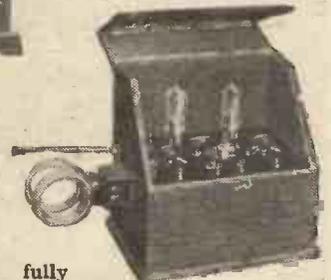
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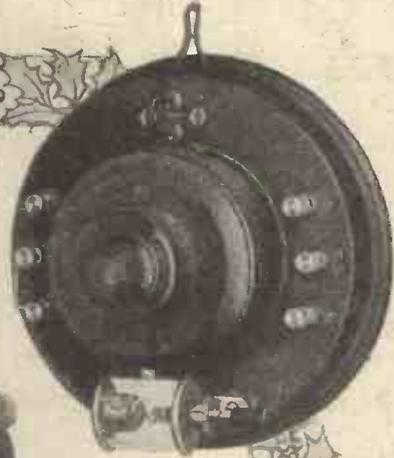
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Wireless Xmas Gifts

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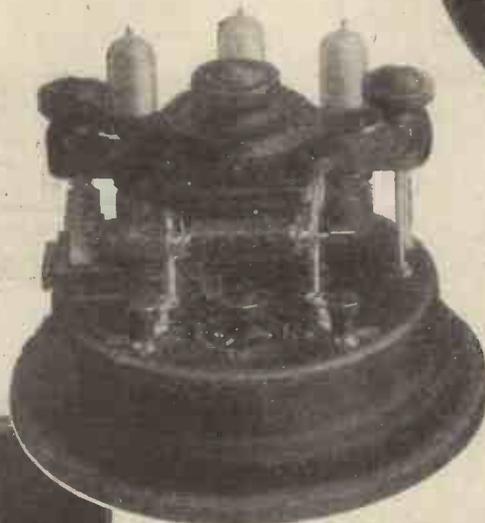
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If your friend is building a set for himself, help him to produce the best results. By way of a Christmas present give him a set of "Cosmos" Strip Coils (from 3/6 each), or a "Cosmos" Square-Law Low-Loss Condenser (from 15/-), or some "Cosmos" D.E.II Valves (at 12/6), or "Cosmos" S.P.18 Valves (12/6 each). He would appreciate nothing better.

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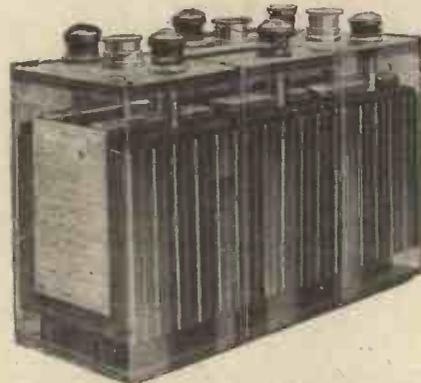
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 or better still let the
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Let us suggest your Xmas present to your friend or relative, the "Kone" Loud Speaker. It is impossible to think of a gift that will give greater pleasure or indicate better taste on the part of the giver. The "Kone" Loud Speaker will operate successfully on any amplifier having an output impedance of 2000 to 5000 ohms. The ideal output impedance is 2000 ohms as in the "Kone" amplifier.

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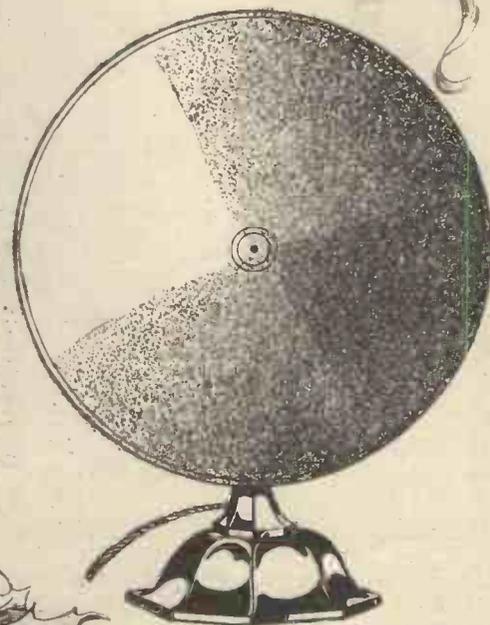
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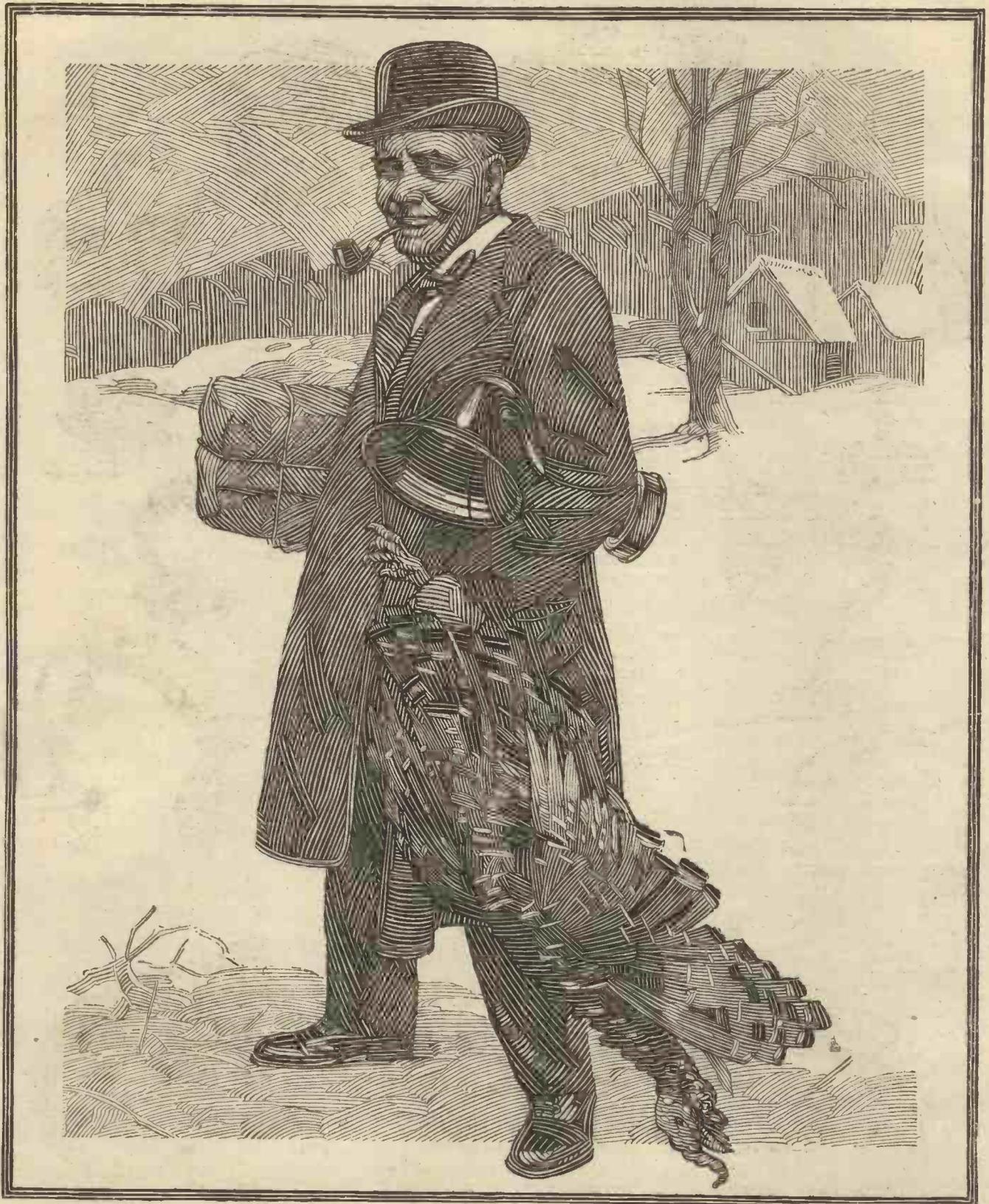
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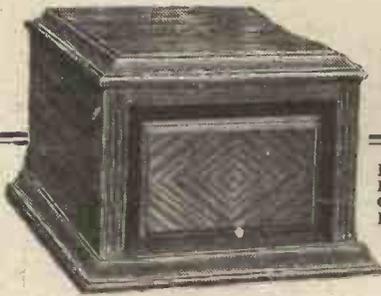
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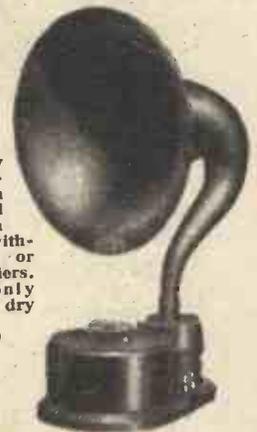
LOUD SPEAKERS **Browne** AND HEADPHONES

Gilbert Ad. 4109



Right: Brown Gramophone Adapter

Left: Brown Cabinet Loud Speaker



The Crystavox
The only Loud Speaker which can be worked direct from a Crystal Set without valves or other amplifiers. Requires only one 6-volt dry battery. £6 0 0

Crystavox Loud Speaker



Brown H.1, 21 inches high

The best Gift of all—a Brown

THIS Xmas choose a Radio gift which will give pleasure the whole year round. All the BROWN Wireless Instruments illustrated on this page are British made and represent the highest standard of manufacture. Each one carries the fullest guarantee. Remember, the first Wireless Loud Speaker was a BROWN—from that day to this, BROWN superiority in design has never been challenged. Every Wireless shop carries a full range of all these instruments.

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The H.1.—The reputation enjoyed throughout the world by the Brown Loud Speaker was built up on the H.1—the original Brown.

120 ohms £5 5 0
2000 ohms £5 8 0
4000 ohms £5 10 0

The H.2—An excellent Loud Speaker for use where the volume of the H.1 is not required.

120 ohms £2 5 0
2000 ohms £2 8 0
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The H.3—A new medium priced Loud Speaker of exceptional volume and purity of tone.

2000 or 4000 ohms, £3

The H.4.—The smallest Brown Loud Speaker made. Fitted with standard tuned reed movement.

2000 or 4000 ohms 30/-

The H.Q.—Fitted with identical movement to that used in Brown H.1, but incorporating a handsome curved horn. £6.

The Cabinet.—A "hornless" Loud Speaker capable of excellent results. In a mahogany or oak cabinet. 2000 or 4000 ohms £6 6 0

The Brown Q.—The de luxe Loud Speaker of incomparable beauty. In all resistances £15 15 0



Brown H.4, 10 inches high



Brown Feather-weights



Brown New A-type 'Phones

Brown Headphones

F. type.—The most popular Headphone for Broadcast use. Weight only 6 ounces. 2000 ohms 20/-

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For converting your Gramophone into a first-class Loud Speaker.

H.1 (2000 ohms) £4 10 0 H.2 (2000 ohms) £2 0 0



Brown Q-type Loud Speaker



Brown H.Q. Loud Speaker, 20 inches high

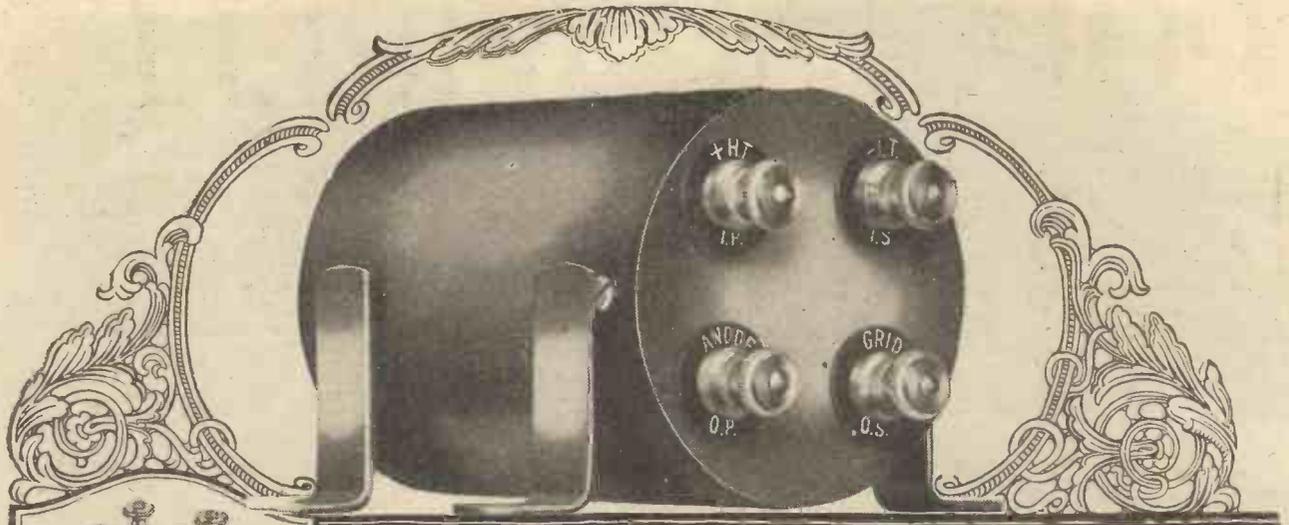
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LOUD SPEAKERS

Brown

AND HEADPHONES



After two whole years Eureka supremacy is still unchallenged

THE Eureka Concert Grand was the first high-grade Transformer to be made with a non-laminated core. It was the first to be made with the large amount of 2½ miles of wire. It was the first to be made with a coppered steel case which simultaneously prevented interaction, and hermetically protected its contents. And it was the first to be sold under a generous guarantee of instant replacement free of charge in the remote possibility of breakdown. Such pioneer work met with instant appreciation. Hundreds of thousands of wireless enthusiasts have realised the importance of using only the finest Transformer that money can buy or that Science can evolve—they have chosen the Eureka. Their choice has been a wise one. Your L.F.

Transformer is to your Set what an engine is to a motor car. You may select the finest looking car—its appearance may be most impressive. But if its power unit is inefficient, your money will have been wasted. So with your Set. You may spend pounds on the other components—you may choose the most expensive panel, yet if your L.F. Transformer is inferior, the whole of your expenditure will be prejudiced. Any Eureka Transformer is a veritable key to melody. Such purity of tone and volume as was never before believed possible is now within the reach of everyone. With its five distinct models there is now a Eureka to fit every need at a price within the reach of the most modest experimenter.



EUREKA REFLEX
The usual transformer is not pre-eminently suitable for reflex circuits. Special qualifications are needed, and here is the first Reflex Transformer built to measure up to true Eureka standards of quality and to conform to reflex requirements. Each ... **15/-**

BABY GRAND Nos. 1 & 2
For those whose purpose does not render the superlative Concert Grand a necessity, we can now offer the Eureka Baby Grand Nos. 1 and 2 for second stage. Incorporating all the recognised Eureka principles of design. Each ... **15/-**

EUREKA CONCERT GRAND
The Standard de Luxe Transformer ... **25/-**

Eureka No. 2. For use as a second stage amplifier. **21/-**

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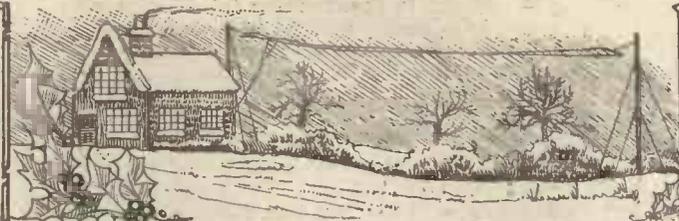
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Assistant Technical Editors:
K. D. ROGERS.
P. R. BIRD.

RADIO NOTES AND NEWS OF THE WEEK.

Best of all the Unidynes—That 1,600-Metre Mystery—Dublin and the Pirates—Good One-Valve Results—Meal-Time Music.

A Happy Radio Xmas.

A VERY happy radio Christmas to you all. Isn't it simply wonderful how this new-fangled invention, wireless, has merged itself into the old-fashioned Christmas spirit? When the wind whistles and howls round the mast, and the lead-in taps the window-pane, could anything be more cheerful than a friendly loud-speaker, flooding the room with music? Can't you imagine how Charles Dickens and all the old-fashioned, cheery, smack-you-on-the-back, plenty-on-the-plate crowd, would have revelled in radio?

That New Unidyne.

"I'VE tried every Unidyne that's been printed except the 3-valver, but the Daddy of them all is the 1926 two-valver," says a Bishop's Auckland reader.

When I tried it, I thought it was a son-of-a-gun, for distance!

The 1,600-Metre Mystery.

WHO is the dark stranger, wandering about on 1,600 metres? Recently when tuning for 5 X X, listeners have been surprised to pick up scraps of conversation in a foreign tongue! Even when heard distinctly nobody can identify the intruder, for the language he uses is in a barbaric tongue, rather like that employed by a Croatian Serb when ticking-off a Bashi Bazouk, in the vernacular. Some say it's a new Russian station, but I fancy it's from farther south than that, near where the Tower of Babel used to be!

Dublin Again.

LISTENING-IN to the new Dublin station is decidedly diverting. At the

moment the announcer there is preoccupied with the financial aspect of broadcasting. He is full of exuberant admiration for what is going on in the studio, but is

To Our Readers.

ONCE more we place before our readers a special Christmas Number and take the opportunity of wishing you one and all the compliments of the season.

This is our fourth Christmas Number, and many thousands of readers who have subscribed to "P.W." since our first issue, and who have retained the back numbers, will find it interesting to scan our earliest efforts and to note the many changes and improvements made during the last three years or so.

We would particularly request our readers to give special attention to the many fine advertisements appearing in this issue. Many of them are entitled to high praise, not only because of their artistic presentation, but because of the undoubted excellence of the goods they describe.

We hope you will enjoy the contents of this issue: we think the articles and other features varied enough to appeal to all, and if we have pleased you in giving you a Christmas Number "full of good things" we are more than compensated for our labours.

The Editor.

haunted by a fear that the Free-States are picking up the concerts without paying their licences! So the poor man is torn between two fires—delighted that the concerts are going out so beautifully, but fearfully anxious that the pirates should not get them!

No Licence—No Programme.

APOLOGISING because a song is unaccompanied by a piano, this broth of a boy at Dublin explains that pianos cost money, and if you will only buck up and pay your licence, etc.! So if you tune in an item and hear someone say, "That was good, wasn't it? More treats are in store for you, but remember, no licence, no programme," you can be pretty sure that you have bagged 2 R N, working on 390 metres, from the McKee Barracks, Dublin.

A Gather-Round.

LET'S have a Gather-Round-Ariel—shall we?—whilst I tell you a perfectly true story. You know that everybody is supposed, nowadays, to be saving, cheese-paring, scraping and economising, to pay for that little war we all enjoyed so, don't you? Most of us have been begged and entreated to economise so often that we are afraid to put on a Players unless someone gives us a light for it, and yet there are some home-destroyers, some boobs, some utter poons, who—well, listen—

Who Was That?

IN spite of all this economy talk, there are depraved listeners still living who are so bent on throwing away
(Continued on next page.)

"P.W." Breaks All Radio Records.

This Christmas Number of "Popular Wireless," consisting of no fewer than 104 pages, is the best and biggest Radio number ever issued for 3d. It is full of interesting fare, not only for the expert but for the ordinary listener.

NOTES AND NEWS.

(Continued from page 861.)

good huddle, that every time they hear a foreign station they rush off to the G.P.O., buy a 1½d. stamp, and waste my time, their time, the P.M.G.'s time, and sheets of paper, by writing me a blotty letter to ask me such questions as, "What station was it where the announcer last Sunday sneezed twice, and then said Ah-low?" or "Who rang a bell at 10.28 last night?"

The Announcer's Babel.

NOW I ask you, how do I know? How in the name of infra-red high-frequency blazes can I tell? Remember that there are about 100 announcers in Europe alone, all on the air at once, all saying, Hello, Hallo, Allo, Ah-lo, Al-low, and the rest of it. Every one of these announcers sneezes sometimes. Some of them—San Sebastian, for instance, where there's a lady announcer—sneeze twice, apparently upon the "once-a-wish" principle!

Confusion Worse Confounded.

WHAT'S more, they all revise their programmes, alter their wave-lengths, rearrange their items, and raise their frequencies—not occasionally but habitually, every time they think of it—at radio-frequency, so to speak. And then some of them thoughtfully relay the others upon different wave-lengths, and, just to complicate matters, the others give foreign talks in another language, and then there's the difference in time, and then—

The Tune He Knows.

RIGHT in the middle of all that, a man in Oxford—Oxford, mark you, not Borstal—has just sent me a letter saying, "What station was it playing a tune that I know when I hear it on 300 metres? Can you beat it? He says that right down there in Oxford (where the cars come from) he'd know that little tune again, if he heard it. What a hope!"

Try Again.

I SUPPOSE you won't believe that, and you'll want to see his letter—well, you can't! For, in my despair, I tore it into ten thousand shreds and tapped off the shreds into units, and jumped upon the units, respectively and collectively, and disintegrated the atoms, and—well, what I was going to say is, if you miss the call-sign of a foreign station, the only thing to do is to make a note of the adjustments, and do what Bruce did when his spider-web coil fell apart—try, try, try again!

Found by a Photograph.

LOOKING through his copy of "P.W." dated November 14th, a Barrow-in-Furness reader saw on the "Technical Notes" page a photograph of a new American wireless set. He was interested to recognise the man operating the set as an old friend of his, John Hartley, who went out to America four or five years ago, and has since become famous out there as one of the leading radio fans. They had lost touch with each other until that photograph in "P.W." was recognised, but it's good to know that the famous John Hartley is an

Englishman, who had made friends over here long before his circuit made them for him!

A DX Champion.

THE name of the American listener who claims to have tuned in 425 different broadcasting stations is Professor S. B. Kall. He certainly appears to have a Kall for this kind of thing, though DX would have suited him better than S.B.!

One-Valve Results.

ARE some of the foreign stations better than the B.B.C.'s? Radio-Toulouse, Madrid, San Sebastian, Petit-Parisien, Oslo, Hamburg, and Brussels, all come in as easily as some of the less-distant British stations, and more than one reader has reported all the foregoing foreign stations upon one valve! One Thorneywood, Nottingham, reader says: "I have logged twenty-six stations (sixteen B.B.C. and ten foreign) upon the Unidyne, which I consider to be the finest one-valve circuit offered to readers of 'P.W.'"

SHORT WAVES.

"As for America calling—there's romance for you. Two bars (reversed) of something, and then vast atmospherics. It is like watching a man swim the Atlantic."—A. G. Thornton, in the "Daily Chronicle."

"We have to arrange things so that when the double bass grunts its gruntest it gives about the same electrical response in the microphone as when the piccolo pickles its piercingist."—Capt. Eckersley, writing in "Lloyds Sunday News."

"Over the hill to the poorhouse, He wends his weary way; He tried to support an 8-tube set On a 2-tube earphone pay."—Radio Digest."

A Radio Boycott.

THE British station using the call G-5 D H is not an amateur station, but is being operated by the Post Office for the purpose of spying on British amateurs." This was part of a message transmitted by an amateur for the benefit of radio experimenters all over the world, according to a recent report in the "Daily Mail." Apparently the Postmaster-General complained of the boycott which resulted from the message, for experimenters all over the world refused to collaborate with G-5 D H until it had made friends again with the Radio Society of Great Britain!

Those Birthday Greetings.

TUNING-IN 2 L O's birthday greetings the other afternoon, I counted no less than 192 names and addresses! All of these had to be gabbled through at a great rate by breathless Uncles and Aunts, obviously racing to get them all finished in time. Consequently, there was only a few minutes available for the non-birthday kiddies, who, after all, outnumber the others by 364 to 1. Is the Wireless Fairy forgetting her arithmetic?

More Jamming by Morse.

ALL the way from Dover to Cornwall south-coast listeners are complaining of increased spark jamming. The offending station is said to be one with a four-letter call-sign, starting with O. For several days I have tried to sort out this station from amongst the others who interfere with broadcasting, but the French

station F F B not only jams the programmes, but actually interferes with the interference—it's certainly time that something was done about F F B!

5 O Y.

LISTENING-IN recently on a Sunday morning, I heard the preliminary canter of 5 O Y, the new South London amateur station belonging to the Belvedere and District Radio Society. Modulation was quite good enough to sound O.K. when the speech was reproduced upon a loud speaker (using a four-valve set). A cheery invitation to join the society was given to residents, and the hope expressed that invalids, hospitals, and "shut-ins" would benefit by the transmission of music from 5 O Y. Well done, Belvedere!

Week-End Meal-time Music.

LOOKING back to last Christmas, it seems to me that broadcasting gets better and better. If there is a weak point at the moment I think it is at the week-ends (no pun intended). The Sunday afternoon programmes are almost ecclesiastic, and the joy of life gets too little expression between Saturday and Monday. Why not more meal-time music at the week-ends?

The Radio Revel.

IT is expected that 4,000 dancers will trip the light fantastic toe at the Olympia Dance Hall, London, on Saturday, December 19th. Simultaneously with the Radio Revel at Olympia, London will provide accommodation for another 6,000 dancers at the Palais de Danses at Wimbledon, Tottenham and Cricklewood. Popular radio artistes will attend the Revels, and it has been arranged that Jack Hyton's Band will play at Wimbledon, the Midnight Follies will go to Tottenham, and the Toronto Band, from Prince's, to Cricklewood.

Britain's Biggest.

ALL the provincial stations have arranged attractive Radio Revel programmes, at the same time, so that the affair will doubtless prove to be Britain's biggest beano! The beauty of it is that all this simultaneous fun will help the hospitals, for in all cases profits have been earmarked for the "Daily News" Hospital Fund, and similar charities.

The Up-to-Date Carol.

GOOD King Wenceslas looked up How-to-make directions, Still he could not find the fault In his grid connections. Brightly shone his valves that night, But his grief was cruel, For he could not get a sound! From his three-valve Dual.

A Radio Greeting.

ONCE again, a very happy Radio Xmas to you all. Enjoy yourself to your Maximum Capacity. Not like years ago, when a man used to Overload his Frame, suffer from Reaction, and then sometimes Choke. Watts the use of Wiring in, if it Hertz the Holder? With a proper Control of Input, it is possible to enjoy every Plate—even if Loaded on the Heavyside—and still have room for Currents, Nuts, and a Fig. 2. So may your table Lay-out be without Parallel, and yours the happiest Dial on Earth! **ARIEL**

A Merry Radio Xmas!



The new Rugby Wireless Station.

Some Cheery Xmas Messages from Famous Radio Personalities.

From **SIR OLIVER LODGE, F.R.S.**

I SEND to all wireless amateurs a friendly Christmas greeting and good wishes for the New Year.

From **SENATORE G. MARCONI, G.C.V.O.**

I wish the many readers and friends of POPULAR WIRELESS a Merry Christmas and a Prosperous and Happy New Year, hoping they will find ever increasing delight in the study of Wireless, the recording of messages from distant parts of the earth, the



Dr. J. A. Fleming, originator of the thermionic valve.

fascinating possibilities of experimenting and the striving to wrest more secrets from Nature's vast store of scientific treasures.

From **Dr. J. A. FLEMING, D.Sc., F.R.S.**

I have much pleasure in offering hearty greetings for Christmas and the New Year to all readers of POPULAR WIRELESS AND WIRELESS REVIEW, and wish them all success in radio work, whether as amateur constructors or simply as listeners-in.

Broadcasting has brought a new joy and interest into thousands of lives and helped to fill with scientific knowledge minds that might otherwise have been less usefully employed. The present year is of interest to all radio amateurs, and especially to me, because it is the year of the "Coming of Age" of the Thermionic Valve, which alone renders broadcasting possible.

My British patent, No. 24850, of November 16th, 1904, was the first patent

applied for in the world for utilising the electron emission from an incandescent filament in vacuo as a means of rectifying high-frequency electric currents and hence detecting electric waves as used in wireless telegraphy.

My original Thermionic Valves, which are the parents and progenitors of all others of whatever type, after being exhibited for two years running in the Royal Society's exhibit at Wembley Exhibition, have now been donated to the National Science Museum, South Kensington, and can be seen in the Electrical Hall of the new building in Exhibition Road, South Kensington, along with a fine collection of Thermionic Valves and other original wireless apparatus, showing the development of that remarkable instrument from its earliest forms (my own) up to the finest examples of modern high-power generating valves with silica or water-cooled metal bulbs.

It is amazing to note the progress made in 21 years, and that with the aid of this

appliance music and speech can be transmitted over oceans and continents, bringing extreme pleasure to millions who would

otherwise not be able to have it placed at their command.

From **Mr. J. C. W. REITH, M.Sc. (Managing Director, B.B.C., Ltd.)**

I am very glad to have the opportunity of sending to POPULAR WIRELESS and its readers a Christmas greeting from the B.B.C. We are keenly alive to the value of the support and constructive criticism which we receive from POPULAR WIRELESS, which, in common with our other friends of the press, contributes considerably to the development of our service.

This Christmas season finds broadcasting under review. Its future has yet to be decided by the Postmaster-General and presumably confirmed by Parliament. We feel sure, nevertheless, that however uncertain the prospect may be in some respects, so far as essentials are concerned there will be no interruption of the tradition of public service under unified control which it has been our privilege to inaugurate and consolidate during the past three years. May I now extend our heartiest greetings for a happy Christmas and a successful New Year to the Editor, the staff, and to all the readers of POPULAR WIRELESS.



A recent photograph of Mr. J. C. W. Reith, taken in his office at No. 2, Savoy Hill.

A Wireless Dream



I LISTENED-IN an hour or two, one night, to 2 L O,
To the Christmas Weather Forecast and a Prize Fight down at Bow ;
I heard a Low Comedian sing of his Lovely Loo,
And lions growl and monkeys howl in chorus at the Zoo.

I LISTENED to a lecturer describe the ocean deep,
Where phosphorescent fishes swim and crawly creatures creep ;
And bands of loud percussion and of saxophonic screech
Had trod with wild cacophony on Winston Baldwin's speech.



I'D been switched on to Borneo, or somewhere just as far—
It may have been to Luna or, perchance, the Polar Star—
But atmospherics, anyhow, made such a frightful din,
When Yankee-Doodle-doo was played I knew not which would win !

AND when the show was over, and I'd lain me down in bed,
I'd all these lucubrations running pell-mell through my head ;
And when the Arms of Morpheus enrapt my sleeping form,
I thought I'd struck a cyclone like the Children of the Storm !



THE atmospherics caught me up and hurled me to the moon,
Where monsters of the nether world played on the big bassoon,
On saxophones of ghastly tones, on brass of frightful bray,
Whilst sixteen lunar lions banged with ham-bones on a tray.



FROM thence the atmospherics dropt me in the deepest sea,
Where goggle-eyed galumphers chased me up a sea-weed tree,
And thereupon the tree was gone, and I was up the Pole,
And the Aurora-borealis danced a rag-time rigmarole.

I TRIED to run, I tried to walk ; I could do nought but crawl,
Whilst twenty thousand Polar cats began to caterwaul,
And an Eskimo comedian began to sing a song
Which had five thousand verses and each verse five fathoms long !



THEN, all at once, the Lovely Loo into my vision swam ;
I took her by her hand and said : " I don't know where I am ! "
And she turned her face—heaven grant me grace !—and said : " Ah spec's yo' do ! "
And her face was as blanky-blankity-black as the back of the chimney flue.



AND I woke to hear the Christmas Bells as they swelled upon the breeze,
And lo ! upon my chest there sat, purring, and quite at ease,
My dear old puss-cat, Felix, just as black as any crow ;—
And if you know a better dream, buck up and tell me so !

By " ARIEL."



Only Three Years Ago

by Captain P.P. Eckersley, M.I.E.E.



We are pleased to include in our Christmas Number this special article by the Chief Engineer of the B.B.C., whose labours for the technical perfection of British Broadcasting are so well known and so appreciated by all listeners and amateurs.

IT seems ages, and yet it is but yesterday! Only three years ago the main studio of the London broadcasting station (the second regular broadcasting station in Britain, and the only one owned by the B.B.C.) was hung with dirty mosquito netting, and from the ceiling pendulous hung ordinary carbon microphones. The room was about a 15-ft. cube.

Only three years ago I got letters from all sorts of listeners asking if London would not shut down for half an hour on Tuesdays so that people should listen to 2 M T, our little station at Writtle. That London should shut down, mark you!

Only three years ago I was wondering vaguely whom they would appoint as chief engineer to this new broadcasting thing; some silly idiot with more talk than sense, I thought. (Cribs of: "And they did!")

Jolly Writtle Days.

It might be interesting to tell you what actually did happen in those days. You probably know that for a year before the B.B.C. was formed the station 2 M T at Writtle was once a week for a quarter of an hour (often extended to half an hour) doing a little programme of its own. It was a station designed for reception by amateurs; it was not strictly a public service. Both those who broadcast and those who listened had a great time—we were wholly irresponsible. Our programmes were of a comic-technico type—lampoons on phases of the art, little plays, appeals even then not to oscillate, gramophones, songs at the piano, and so forth. We had Melchior to sing once; he was the only "star" artiste we ever broadcast.

The coming of the B.B.C. was treated as something of a joke, and afforded us at Writtle a fund of material on which to base new burlesque. Thus the Children's Hour and "Uncle Arthur" came in for a good deal of, I hope, very light-hearted and well-meaning "ragging." The innovation of striking the chimes on the hand bells at 2 L O was carefully considered by our programme committee (two people with not a great deal of solemnity in their compositions), with the result that our next transmission began with the Writtle chimes.



Captain Eckersley cheerily dictating orders to his staff over the telephone.

We hung up all the old scrap iron we could find, and with an ebonite rod lashed this to make a hideous cacophony of crashes and tinkles. The clock was wrong, because the enthusiasm of the striker brought down the whole caboose on the fifth stroke of eight, and I had to announce: "Children, dears, that was eight o'clock, and now for the bedtime story." Dear dead days—but great fun!

I think my unimaginative brain was

awakened from a somewhat contemptuous toleration of broadcasting as a public service to a full realisation of its potentialities when the National Opera Company sportingly allowed the B.B.C. to put a microphone in Covent Garden, and I tuned in casually one night to Humperdinck's "Hansel and Gretel." The microphone was to us something quite new. It was a Western Electric carbon developed by the Americans for their broadcasting, and was in those days a tremendous advance over anything we had in this country. The change of quality, the feeling of space in the 'phones, the applause of the audience, and wonderful singing of the artistes are commonplace to modern listeners; to us, then, coming so suddenly on top of amateurs singing into carbon microphones, the whole transmission was a revelation.

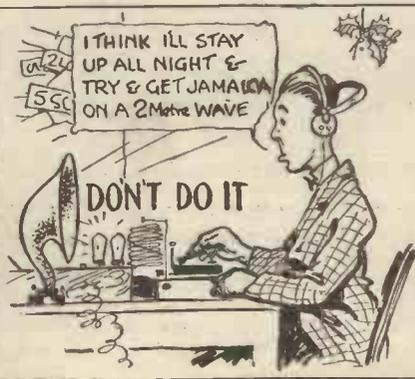
P.P.E. Joins the B.B.C.

In February, 1923, I threw in my fortunes with the new organisation. Timid, striking out somewhat blindly in this new cold sea of problems, it was a great change from the comparative obscurity of Writtle. I was, nearly three years ago, the only engineer in the B.B.C.

The title "chief" rather reminded one of the boy who said he was top of his class, when it later transpired that the total strength of the class was one.

The whole staff of the B.B.C. in those days was concentrated in one room—secretary, Major

(Continued on page 866.)



A LOW-POWER RECORD.

By R. L. SANGSTER.

NEW ZEALAND to England on 2½ watts power! Such is the latest record of station Z 3 AL, a full description of which has been previously published in POPULAR WIRELESS. The following extracts from the log of this famous station "down under" need but little imagination to form a fascinating story.

When Mr. W. M. Dawson, of station 3 A L, Ashburton, N.Z., entered his wireless "shack" one fine afternoon he probably had not the slightest premonition that before leaving again he was to break all previous records for low-power wireless work. Such was the case, however.

It was a winter's afternoon in Ashburton, a small town on the Canterbury plains, and at 4.15 p.m., when the evening "séance" was decided upon, the sun was already swinging low in the heavens. After working an amateur in Turin, Italy, a few days previously on the usual input power of 14 watts, Mr. Dawson was hoping for a "G." So that when G 2 L Z was heard calling for a test, no time was lost in replying.

Signals Surprisingly Strong.

Mr. Mayer, of 2 L Z, came back right away with greetings, informing 3 A L that his signals were Q.S.A. (strong), and requesting the name and location of the owner. This information was tapped out by 3 A L, who also added that he was using 14 watts input power.

This evidently surprised 2 L Z. "Say, old man, your strength on 14 watts seems impossible," he protested. "Have just heard Z 2 A C (Mr. Ivan O'Meara, of Gisborne), and you are stronger than he is." (2 A C is believed to have been using a 250-watt tube at the time.)

Mr. Dawson assured 2 L Z that he was using a single American valve (at under normal input), and requested Mr. Mayer to take a message to forward to F 8 B V, and then to try a low-power test.

Station 2 L Z was enthusiastic.

"Well, old man, that is as good as any signals I have heard from your part of the globe," he telegraphed. "Can hear you with 'phones on the table on three valves."

Power Reduced.

After the message had been sent and received, 3 A L cut down his power to 8 watts. Mr. Mayer reported that signals were nearly as strong on 8 watts as on 14, and suggested that 3 A L could go much lower.

Mr. Dawson then took a bold step. The distance certainly was 12,000 miles, but conditions were rapidly becoming unfavourable. The power was reduced from 8 watts to 2½ watts (160 volts, 16 milliamperes), and a reply eagerly listened for.

Straight away 2 L Z came back!

"Cannot quite get all, due to atmospherics," he remarked, "but you said power was 2½ watts. If no interference would get all. Fine business, old man.

My power is 250 watts. Say, when you reply, come up on full power, and I will note if there is any fading. Time nearly seven a.m. local." Here he reduced power and telegraphed: "3 A L Z G 2 L Z—35 watts—Q R K?"

End of the Test.

With face registering his delight, 3 A L reported that the signals on 35 watts were O.K. Feeling it was one of those afternoons when things simply could not go wrong, Mr. Dawson then cut down his power to 1½ watts (100 volts, 12 milliamperes), sat back, and held his breath hard.

It was too late, however. "Nothing doing," reported 2 L Z sadly. "Fading now, old man. See you same time to-morrow; good-bye!" Both stations then signed off.

However, 2 L Z did not work anyone the next afternoon. Station 3 A L heard him calling "Test" time and again; but 2 L Z evidently could not hear the calls of several New Zealand amateurs who were after him.

However, when they *do* meet again——!

ONLY THREE YEARS AGO.

(Continued from page 865).

Anderson; the two "programmers," Mr. Burrows and Capt. Lewis; Mr. Smith, the publicity man who travelled up for an interview with a spare collar and some optimism, and never returned to his native fastnesses in Scotland any more; and last, but not least, Mr. Reith, our chief, who was allowed the superior privacy of a cupboard at one side of the room. Typewriters clicked



Mr. A. Burrows speaking into one of the early microphones.

all day, telephones clanged, visitors poured in, correspondence accumulated (I had three months' back work besides getting the whole organisation going), and there we were, the vigorous nucleus that has, with frequent thyroid injections from an eager public and an enthusiastic leader, grown with such extraordinary rapidity.

These three years have seemed like a nightmare in some ways, and even now it is

so impossible to consolidate sufficiently. All day, every day, we have had to advance, rejecting the obsolete, considering the new. I was impressed in America sometimes with the beautiful spick-and-span arrangements at many stations, but I found that where bits of wire and lash-ups held sway, there it was that progress was mostly manifest.

The last three years in retrospect are "lash-up" years, where this was tried and rejected, that was lashed up and found good; but from the welter of discarded ideas something materialised, we have found some bed-rock at least. Our development staff dreams always in terms of straight lines, transformers that don't cut off, transmitters that control equally from 10,000 to 10 vibrations a second, lines that care not whether it be a bat's squeak or the pedal notes of an organ, but transmit all and each with equal facility.

"Lash Up" Transmitters.

Three years ago we had no development staff, no lines, no control-room, no central batteries—only a few lash-up experimental amplifiers, the valves pendulous on rubber strings, cotton-wool insulating shock, plasticine deadening resonance, and slowly we have crystallised this into final designs that are worthy of a maintenance system.

The most rapid advances have been made in microphones; to-day it is not unlikely we are on the eve of being able to use an arrangement responsive at all frequencies equally, that will work in a bucket of water or in a studio, that requires but a two-valve amplifier. This little cube "plunked" down inoffensively anywhere, linked to the nerve centre at Savoy Hill, can make the slightest noises around it apparent to 10,000,000 people.

Receivers More Advanced.

Transmitters, although their framework is much the same as when they were installed three years ago, have been modified to give a better response curve; lines cutting off at 2,000 are being substituted for those which are still useful with their correction at 10,000 vibrations a second.

And what of the receivers?

Three years ago one had to be an expert; one was of a brotherhood if one owned a valve set, and one's impressive jargon told of grid leaks and square laws, and reflex. To-day we are beginning to see "old men and maidens, women and children" tuning in Bournemouth, Birmingham, London, and the rest as skilfully as we used to fake our sixteen-handled reflex super! And that is the greatest advance of all, because wireless will only become ubiquitous when the loud-speaking set gives us as little trouble to operate and maintain as the crystal set of to-day.

The Future?

In three years from to-day may it not be that sets will be sold like gramophones, and that the user will bother as little about the internals as he does about a gramophone. He will ask for a demonstration, have a look at the cabinet work, his pass book, and will state the voltage and type of his electric light supply; he will have the set delivered at his door, will plug it into the mains, and, after a glance at the programmes, will choose jazz, or a talk, or a concert by the tuning of one knob!

It only means a rate of progression for the next three years similar to that which has taken place in the last three.

A Scientist's Christmas

By Sir Oliver Lodge F.R.S.



No special issue of "Popular Wireless" would be complete without an article from the pen of our great Scientific Adviser, Sir Oliver Lodge. At my special request he has contributed to this Christmas Number one of his delightful and thoughtful essays, which I am sure will be universally enjoyed by readers of "Popular Wireless."—The Editor.

YOU, Mr. Editor, have asked me to write down some reminiscences of past Christmases, so I will try to see what my recollections of the season are like. It has often struck me that there is a time in the year when the work of the world seems to stop, when correspondence can be safely neglected, when the newspapers need not be read, when there are no engagements to keep, and when it is safe to get into a brown study and concentrate.

Opportunity for Thought.

Not exactly a slack time of year, a time indeed for extra work, but not of the usual kind. Most people associate that kind of feeling with the month of August; but that is usually given to bodily exercise and travelling and more or less complete holiday: anyhow, it is full of interruptions, and not at all suitable for concentrated work.

But the week between Christmas Day and the New Year has a totally different character: there is not much temptation to go out, nor is anything important going on. There are undoubtedly the claims of family life; but a large family is complete in itself; and it has often been possible for me to shut myself up in the study, to let letters and everything else accumulate, and to pursue some idea continuously without interruption.

In that way I have done several papers for "The Philosophical Magazine," papers of calculation involving continuous thought and concentrated effort. Not that such a paper can be completed in a week; a good deal of subsequent elaboration is needed, but the main ideas can be got in such a period, and the rest is a matter of work rather than of inspiration.

"A Spirit of Joyousness."

No doubt one had to come out occasionally and join in festivities, and act as Father Christmas for the youngsters, distributing the presents provided by others, and hoping that the children would be charitable enough to take Father Christmas on his merits, without inquiring too closely as to his identity. Children are very kind in that way, and allow themselves to enjoy at their face value the efforts of seniors at a little innocent deception. But these trivialities are no interruption to the work.

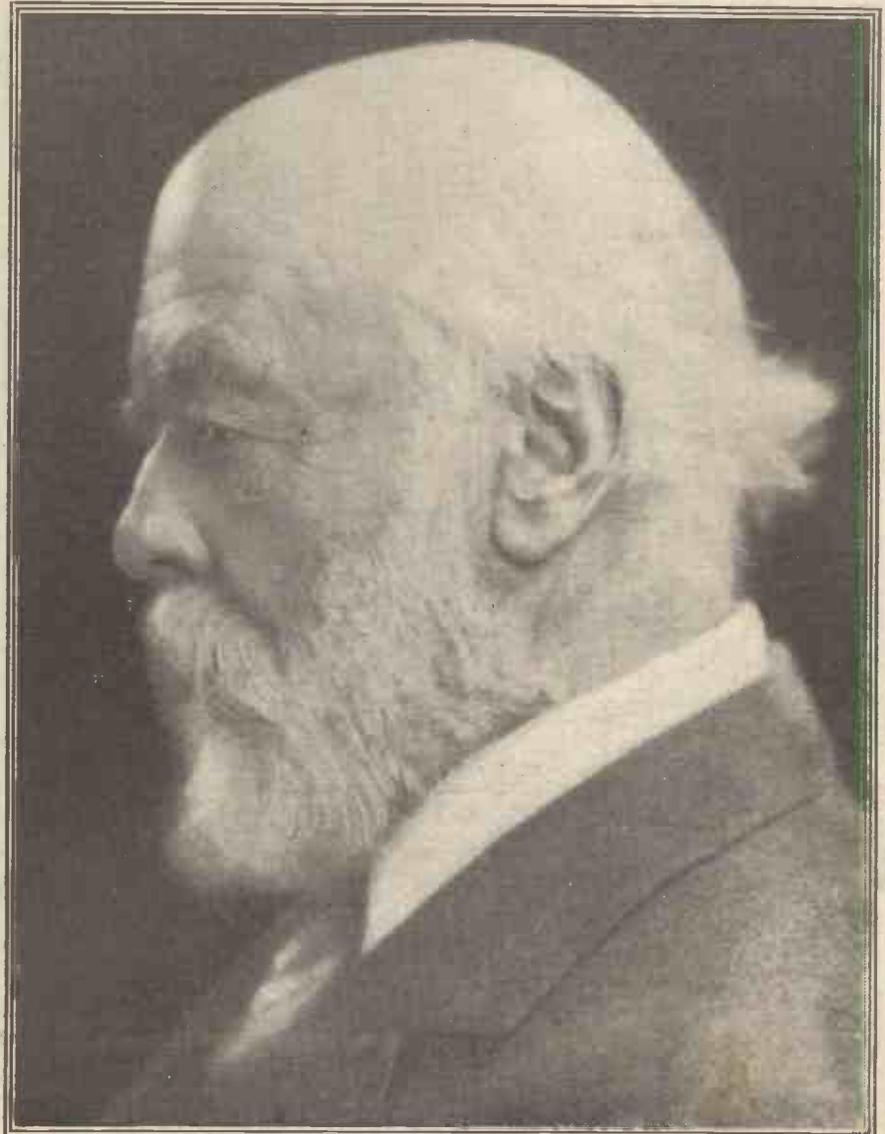
They do not break the thread, as college or university engagements do, and one goes back to it refreshed rather than otherwise; staying up sometimes very late at night while young people are otherwise enjoying themselves.

There is a spirit of joyousness and absence of care in the background, which soothes and satisfies without interrupting. Occasionally, of course, in a large family there are painful distractions at this season as at any other. A large family is always liable to illnesses or surgical operations or even death; but fortunately painful things like that are rare. For the most part it is a time

of peace, and may easily be a time of concentration. Nothing is expected of one by the outside world, and the seclusion necessary to all productive work can be obtained.

It is at times like these that I wrote, for instance, such a book as "Life and Matter,"

(Continued on page 868.)



The latest portrait of our Scientific Adviser, Sir Oliver Lodge. (Photo by Lafayette.)



Technical Notes

Conducted by our Staff Consultant, J. H. T. ROBERTS, D.Sc., F.P.Inst.

ONE of the simplest methods of inter-valve connection is the "tuned-anode," according to which the anode of the first valve is tuned to the wave-length of the incoming signal by the use of a tuning coil and variable condenser. Connection is then made, through a fixed condenser and a grid leak, to the grid of the detector valve.

The fixed condenser passes the impulse from the plate circuit of the one valve to the grid of the next, the value of the condenser generally being between .0002 mfd., and about five times that value, that is, .001.

Amateurs often ask questions as to the extent to which this type of H.F. amplification may be employed, and it is pointed out that if more than two stages of amplification are used, the set is apt to become very difficult to control; in fact, two

with the tuned-anode system mentioned above; but, on the other hand, two, or even three, stages may be employed with comparative convenience.

When Reaction Becomes Necessary.

Another method of intervalve coupling for the same purpose is the H.F. transformer method, the valves being connected through (air core) transformers, tuned by means of small condensers. The "semi-aperiodic" is another method, in which special transformers are used, which I cannot deal with further at the moment, however, owing to lack of space.

These various methods of H.F. amplification have their special points of advantage

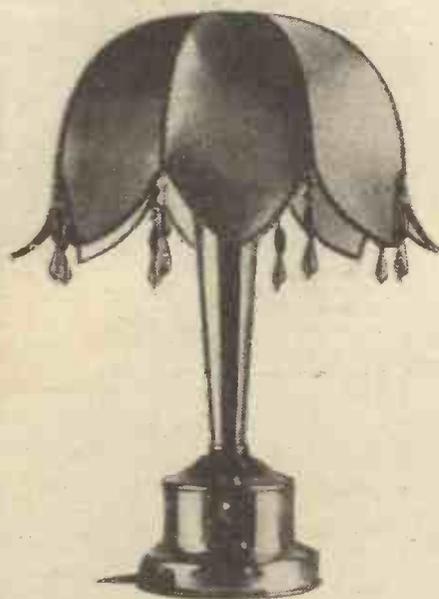
and different experimenters favour different methods. There will be found circumstances, however, in which it is impossible, by any of these means alone, to amplify the incoming signals sufficiently to operate the detector efficiently, and in such cases, or, in fact, in general, recourse is had to the principle of reaction.

Dull-Emitter Filaments.

A remarkable new discovery, or, rather, a development in existing methods of manufacture, was announced recently in the United States in connection with an exhibit at the Society of Chemical Industries. The interest lay in the exhibit of pure thorium metal, which has been manufactured in a variety of special forms by Drs. Rentschler and Marden, of the Westinghouse Co.

It is well known that the extra emissive properties of the dull-emitter valve filament are due in some way to the working-up to the surface of a layer of pure metallic thorium. In the case of a thoriated filament, this metal is introduced as an impurity in the tungsten of the filament, the thorium oxide being reduced to metallic thorium. In the case of the coated filament, the extra emissive material is coated upon the surface of the filament.

(Continued on page 936.)



This R.T.H. combined table-lamp and loud speaker can be recommended to the attention of seekers of artistic radio Xmas presents.

stages of H.F. amplification may be regarded as the limit for ordinary working on this system by the average amateur.

In the resistance-capacity method of coupling, the plate of the first valve is similarly connected to the grid of the next, but a fixed resistance of, say, 50,000 to perhaps 100,000 ohms is introduced in the anode circuit of the first valve instead of the variable coil and condenser. This arrangement has the effect that somewhat increased impulses are passed on to the grid of the detector valve. The amplification per stage is not so great with this method as

A SCIENTIST'S CHRISTMAS.

(Continued from page 867.)

when I was absorbed in the materialistic philosophy of Haeckel, which was then widespread over the country by the translation and cheap issue of his book called "The Riddle of the Universe," to which it seemed an antidote or counterblast had to be provided.

It was then that I formed my ideas, such as they are, of the relations between life and matter—a problem still far from complete solution.

"The Faculty to Appreciate."

It was then also that I elaborated my more mathematical papers, such as the one on "Opacity," which I subsequently gave as a presidential address to the Physical Society; or one on the "Propagation of Electric Waves and the Properties of the Ether."

While on yet another Christmas I remember I was immersed in arithmetic, and was producing a book on the teaching of mathematics, which I hoped would be of service to parents and teachers; the continuity of the work making it much easier than it otherwise would have been, and making it more lively and freer from boredom than if one had to drop it and take it up again after an interval.

There seems but little connection in all this with the sacredness of the season and the Event which the greater part of the civilised world was commemorating. But that was in the background, too; it was that consensus of agreement that rendered the peaceful time possible. The end of the year's seasons and the returning of the sun

have always been felt to be rather a sacred time, a time of rejoicing; and the instinct of the Christian world was wise in fixing on this period for celebrating the greatest event in the world's history—namely, the Incarnation of the loftiest Spirit which has appeared on the planet—whether historically it actually occurred at that season or not.

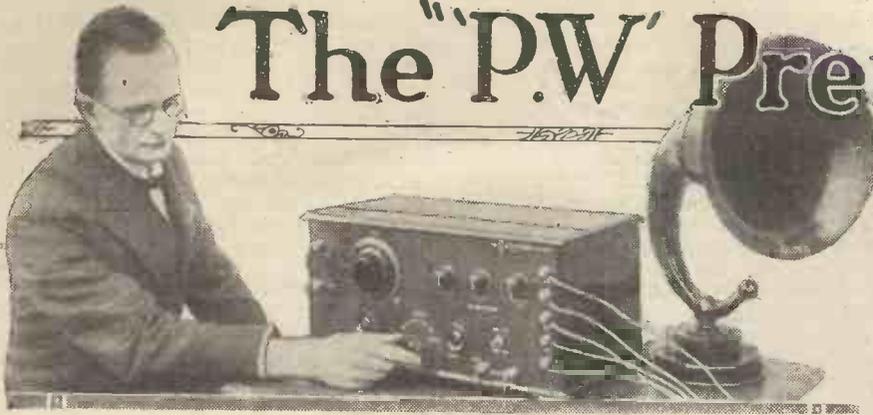
From that first Christmas Day we date our reckoning of time; and every time we write "1925" we are making an unconscious reference to that marvellous event. Peace and goodwill are in the air. There was rejoicing then, and there is rejoicing now. Different individuals rejoice in different ways, and those whose motto is "Laborare est orare," may conduct their worship by losing themselves in the wonders and intricacies and extraordinarily satisfying contemplation of the deeper beauties of Nature underlying its superficial appearance and the direct apprehension of the senses.

A study of science is essentially a study of the Mind which brought all things into existence and planned their adaptation, their mutual working, and the marvellous intricacies to which the process of evolution has given rise.

No matter whether we study the problems of life, or the problems of the atoms, or the laws of space and time, or of mind and matter, or the nature of force and energy, we are studying something which the human mind has not produced, and only with difficulty understands, but which yet it has the faculty to appreciate and reverently to admire.

I cannot but think that the possibility upon which we are now entering, of broadcast communication with the ends of the earth, will carry the Spirit of Christmas far and wide, and help to inaugurate an era which in due time will surely come, of Peace and Goodwill among all mankind. Meanwhile, I send to all wireless amateurs a friendly Christmas greeting and good wishes for the New Year.

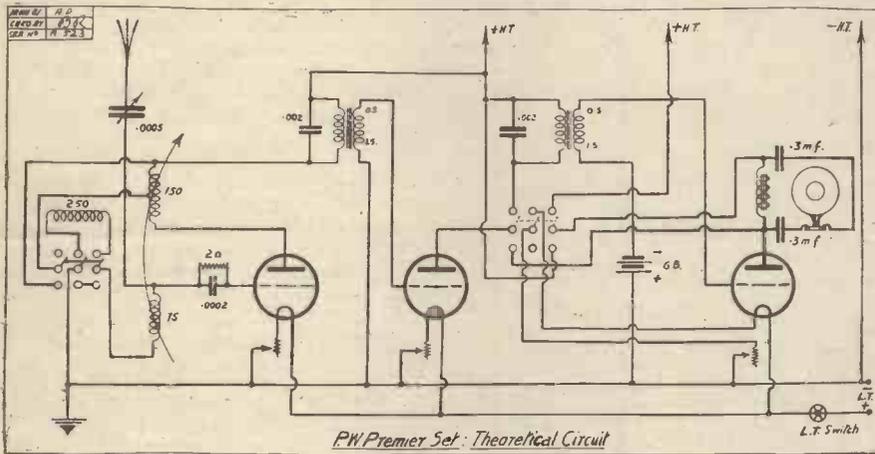
The "P.W." Premier Set



This magnificent receiving set has been specially built in the "P.W." laboratories for Mr. Ramsay MacDonald, the ex-Prime Minister. Many readers will be interested in this extremely simple but efficient model.

THIS "Premier" receiver was designed by "P.W." with two main objects in view—adaptability and simplicity. The ends were achieved without introducing undue circuit complications, and with no loss of efficiency. The result is that al-

Three valves are employed, one as a detector and two as L.F. amplifiers. A second switch brings in either the full three valves or only two, as required. The same switch adjusts the H.T., so that the H.T. plates do not require to be altered when the

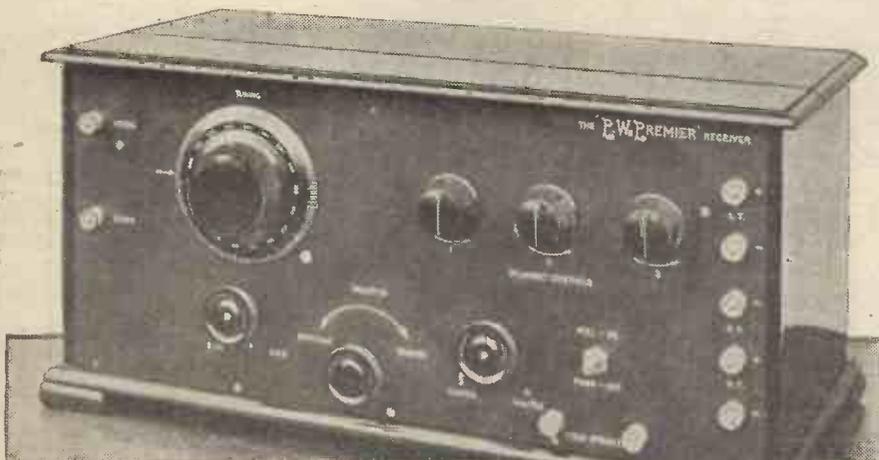


though plug-in coils are used and any range of wave-lengths can be covered, a certain combination of coils can be left permanently in the set, and by means of one simple switch, either a "normal" or a "5 X X" range becomes available. Tuning is accomplished in the usual way by means of a variable condenser and a moving coil reaction control.

last L.F. valve is "cut out." Further, this switch breaks the filament circuit of the third valve when it is not in use, so that the filament rheostat does not need to be touched during the switching operation.

Circuit Details.

A third switch of the "push-pull" type breaks the filament circuits of all the valves,



The handsome appearance of the "P.W." "Premier" receiver strikes a distinctive note in radio design. The controls, as shown by this photograph, are arranged both symmetrically, and so that tuning operations are facilitated.

LIST OF PARTS for the "P.W." PREMIER SET.

	s.	d.
One panel, 18" x 8" x 1/2"	9	0
One mahogany case (Peto-Scott) with 5-ply wooden baseboard, 18" x 9" x 1/8"	30	0
Two aluminium angle-brackets (Peto-Scott)	2	6
One .0005 variable condenser, geared, with large 360° dial (Peto-Scott)	23	6
Two 3-pole 2-way switches, Rotary Type, "Utility"	10	0
One 2-way coil holder, long handle (Lotus)	8	0
One single coil holder (Peto-Scott) (For baseboard mounting.)	1	6
One grid leak and condenser, 2 meg. and .0002 mfd. (Dubilier)	5	0
Three valve holders for baseboard mounting (Lampugh)	3	9
One L.F. transformer, 1st stage Concert Grand (Eureka)	30	0
One L.F. transformer, 2nd stage, Concert Grand (Eureka)	21	0
One L.F. choke (A. J. Stevens)	15	0
Three filament rheostats (Yesly)	19	6
One filament break switch, push-pull (Peto-Scott)	2	0
Two fixed condensers, .002 mfd. (Watmel)	5	0
Two fixed condensers, .3 mfd. (T.C.C.)	6	0
Nine terminals	1	1 1/2
Wire, screws, 2 plugs, etc.	3	0

ACCESSORIES.

- Three valves, 1 D.E.11, 1 S.P.18 (Cosmos), 1 P.V. 6 D.E. (Ediswan).
- Three Igranic coils (150, 250 and 75); the 150 is tapped near the centre.
- One grid bias battery, 9 volts (Siemens).
- One H.T. battery, 120 volts.
- One L.T. battery, 2 volts, 40 amp. actual.
- Loud Speaker, Q type Brown.

so that having "set" the receiver on one particular station, it can be immediately switched on or off at any desired time.

A choke by-pass for the loud speaker is introduced, and a large fixed condenser is placed in series with each loud-speaker terminal, so that the loud speaker becomes completely isolated and very long extension leads can be employed, if necessary, without trouble resulting. In all other essentials, the circuit is perfectly straightforward, as a glance at the theoretical circuit diagram on this page will show.

(Continued on page 370.)

THE "P.W." PREMIER SET.

(Continued from page 871.)

not be used for this purpose, but the point of a sharp instrument. Marks need not be made in the form of extended lines—small crosses are all that is required for marking centres accurately. Great care in handling the panel is necessary if ugly scratches are to be avoided. Above all, it should be remembered to clear the bench or table before laying it down for drilling. It is a good plan to have a sheet of soft cloth always between the panel and whatever it is laid upon during the process of marking-out, and whenever it is laid aside for any reason.

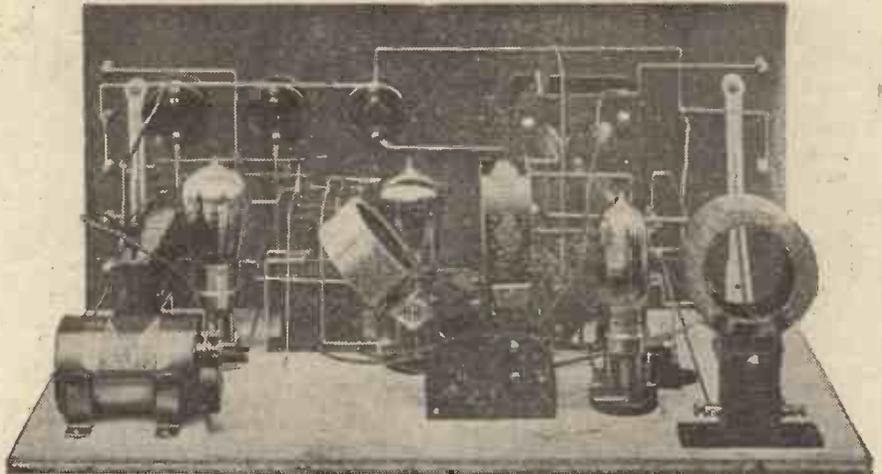
Mounting the Components.

There is nothing out of the way to be encountered in drilling the panel—this can be proceeded with in the usual straightforward manner. It is strongly advised that the holes for the terminals should be tapped or threaded by drilling undersized holes,

and forcing the terminals to cut their own threads. This will ensure permanency.

The relative positions of the various components on both the panel and baseboard can be clearly seen in the photographs. On the panel are mounted nine terminals.

one variable condenser two Utility switches, one push-pull switch, and three filament resistances. The coil holder is mounted on the baseboard, and its control knob protrudes through to the front of the panel. The remainder of the components



The valves and coils are in position, and the "P.W." "Premier" receiver is ready for a test. The degree of reaction coupling shown is actually the one employed for 5 X X in the original model.

POINT-TO-POINT CONNECTIONS

(Looking at the "Premier" set from back of base-board.)

Aerial terminal to moving vanes of variable condenser, fixed vanes of variable condenser to grid leak and condenser, and to aerial (moving) coil holder (flexible lead to plug side). Other side of grid leak and condenser to grid of first valve. Socket side of moving coil (by flexible lead) to inner centre contact of first Utility switch.

The middle of the centre contacts of the first Utility switch is connected to the earth terminal. The outer (nearest panel) centre contact of first Utility switch is connected to the centre tapping on the reaction (fixed) coil.

L.T. negative is joined to negative H.T., to one side of each of the rheostats and to the earth-to-switch lead. L.T. positive is connected to the break switch. The other side of the break switch is connected to one filament socket of each valve holder. The remaining filament sockets of the first two valve holders are joined to their corresponding terminals on the respective rheostats.

The lower rheostat terminal of the third valve holder is joined to the middle one of the centre contacts of the second Utility switch. The middle one of the left-hand contacts of this switch is connected to the remaining filament socket of the third valve holder.

The plate socket of the first valve is joined to the socket side of the reaction coil holder (fixed). The plug side of this coil holder is connected to O.P. of first stage L.F. transformer, and to the outer (nearest panel) of the upper contacts of the first Utility switch. The inner and centre of the upper contacts of this switch are joined together.

I.P. of the first stage L.F. transformer is connected to I.P. of the second stage L.F. transformer, and to the first H.T. positive terminal (fourth terminal down). This lead also goes to the outer (nearest panel) contact of the right-hand contacts of this second switch.

O.P. of the second stage L.F. transformer is connected to the inner left-hand

contact of the second Utility switch. A 002 fixed condenser is connected across each of the L.F. transformers between I.P. and O.P.

The grid socket of the second valve is connected to O.S. of the first L.F. transformer. I.S. of this transformer is joined to the negative L.T.-to-earth lead.

The plate socket of second valve is connected to the inner centre contact of the second Utility switch. The grid socket of the third valve is joined to O.S. of the second L.F. transformer. I.S. of this transformer is connected by a flexible lead to a black plug which is inserted at the negative end of a 9-volt grid bias battery. The positive end of the grid bias battery has a red plug inserted, which is joined by a flexible lead to the negative L.T.-to-earth lead.

The plate socket of the third valve is connected to the inner right-hand contact of the second Utility switch, to the "P" terminal of the L.F. choke, and to the right-hand contact of the outer (nearest panel) 3 mfd. T.C.C. condenser. The other side of this condenser is joined to the right-hand loud-speaker terminal. The remaining loud-speaker terminal is joined to the left-hand contact of the inner (nearest observer) 3 mfd. T.C.C. condenser. The remaining (right-hand) contact of this condenser is joined to the outer (nearest panel) centre contact of the second Utility switch, and also to the H.T. + terminal of the L.F. choke.

The outer (nearest panel) of the left-hand contacts of the second Utility switch is joined to the second (lower) H.T. positive terminal. (Note.—The centre of the right-hand contacts of the second Utility switch is left unconnected.)

The inner (nearest observer) of the bottom contacts of the first Utility switch is connected to the left-hand side of the single-coil holder. The remaining terminal of this coil holder is joined to the middle of the bottom contacts of this switch. (Note.—The outer bottom [nearest panel] connection of the first Utility switch is left unconnected.)

are fixed to the baseboard, with the exception of those fixed condensers which are supported by their own connections.

Before finally fixing the baseboard components in position a clearance check should be made. It should be noted particularly whether plenty of room has been left for a moving coil in the coil holder of reasonable size to clear everything, and whether room has been left for valves when everything else is in position.

One Utility switch should have its connecting points pointing upwards. This is the left-hand switch looking at the back of the panel, and is the one which controls the number of valves used. The other Utility switch should have its connecting points pointing outwards. The photographs will make this quite clear.

Having mounted all the components, the wiring can be proceeded with.

The Wiring Connections.

Now, instead of one 150 turn fixed coil tapped approximately in its centre, two basket or other coils, each of 75 turns, can be used. Two such coils should be joined together by one outside and one inside connection, and clamped together on a basket coil holder so that their windings are both in a similar direction. The tapping point would correspond with the two connected leads, one from each coil, while the remaining two connections are connected to the plug and socket of the holder.

The diagram, page 870, and the list of point-to-point connections should make the wiring a fairly simple task. Due regard to component clearance should again be taken and ample spacing allowed to prevent possibilities of shorts. Square section tinned copper wire should be used, and soldering is advised throughout. Readers are recommended to turn up that article, "Wiring Up Your Set" in last week's "P.W." for some invaluable advice concerning this part of the work.

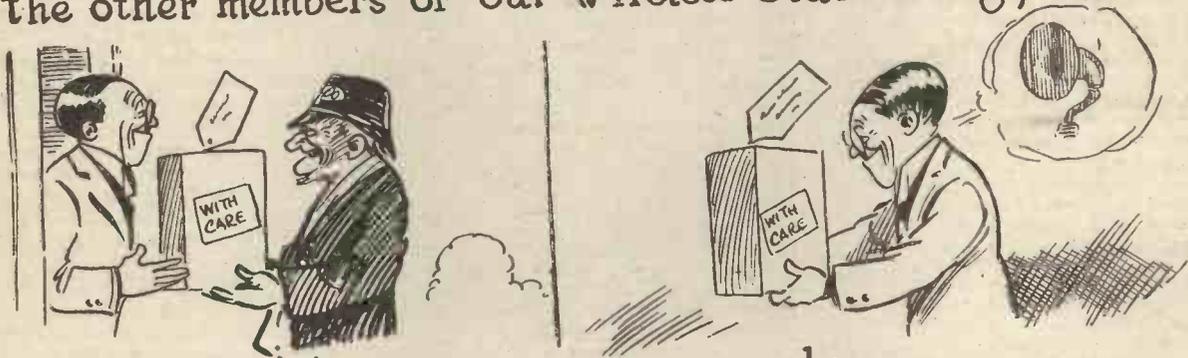
It will, perhaps, be noted that one of the leads appears to go into or through the panel. This is not a connecting lead at all,

(Continued on page 935.)

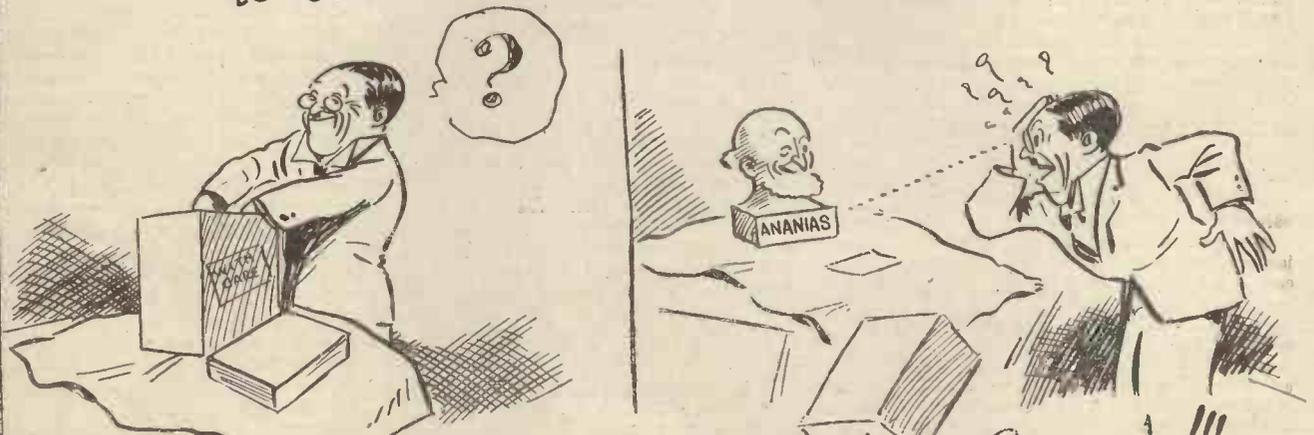
WHAT TO BUY AT XMAS: A RADIO PROBLEM SOLVED.



Although Mr. Septimus Bragg — is only a new member — yet in recognition of his great services to **THE CAUSE** the other members of our Wireless Club willingly subscribed



to send him a



suitable Christmas Present !!!

CHRISTMAS!

There is magic in the very sound of it, and it is one of the few festivals left in our busy, bustling, workaday world which still means something to every one of us.

Laughter and happiness, music and song, freedom from care and sorrow, come to all of us at this time, no matter how burdened with troubles and worries we are throughout the rest of the year. To me it means all these things with just one other in addition—hard work. Working hard at Christmas-time would not appeal to many people, but to me hard work and more time spent with my beloved violin spells true happiness.

From Christmas-time right over into the New Year is quite the busiest time in my year, for now it is my duty to see that, as far as it lies in my power to do so, my patrons have a real Merry Christmas. and a happy start off in the New Year.

On the eve of 1926 I will have spent eighteen years at the Piccadilly Hotel, and during that time I have seen the gradual change in the way in which people keep the Fête de Noël. Years ago it was considered a most terrible thing to go out to dinner on Christmas Day, and in an hotel you would only find those people who had no home festivities to go to.

But all that is altered now. Year by year we get more and more people dining and merry-making in the Piccadilly Hotel on Christmas Day, and, of late, our accommodation has proved quite inadequate to cater for all those who wish to celebrate the festival in this way. Tables for the 25th and 26th have to be booked weeks in advance, and exactly the same state of things prevails for New Year's Eve.

A Busy Time.

Christmas this year will mean a busier time than ever for my orchestra and myself. We have to play at the Piccadilly Hotel in the afternoon and evening on Christmas Day. On Boxing Day we have to do the same, and, in addition, rush, between whiles, to fulfil both matinée and evening engagements at the Coliseum. On top of this we have our broadcasting engagements, endless rehearsals, while I, personally, have to put in a lot of time arranging new scores and doing some good solid practice, without which no violinist who takes a pride in his performances can hope to keep up to "tone."

But it is all worth it. When I first came to England I thought that I would never stay here for even one year. It was all so different to the country of my birth—Holland. Now I have learned to love England, my adopted country, and it would be a great sorrow for me if I ever had to go away. Every day I get shoals of letters from those who have heard me play, either at the hotel, on the stage, or over the radio, and they all testify how deeply engrained in the hearts of my hearers is the love of really good music.

In Touch with Millions.

Jazz bands are all very well in their way, but, after a time, they are bound to pall. I saw the dancing boom come in and I shall see it go out. Of that I am convinced. The French Tango has not been a great success. That is a pity, because it possesses tunefulness and melody which is so strikingly lacking in the fox trot. Broadcasting is doing much to hasten the end of the dancing craze. When people can sit in their own

WHAT CHRISTMAS MEANS TO ME.

By De GROOT.

(The Famous Violinist and Broadcasting Artiste.)

homes and hear first-class artistes in first-class programmes, when musicians can take their stand before an audience a thousand times larger than our largest concert hall would hold, what more can be wished?

Of the success of the radio in its present popular form I never had any doubts; of its continued success and limitless possibilities I am convinced. To wireless I owe a very great debt of gratitude. It has brought me



A recent portrait of De Groot. (Hana Studios.)

in touch with millions of people to whom, without its aid, I could never have hoped to have played.

My Correspondents.

Even as I write this article, I have a pile of letters from radio admirers at my elbow. One of them contains the sincerest compliment I have ever had. It comes from a man in the north of England, who starts by telling me how much he enjoys listening-in to my orchestra. He congratulates me on my conducting, and then he goes on to say: "... but the real backbone of your orchestra is, undoubtedly, your first violin. In my opinion he is the soul of it."

He has never seen me. Probably he had never heard of me before he put on the headphones. He didn't know that I combine the rôle of conductor with that of first violin!

Not all my correspondents, however, are quite so clear or concise in their praise. I am fortunate in that the volume of praise far and away exceeds the little squeakings of the grumblers. But I get some letters that I really don't know how to take. This typical specimen for instance. It comes

from a Midland town, and runs, "Dear Mr. de Groot.—I have heard your band. Yours faithfully —" Whether to feel flattered or flattened I don't know!

Another gentleman, no doubt with the best will in the world, said that he had never enjoyed anything so much as my playing since he saw a performing monkey at a Zoo in his youth. What do you make of that?

But perhaps the greatest boon which wireless has brought me lies in an incident that happened just before Christmas last year. I received a communication from a man who, having heard my playing from the London broadcasting station, wrote to say that he was himself a great lover of the violin. He had in his possession a very valuable Stradivarius of which he was very fond. His ambition was to hear it played by a master, would I accept the loan of it indefinitely? Of course I accepted with the greatest delight, and, shortly afterwards, the instrument was in my possession. No wonder I feel flattered every time I tuck that fiddle under my chin!

A Better Violin

When I was appearing recently at Cardiff, I had a rather amusing experience in connection with that Strad. I came out of the theatre after giving my performance, and found a man waiting for me at the stage door. He was a very high-and-mighty kind of individual, and congratulated me in a condescending way on my playing.

"But," he added, thinking to show me how much he knew about the matter, "It is a pity you haven't got a better violin."

When I explained to him that the instrument in the case under my arm was worth anything from £2,000 upwards, he gently wilted away!

But at Christmas, in spite of all the extra work I have to put in, I always seem to get my full share of fun. Last year a little interlude took place which still makes me chuckle every time I think of it.

An Unintended Present.

Early in December I was approached in the Piccadilly Hotel by a lady who asked me if I would oblige her by rendering the "Chanson de Noël" on Christmas Day. It appeared that it was her favourite composition, and that she was bringing a party to the hotel specially to hear it. I told her that I should be happy to accede to her request.

Shortly afterwards I went to my music-dealer and purchased a full orchestral score of the piece. Having looked through it, I handed it to my librarian, saying:

"This is for Christmas."

He thanked me, and went off with it.

When the morning of December 25th dawned, I looked everywhere for that score but was unable to find it.

"What did you do with that score of the 'Chanson de Noël'?" I asked the librarian, at last.

He looked more than astonished.

"I took it home," he replied. "You said it was for Christmas. I thought you meant it for a present."

So that lady was disappointed after all.

This year I am looking forward to a jollier and busier time than ever. To all my friends who have been so kind to me with their applause (both heard and unheard) I make one of my very best bows and wish them the old, old wish, "A Merry Christmas and a Happy and Prosperous New Year."

SO many inquiries have been received from wireless enthusiasts asking me if I would furnish particulars of the instruments and apparatus used by me in connection with my lecture and demonstration at the third great POPULAR WIRELESS meeting held at the Central Hall, Westminster, on October 23rd, that I have been asked to write a special article describing some of my "lecture-room" experiments.

At the meeting in question I controlled by wireless a carillon of twelve bells, cinematograph, and an instrument arranged in a humorous form which I referred to as a



Major Raymond Phillips, I.O.M.

"morning alarm" for rousing "light" and "heavy" sleepers. For the wireless control of the various instruments and apparatus I used a spark transmitter, as shown in

Fig. 1, which it will be noted consists of an ordinary motor-car ignition coil, spark gap, Morse key, and a 4-volt accumulator, all contained in a mahogany case. It will be observed that a switch and press button are provided. The latter is for use in case it is not convenient to operate the Morse key when carrying the instrument in an auditorium.

For an aerial two aluminium rods (for lightness) 48 in. long and 1/4 in. diameter are fitted in the terminals on the top of the transmitter case. A licence is not required to use the transmitter provided an earth connection is not made to the instrument. A key diagram of the circuits involved is shown in Fig. 2.

A Radio Carillon.

The wireless-controlled carillon of twelve bells was originally fitted with my system of direct selection, which involved the use of a transmitter fitted with a keyboard, but owing to its complicated nature, and the

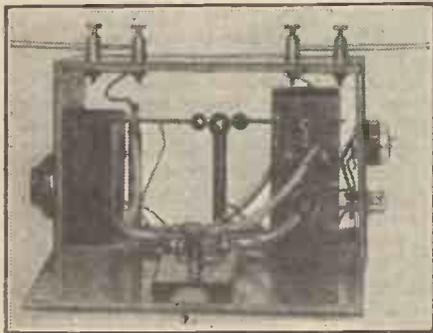


Fig. 1.

fact that public audiences generally want to see apparatus brought into operation expeditiously without waiting for long preliminary technical explanations, or fine adjust-

RADIO WIZARDRY.

Some Amusing Xmas Experiments.

By Major **RAYMOND PHILLIPS, I.O.M.**
(Late Member of the Inter-Allied Commission of Control).

ments made to instruments, I came to the conclusion that for demonstration purposes selection by sequence or simple selection would be more spectacular.

In the presentation of scientific apparatus it always seems advisable to make instruments as showy as possible, even though their operation may be comparatively simple. For that reason I arranged the carillon in question so that the bells could be sounded singly, in chords, or made to play an air or melody. A key diagram of the various circuits is shown in Fig. 3.

A "Television" Demonstration.

Only two bells are shown in the diagram, but it will be understood that by increasing the contacts fitted to a selector the number of bells can be increased accordingly. On referring to the diagram (Fig. 3) it will be observed that the carillon is fitted with a coherer which controls the whole of the mechanism. The coherer, of course, functions in an entirely different manner to a valve or crystal, as an incoming wireless wave causes filings contained in the coherer to cohere and short-circuit contacts connected with a battery and relay.

The latter opens or closes other circuits connected with an electro-magnetic device (which also functions as a dash pot) arranged to admit electric current to, and set in motion, the armature of an electric motor. The latter drives a selector, the contacts of which are arranged to open or close circuits connected with the electric bells to be controlled.

Another circuit is arranged to admit electric current to a decohering device, or tapper, which (as is well known) shakes up the filings contained within a coherer, and restores its normal resistance.

Two aluminium rods provide an aerial for the carillon, and are the same length and size as those described for the transmitter shown in Fig. 1.

The cinematograph machine which I have arranged to control by wireless is fitted with a universal-type electric motor and miniature arc lamp. The wireless receiver which I use for controlling the machine is shown in Fig. 4. I originally designed this receiver for controlling a model train, but have since added further improvements so that the

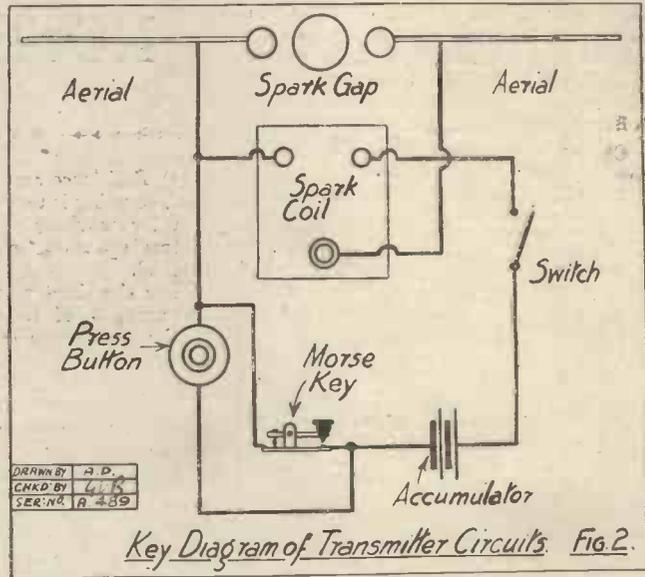
instrument is now adaptable for controlling various mechanisms as desired.

When controlling the cinematograph in question it is necessary to use (in addition to the wireless receiver) a supplementary relay. The latter has mercury contacts arranged to admit or cut off electric current from a main supply to the miniature arc lamp and motor fitted to the machine.

By carefully manipulating the Morse key fitted to the transmitter shown in Fig. 1 it is possible to transmit wireless waves in such a manner that a projected animated picture can be made still or animated as desired, thus producing an effective display which gives one some idea of what it may be like to one day have in our homes news of the day in picture form by wireless; but, of course, such an innovation will not be possible until television has been solved.

Space in this article will not permit giving a more detailed account of my wireless-controlled cinematograph, but the receiver shown in Fig. 4 possesses points which may perhaps puzzle those who have had little or no experience with coherers, as the latter sometimes have a nasty knack of functioning even when unaffected by wireless waves.

In most cases the fault (well known to experts) appears to be due to non-restoration of the normal resistance of the filings (wher-



such are shaken up) contained within a coherer. To eliminate the defect I found that fitting a sheep gong close to a coherer, and arranging the decoherer or tapper to strike the gong simultaneously with tapping the coherer, the sound waves emitted from the gong kept the filings in a state of agitation after the decoherer or tapper had ceased to function. The arrangement will be readily noted on reference to Fig. 4.

Preventing Accidents.

The device has proved very efficient for demonstration work, so much so that wireless experts have expressed surprise at the sensitiveness and positive action of the coherer. It will be seen that aerial terminals

(Continued on page 876.)

RADIO WIZARDRY.

(Continued from page 875.)

are mounted on the top of the receiver for securing aluminium rods the same as those previously described.

Two switches are also provided so that the coherer and relay circuit, also the selector circuits, can be opened or closed as desired.

The two press buttons shown (at one end of the receiver) are for the purpose of electrically operating the selector and decohering device should it be necessary to do so. It is generally advisable to decohere a coherer before commencing a public demonstration, so as to preclude the liability of a receiver functioning when unaffected by a wireless wave. The latter contingency might create a wrong impression in the minds of a non-technical audience. Even to-day the general public suspect trickery in any apparatus which appears to be of a mysterious nature, and instruments arranged for wireless control look very different to those for the reception of broadcast telephony. The instrument referred to in this article as a morning alarm for rousing light and heavy sleepers is fitted with a coherer, relay, large electric motor horn, and a converted .380 revolver for firing five blank charges of black gunpowder.

A Radio Alarm.

The proposed idea is that one of these days we may be aroused from our beds by wireless, and in order to create as humorous a situation as possible I arranged the mechanism so that an electric motor horn is first put in action to rouse light sleepers, but for the heavy variety the charges of black gunpowder are exploded.

I recently fitted up a bedstead, and

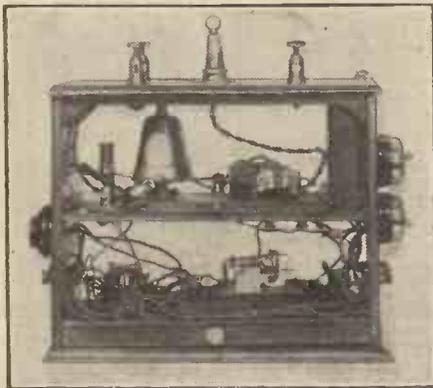


Fig. 4.

arranged that the violent explosions of the gunpowder charges caused a microphonic type of relay to operate mechanism which made the bedclothes fly into the air and throw an apparently sleeping person out of bed. Needless to say, the experiment caused roars of laughter.

The receiver of the morning alarm is fitted with a simple selector which controls circuits connected with a 4-volt accumulator and an electric motor horn, also a small "series"-wound electric motor. The latter drives reducing gear which causes a crank shaft to engage with a steel rod brazed to the trigger of the .380 converted revolver; the operation of the various

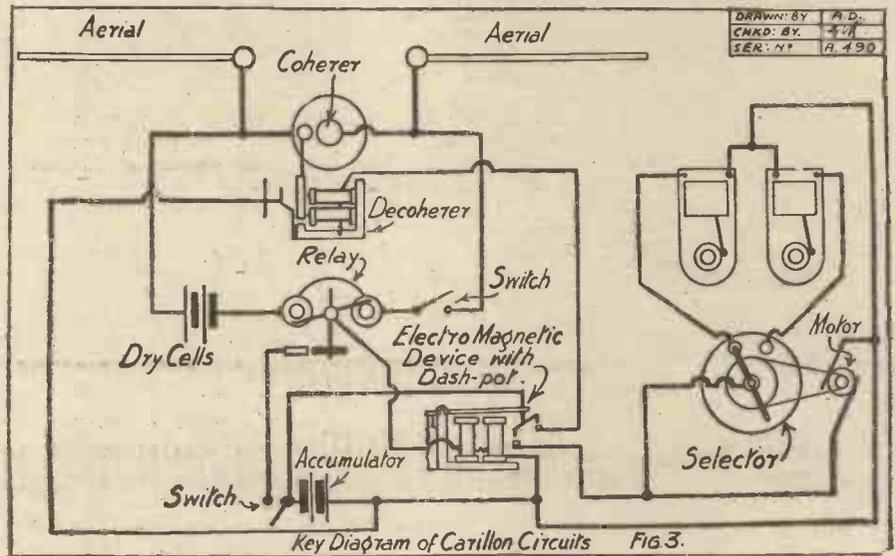
mechanisms being controlled by wireless waves according to the number and order of signals transmitted from the instrument shown in Fig. 1.

Two aluminium rods provide an aerial the same as for other instruments described.

The writer hopes at a future date to furnish particulars of further experiments.

Enthusiasts will find the wireless control of mechanism a most fascinating hobby, and one which might lead to great discoveries.

The problem of jamming—i.e. interference from other transmitting stations, has not as yet been solved. Its solution would undoubtedly open up a new era in wireless with unlimited possibilities.



Key Diagram of Carillon Circuits Fig. 3.

NOTES ON H.F. COUPLING.

(From a Correspondent.)

(a) *Resistance capacity.*—This method of H.F. coupling is the simplest and cheapest, and for wave-lengths above about 1,500 metres is practically as efficient as any other method.

For the shorter wave-lengths, however, on account of the increased importance of the extraneous capacities in the set, its efficiency falls off considerably. With this type of coupling the anode impedance is constant for all frequencies, and therefore an H.F. valve, so coupled, does not add to the selectivity of the set.

A Selective Method.

(b) *H.F. Transformers.*—This method of coupling has had great popularity of recent years, and it is undoubtedly easier to handle than tuned anode coupling, although not capable of quite the same amplification. It adds a fair amount of selectivity to the set.

If you adopt this method, do not use a transformer wound with very thin wire on a moulded former. Use a turned ebonite former, sectional if finances permit; or, better still, select one of the excellent formerless transformers now on the market. Both primary and secondary windings of an H.F. transformer are high-frequency tuning coils, and should have the same care expended on their design as the aerial coil has.

The tuned type of transformer is, of course, far more efficient than the aperiodic type, and the latter type should not be used except in circuits where it is difficult to obtain stability by other methods.

If you are using interchangeable transformers of the plug-in type, make sure that they are all connected in the same way, as there is an appalling lack of standardisation in this respect.

(c) *Tuned Anode Coupling.*—This method of coupling is the most efficient method, particularly for the shorter wave-lengths, and the degree of selectivity attained with properly designed components is unattainable by either of the methods described above.

For best results the anode coil should be wound with wire of fairly large section, and in one of the approved low-capacity styles.

Use of Double Condensers.

Semi-aperiodic anode reactances are not nearly as efficient, since, by reason of their flatness of tuning, they involve loss of selectivity and volume. In sets with more than one H.F. valve the tuned cathode method of coupling will be found easier to handle, but it involves the additional complication of separate L.T. supply to each valve.

Double or triple condensers may with advantage be used for tuning two or three H.F. valves, but these components must be absolutely above suspicion as far as insulation is concerned, and the various systems should be well spaced apart to avoid intercapacity as far as possible. It is advisable to incorporate a small vernier condenser for each valve, so as to compensate for any slight want of balance in the tuning coils or transformers.

OURSELVES—AND THE

ELECTRICAL IMPULSE



his secrets are ours

Think of it! Seventeen years' patient study of the vagaries of our jolly impulsive friend, the electrical impulse. And our laboratory experts have come through with intellects unscathed. Nay! Not only unscathed, but brightly furbished. They were able to establish friendly contact with the electrical impulse; he helped them with their plans for building radio sound reproducing instruments and encouraged their scientific research. Now, this electrical impulse uses his electrical energy to bring the radio as far as your receiver. To get him to talk easily and naturally is an operation we have perfected with his own help and advice. Seventeen years' study of the best way to capture and transform this spirit of radio sound has helped us to build the best radio speakers of the age; his secrets are ours. Get a Brandes and you will know that the properties of radio sound are harnessed as effectually as you can possibly desire.

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THE TABLE-TALKER

The new goose-neck design is the result of research in radio acoustics, which definitely establishes its value in relation to the diaphragm fitted. Patent material used in the construction of the horn eliminates metallic harshness. Volume and sensitivity controlled with small lever located at the rear of the base. Elegantly shaped, tasteful neutral brown finish, felt-padded base. Height 18 ins., bell 10 ins.

30/-

MATCHED TONE HEADPHONES

The whole secret of Matched Tone is that one receiver refuses to have any quarrel with its twin. Aply schooled in these generous sentiments by our specially erected Matched Tone apparatus, their synchronised effort discovers greater sensitivity and volume and truer tone. There is no possibility of the sound from one earpiece being half a tone lower than its mate.

20/-

THE AUDIO TRANSFORMER

Ratio 1 to 5. The main objects in view are high amplification of applied voltage, together with a straight line amplification-frequency curve. That is to say, for a given input voltage, the amplification is constant over a wide band of frequencies, thus eliminating resonance. Mechanically protected and shielded so that the transformers may be placed close together without interaction.

17/6

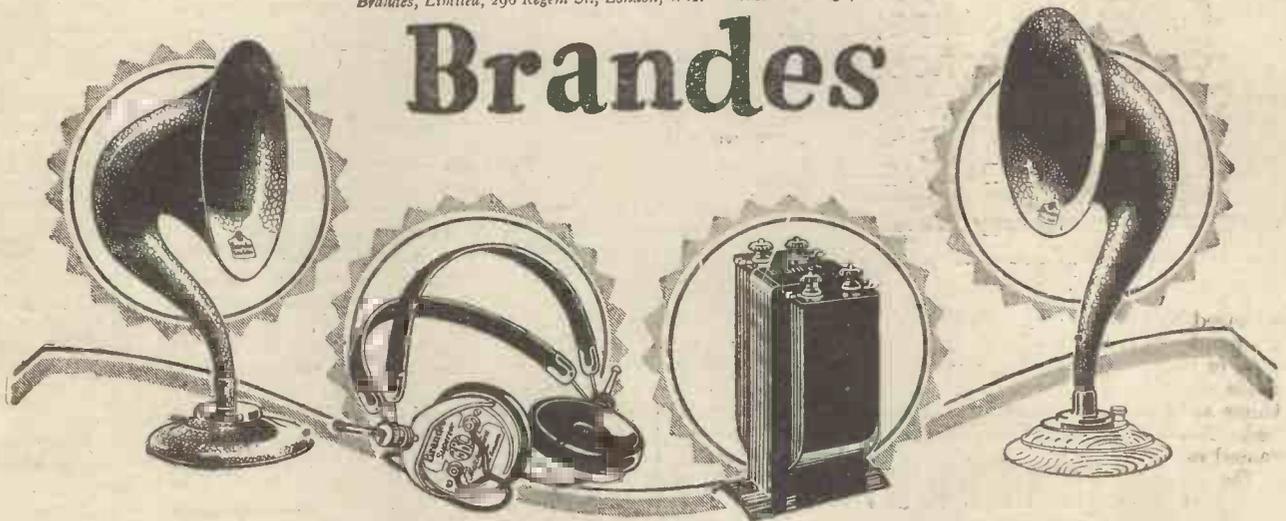
THE BRANDOLA

Specially built to bring greater volume with minimum current input and exceptional clarity over the full frequency range. A large diaphragm gives new rounded fullness to the low registers and new clarified lightness to the high. Reproduction controlled by a thumb screw on the base. Polished walnut plinth with electro-plated fittings. Height 26 ins., bell 12 ins.

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EXPERTS IN RADIO ACOUSTICS SINCE 1908

No. 333—No. 29.

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Keeps any Accumulator fully charged for 3d. weekly.

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THE old idea was to wait for the accumulator to be completely run down and then to put it on charge. This was expensive and inconvenient. The Rectalloy charger, on the other hand, gives a trickle charge. It is permanently plugged into the electric light socket and connected to the accumulator. When using the Set you work from the accumulator. Afterwards you switch over and your

accumulator receives a gentle trickle charge from the mains to bring it up to concert pitch until the following evening. In this way your accumulator is always kept fully charged, no matter how many valves you are using. In two voltages 100/120 volts and 200/250 volts alternating current. Complete ready for use, nothing more to buy. **65/-**

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Special Rectalloy Transformer complete with case, mounting brackets, flex and plug, **37/-** etc. Two Rectalloy Units mounted complete, ready for immersion, the pair **17/-**

Optional Items. One lead Unit mounted complete **2/-** One celluloid case with taper collars **2/-** Switch Unit **2/-** Base-board **2/-**

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(Patent applied for)

SIMPLIFY SOLDERING. NO SOLDER REQUIRED. IT IS IN THE SOLDERCUP.



Screw the Soldercup firmly to the Terminal Base. Apply a little Flux to the wire, and hold in position with a little pressure on the solder.



Heat the wire by holding the side of Hot Soldering Iron against it.



With the slight pressure applied, the heated wire will melt its way into the solder, making a perfect soldered joint.

Soldercups to fit 2, 4, 5 & 6 E.A. Terminals 1/6 per doz. post free. Agents Wanted.

THE SOLDERCUP CO., 55, Hylton Road, SUNDERLAND.

Another tribute to the MARS Coils



Hale,
Cheshire,
18/11/25

Messrs. E. & W. Makinson Ltd.

Dear Sirs,

I have tried your MARS coils and find them superior to any I have yet used. Not only is there more volume, but the tone also is much improved. However loud the signals are the violin always sounds like a violin, the piano like a piano, the flute like a flute. In other words the reproduction is always true to type.

On my Four Valve set, on an aerial inside the room, I get on the Loud speaker all the B.B.C. stations and all the Continental stations at sufficient strength to hear outside the room in which the set is working. Are there coils to beat the MARS Coils? I doubt it.

Yours faithfully,
H.F.G.
Professor of Music,
Manchester School of Music.

We have published in our advertisements several glowing tributes to the merits of MARS Coils, written by technical editors of the wireless press. Reports from users are equally enthusiastic and the one we publish this week stresses a point of great importance to those who listen-in for the sake of the programmes rather than for experimental ends.

MARS Coils are not only more selective and provide more volume than most others they are infinitely MORE MUSICAL. The method of winding is based on the principles of harmonics, and MARS' theory in this connection is borne out in practice, as our correspondent emphasizes.

For Broadcast Wavelengths.

No.	Price	'0005 Condenser
35	4/9	280 to 440 metres
50	5/0	390 " 680 "
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For Davenport, Etc.

150	7/1	1,100 to 2,050 metres
200	8/0	1,450 " 2,300 "
250	8/9	1,800 " 2,700 "

Discard your 7/22's Aerial—Get the famous spirally wound 84-strand MARS

Changing aerials is not a job to be undertaken lightly in this weather but if you change to a MARS you will be abundantly repaid for your trouble. The MARS Aerial provides 80 per cent. greater surface area than 7/22's and gives at least 50 per cent. greater signal strength.

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No other aerial is easier to fix. Supplied on a

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Alluringly



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Feel its comforting warmth
Tingle through your veins
To fill you with a sense of
Well being



Drain it
To the last drop
Till its penetrating glow
Warms and cheers
The very cockles of
your heart!



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SIP IT—DRINK IT—DRAIN IT—THE THREE STEPS TO REAL GINGER WINE ENJOYMENT

Nature's Wireless



By LESLIE G. MAINLAND, the famous writer on Zoo Topics in the "Daily Mail."

NO, I don't mean atmospheric, though I suppose these may be called Nature's best-known and least-appreciated demonstrations of broadcasting.

Nature has endowed some of her creatures with very strange transmitting and receiving sets. No, I don't mean the audio-frequency vibrations which are broadcast from the Zoo lion-house at feeding-time, but some much stranger and less understood forms of "wireless."

Some Zoo animals, reptiles, fish, birds, and insects, have some strange ways of signalling to each other, many of which we do not even begin to understand.

Consider the mystery of the Emperor moth. When a female emerges fresh from her cocoon, she is never worried as to whether she will "get off this season." She instantly begins to Morse her "call," demanding a husband. How she does it is one of Nature's unguessed riddles, but the effect of her signals is amazing.

Mr. F. Martin Duncan, F.Z.S., told me that he once placed a newly-hatched female Emperor moth in a gauze box, hid her in a pocket, and went for a walk over heathland. Suitors for the lady appeared instantly from all parts of the compass! He had eight of the handsome-winged wooers crawling over his jacket at the same time, all trying to find her—fairy princes in search of the Sleeping Beauty; only she must have been very much awake.

When the lady makes her choice, the rejected lovers fly off without a grumble, hoping for better luck next time.

How is it done?

Natural "Aerials."

Some naturalists put it down to scent of an extraordinarily penetrating character, but it cannot be perceived by human senses. It may be that some form of wireless ether vibrations may be involved in this strange courtship. Anyone would be struck by the differences between the antennæ of the male and the female. The princess has a pair of plain, straight "wires" projecting from her head. She has no signals to receive, only orders to transmit.

The male is astonishingly different. In touch with his "brain" are two most complicated antennæ composed of a multitude of tiny bushes and brushes. A wireless enthusiast is irresistibly reminded of an efficient "cage" aerial. Do these play a part in picking up the mating call of she-who-must-be-obeyed?

The riddle is hard to solve, because the senses of a man and a moth are so widely different that it may be very, very long before we can determine if the result is due to unsmellable scent, inaudible sounds, or undetectable ether waves. Anyone who has bred Emperor moths, however, knows that when a female hatches, males hear the tidings somehow and flutter in

through your open window to find their lady-love.

"Inaudible sounds," which I mentioned just now, are really quite common in Nature. The ordinary song of a grasshopper (called "stridulating") is due to rubbing a leg against the toothed edges of the wing-cases, and so causing vibrations, just as a boy runs a hoop-stick along a row of railings. There are some Indian crickets who are so small that this note vanishes; it gets too high in pitch for the human ear to detect. Yet you can see the little beggar making his music with his legs and wing-cases.

Nearly three years ago I sent certain of these inaudible sounds through the microphone at 2 LO for the benefit of listeners' dogs and cats, with amusing results. Apart from the excitement and interest shown by the listening pets (which you may remember), a very interesting test was made behind the scenes at Marconi House, then the home of the B.B.C.

The Sound that "Vanished."

Captain Round wished to demonstrate whether these soundless notes were actually transmitted by the microphone and aerial. A dictaphone was placed at the mouth of a loud speaker. It was geared to run at about four times its usual revolutions. If I sent out a note of 20,000 vibrations a second, the dictaphone would reproduce it afterwards, when running at its normal speed, at 5,000 vibrations a second, and it would then become perfectly audible, if it had been transmitted and recorded: for the lowered vibrations would come within the range of "audio-frequency."

In the studio I made a noise like "Ow-ooo-oo-eee-i" (silence) "i-eee-oo-ooo-ow,"



"L. G. M." is very popular among the denizens of the London Zoological Gardens, as this characteristic photograph indicates.

This is exactly what happens when a heterodyne whistle produced by two neighbouring broadcast stations gets higher and disappears when they move their wave-length. The whistle is still there, but we cease to detect it, and so it vanishes.

Two Extremes.

If all listeners were elephants, or had elephants' ears, we could crowd many more stations into the broadcasting wave-band, for the elephantine hearing apparatus is too coarse to perceive certain heterodynes which cause us acute annoyance.

If we all had the ears of dogs or cats, it would be the other way round, for they continue to hear noises after the sound has grown too high (not too faint) for the human ear.

using a special ear-testing whistle I had borrowed from a hospital. The "silence" represented the moment when the sound rose above the limits of the human ear, though theoretically the noise was still going on. The vibrations, as recorded on the phonograph of the dictaphone, were then reproduced at the lowered speed, and the wax cylinder told the truth.

The sound never really vanished, and the dictaphone rendered it as an unceasing whistle which rose and fell without a break at its highest point.

This illustration of "soundless noises" is just to show you the possible explanations of some mysterious things in the animal world.

During the air raids of the Great War it was noticed that pheasants perceived

(Continued on page 882.)

BROADCAST NOTES.

By O. H. M.

The Radio Festival Week—Sir Harry Lauder to Broadcast—The Latest Wireless Scare—Extending Broadcasting Hours—The Revolt against S.B.

THIS promises to be a right royal wireless Christmas. With the prospect of severe weather, and with the promise of another festival week of British Broadcasting, the vast majority of those who are fortunate enough to have wireless receivers will be glad to spend Christmas at home.

Sir Harry Lauder will make his broadcasting debut during Christmas week, probably on December 23rd.

The Festival Week will begin on Sunday, December 20th. In the afternoon there will be a ballad concert of radio stars, including the Squire Octet, Miss Peggy Cochrane and Miss Edith Penville. Some of Crook's "Peter Pan" music will be played by the Octet. In the evening the band of the Grenadier Guards will play in the London studio. Mr. Harold Williams and Mr. Maurice Cole will also be heard.

In the early part of Monday's programme Sir Gerald du Maurier will broadcast a special talk. Corelli's Concerto for Christmas Night will be appropriately included in the pieces to be played by the London Chamber Orchestra, conducted by Mr. Anthony Bernard. Tailleferre, the eminent French poetess, will recite one of her own compositions. A novelty of Monday's programme will be the broadcasting of the End-of-Term Concert from Marlborough College.

On Tuesday, December 21st, the Christmas opera, "Hansel and Gretel," will be conducted by Mr. Percy Pitt.

On Christmas Eve, about 9.30, carols and waits will be relayed from Whitechapel. On Christmas morning the chimes of Bow Bells will be broadcast from all stations. Mr. A. J. Alan, the ever-popular raconteur, will tell a new story to listeners.

John Henry will be very much to the fore on Boxing Day, when the B.B.C. will make an effort to put on the lightest programme of its history.

The Latest Wireless Scare.

The latest wireless scare is related to cancer. Curiously enough, complaints have emerged simultaneously from different parts of the country, accusing wireless waves of communicating cancer germs. This is yet another serious charge to an already considerable accumulation. Wireless has been made responsible for bad weather and for the encouragement of thunderstorms. Wireless has been presumed in some quarters to be a disturbing influence on the movements of several planets whose habits have been sedulously regular for the past 20,000 years.

But this cancer charge is undoubtedly grave, and I trust that the B.B.C. will be able to issue a fully fortified official denial at an early date!

Extending Broadcasting Hours.

I understand that the suggestion I made in these columns some weeks ago about the necessity of extending the present

hours of broadcasting is to be acted upon early in the New Year, and the gaps will be filled in the programmes of 5 X X and the main stations. There will be nominally a broadcasting day of thirteen hours, starting at eleven in the morning. This will mean, of course, a considerable increase



Mr. Donald Calthrop, the well-known actor-manager, who recently joined the staff of the B.B.C.

NATURE'S WIRELESS.

(Continued from page 881.)

the approach of air-craft long before any of our listening devices gave notice. Disturbances in the coverts showed that something was worrying the birds, and then the raiders appeared to confirm their fears.

So well was this recognised that many anti-aircraft stations had a cageful of pheasants, "borne on the strength" with official rations, as part of their equipment. Hearing of a most exquisite acuteness seems to be the only explanation.

Another bird-riddle—how do vultures pass on the news of a find, and why does a flock invariably find its way to an animal's body a few minutes after life has left it?—is rather simpler. It is a matter of sight.

Through Ocean Depths.

A vulture, hovering on his mile-high beat in the heavens, sees a meal and sinks to the ground. A second hovering bird, miles away, notices the act and goes to investigate. The second bird's movements are spotted by a third and fourth from equally long distances, and the original discoverer soon finds himself surrounded with competitors.

A very fair sample of Nature's wireless.

in expenditure, and an added strain on staff, but it is certainly what the public wants.

Need for Better Land Lines.

Despite the improvements made by the new repeater stations on the land lines borrowed from the Post Office by the B.B.C., there is still a growing need for improvement in the land-line service in this country. In this respect we are a long way behind the United States, where land-line links have reached a high degree of perfection.

Unfortunately, the present broadcasting committee appears to be precluded from discussing technical subjects, but my impression is that not the least important of its recommendations will transgress its terms of reference and will bear upon the land lines available for British broadcasting.

In any reorganised system that will mark a definite step forward, British broadcasting must have its own land lines, quite apart from the trunk system of the Post Office.

The Revolt Against S.B.

The revolt against simultaneous broadcasting appears to grow in strength and in area. The development of this revolt is yet another chapter in the story of the swings of the pendulum of public opinion.

It is quite six months ago since I was recording an equally violent outburst against local programmes, and demands

(Continued on page 932).

Matters are not quite so simple when we look into the cases of sea-animals and fishes. Even out of the water, after capture, a conger-eel will bark. What use does he make of his voice under water?

Water is the finest medium for conducting vibrations and sounds. The death-flurry of a wounded whale is detected by other whales on the other side of the skyline. The shock of a single exploding anti-submarine depth-charge near the Tuskar Rock (S.E. Ireland) knocked a diver off his feet in Rosslare Harbour, eight miles away.

Do fish make any use of such natural opportunities for broadcasting their fears and wishes?

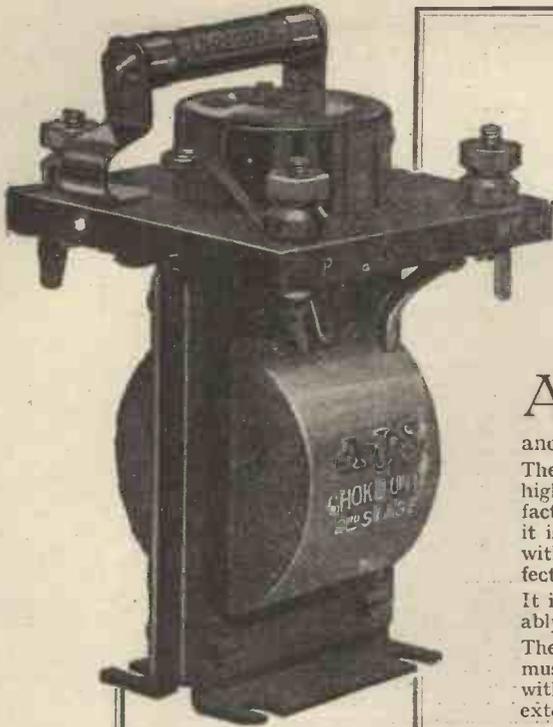
Maritime Mystery Noises.

Captain West, of the B.B.C., spent a strange hour with me at the aquarium of the London Zoo. Hydrophones were dropped into some of the tanks, and the sounds were amplified while we eaves-dropped on headphones.

This great secret was not one which Nature was disposed to give up in such a casual way. We heard the wrasse devouring crabs, but that gruesome crunching was the only sound we could understand.

There were plenty of other mystery noises, but their meaning and origin could not be guessed at with our improvised apparatus and limited time.

Still, the sounds were there.



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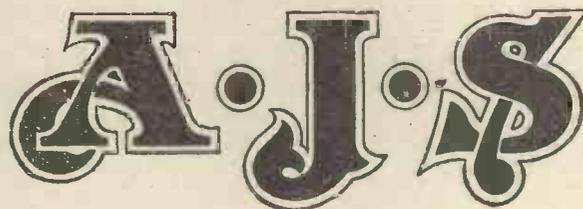
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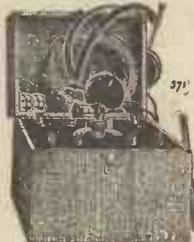
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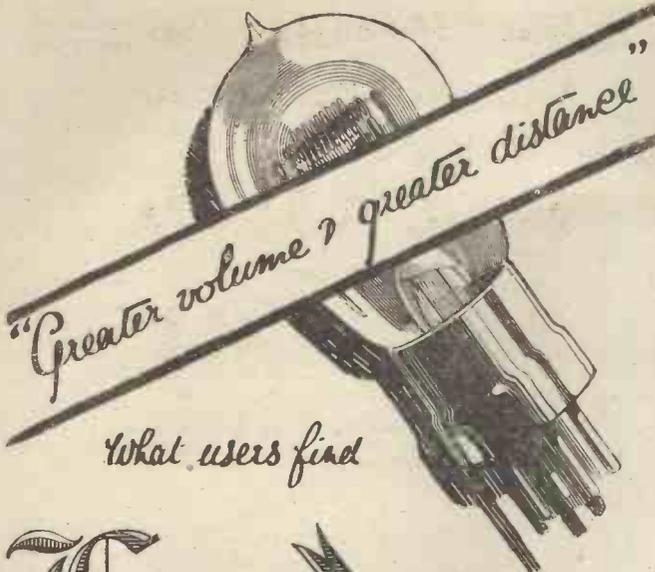
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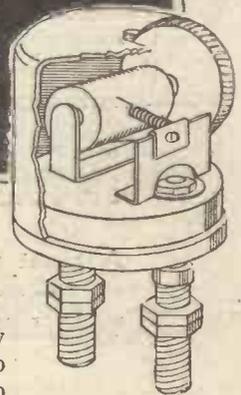
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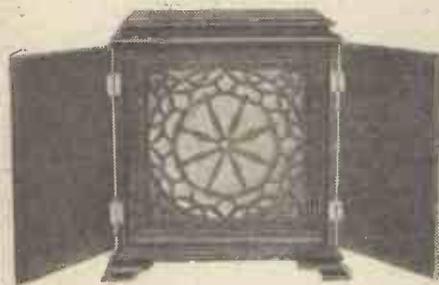


Choosing Your Radio Xmas Presents

By G. V. DOWDING, Grad.I.E.E.
(Technical Editor.)

WELL, the Christmas season is once again upon us. "Carolling" has commenced, the quarterly bills have started to stream in, and that present problem has loomed up again demanding a complete new set of solutions. These latter must be provided very quickly now; "shop early" is the slogan, and quick decisions will be necessary if it is to be observed. No doubt quite a number of people have already prepared tentative "lists"; if they have it is to be hoped that they haven't forgotten the claims of radio.

The primary object of this article is to show how broadcasting has opened up an entirely new field in which present seekers can wander and search in order to fill some of those perplexing gaps. Its further purpose



This Be-Co loud speaker makes a very attractive Radio present.

is to indicate how they can, at the same time, purchase really worth-while wireless gifts for their relatives and friends.

An excellent idea of what radio has to offer in this direction is given in the "Suitable Radio Gifts" supplement, which appears in this issue and also in the advertising columns, and it is hoped that the following few general remarks will help readers to make their choice.

A Happy Gift.

First of all, it must be pointed out that radio presents are not necessarily expensive presents. Certainly, beautiful radio gifts costing many guineas each are available, but at the same time, there are as many more again which, costing but a few shillings each, can prove extremely acceptable to anybody with a wireless set. And this brings forward another important point. Practically every house in the country boasts of a wireless installation these broadcast days, and radio presents need not be confined to components and other bits of "innards" that appeal only to constructors and amateurs. To choose a radio gift for anybody who hasn't got a wireless set is a simple matter; give him or her a set! No gift is capable of giving such pleasure; pleasure? It is possible that happiness is the right word to use. Even the little crystal receiver, costing but a pound or two complete, is an "open sesame" to endless hours of song and music, and everything

else that is pleasing to the human ear. And there are some excellent crystal sets obtainable these days; excellent in both appearance and in operation.

Presents must always be chosen carefully, especially radio presents. "So-and-so" may have a crystal set, and it might appear on first thoughts that nothing could be more kindly and thoughtful and nothing more likely to give him delight than to buy him a loud speaker. But it is probable that "So-and-so" would receive such an offering with decidedly mixed feelings. In the first place, to give him a loud speaker only would mean, failing the arrival of other appropriate gifts, that he would have to buy an amplifier and all its necessary batteries, etc., before he could use it. It is on the cards that he would not be able to indulge himself to that extent. Then again, it is quite probable that he hates the very sight of loud speakers and would not use one in preference to 'phones even if he were supplied with a complete loud-speaker outfit. Tact is certainly a factor that is necessary to the successful bestower of Christmas radio gifts!

Buy Reputable Goods.

Discreet inquiries *should*, of course, be made, but that is often quite impossible, more especially if it is desired that one's presents should form surprises—delightful surprises.

Youngsters are not generally difficult to deal with—it is seldom that they trouble to conceal the nature of *their* outstanding requirements! A splendid present for a boy who is interested in wireless is a complete set of parts for a receiver and instructions for assembling it. But here, again, it should be remembered that it would be sheer cruelty to give him a complete kit for a valve set without supplying him with the necessary accessories to place it into commission when built, or, at least, without finding out whether some other kindly person will come along with the necessary missing links in due course.

No trouble will be experienced in the case of the enthusiastic wireless amateur. Anything of a wireless nature will please him. He cannot have too many valves, transformers, and the like. Don't make the mistake of giving him cheap stuff, however, for your enthusiastic amateur is terribly discriminating. It would be far better to give him a really first-class crystal detector than a second-class rather shaky variable condenser. Yes, discrimination is most emphatically necessary in quality with your keen radio "fan," relative or friend.

And tread carefully all you who have never been into a wireless store before. It is the business of salesmen to sell, and unfortunately there are salesmen who have no consciences. Radio salesmen are not excepted, and wireless gear is tricky stuff to buy at the best of times. Here, of course,

our supplement comes in. Nothing is included in *that* which we wouldn't mind buying ourselves, and that is saying something! Let those whose wireless knowledge is limited remember that there are, for instance, loud speakers and "loud screechers." The advice of a friend who knows something about matters radio—not one who thinks he does!—should be followed if it can be obtained. If it cannot, a real safeguard is to limit purchases to branded goods; branded, that is, with the names of reputable firms. "P.W." advertisers can be trusted.

Useful Components.

"Made in England" makes a patriotic appeal, and it can be honestly stated that it is also something of a hallmark. In any case, should the receiver of a present discover at some future date a tiny little inscription indicative of "NOT made in England" on his present, even should it be passably good in operation, it is possible that he will tend to think less of it subsequent to the discovery if he doesn't think less of the donor.

There are many things radio that can prove acceptable to people who already possess complete wireless outfits. These will suggest themselves; for instance, it is obvious that telephone receivers would be received with sincere gratitude by anyone who has hitherto been limited to but one pair. A cheaper present, but one that might please a crystal set owner, is a new piece of really good crystal, anyway it would be a change from that ubiquitous almanac!

(Continued on page 888.)



The new B.T.-H. loud speaker is sure to be found in many homes this Xmas.

PROLONGING THE LIFE OF YOUR TELEPHONES.

FROM A CORRESPONDENT.

THERE are many ways in which telephones can be badly treated by a careless owner, but nearly all telephone troubles could be avoided quite easily by attention to the following points.

If the telephones are not left permanently connected to the set but are stowed away after use, make sure that they are kept in a dry airy place, as dampness will in time adversely affect them.

If you are using a valve set, be careful that the 'phones are connected in circuit the right way round. Most 'phones are marked with red cord or a plus sign to denote which side of the 'phones should be connected nearest to H.T. plus. Should they be connected to the set so that current flows in the reverse direction, it is only a question of time before the telephones become de-magnetised.

Determining Polarity.!

When telephones have no indication which is the plus lead, the polarity can be determined as follows:

Carefully unscrew one of the earcaps, and remove the diaphragm, leaving the magnets exposed. Hang the 'phones up rigidly, and then "load" one of the magnets with small pins, gramophone needles, or similar objects, until its magnetism is supporting all the load it will hold. Then send a small current from a dry-cell through the 'phone-cords, first in one

direction and then in the other. If the loading of the magnet has been very



A handsome American receiver—the Ultradyne, a product of the Phoenix Radio Corporation.

carefully done, it is possible to tell when the current from the cell is flowing through the 'phones in the right direction, because it then assists to hold the load of pins. When the cell is reversed, however, and the current opposes the magnetism of the 'phones, the load will fall off as soon as the current starts to flow. The leads can then be marked plus and minus to correspond with the cell connections.

When telephones get burnt out or become de-magnetised there is no need to scrap them, as they can be reconditioned quite successfully. (See advertisements in "P.W.")

Never drop your 'phones, but treat them as carefully as you would any other sensitive instrument. Generally speaking, the

diaphragms should not be removed, as this is a tricky operation, especially with 'phones of the Brown reed-type. Should an ordinary flat diaphragm become rusty through long use, it can be carefully cleaned and lightly smeared with vaseline, but great care must be taken not to bend or dent the diaphragm in any way.

It is perhaps as well to say that there is no right-way-round or wrong-way-round to connect 'phones in a crystal set, as in this instance the currents flowing are not strong enough to adversely affect the permanent magnets of the telephones.

Whilst on the subject of 'phones for crystal sets, one other little point is worthy of mention. If your 'phones are not the ordinary 2,000 or 4,000 ohms kind, but are wound to a higher or lower resistance (say, 120 or 6,000 ohms), it is generally well worth while trying as many kinds of crystal in the detector as possible. The resistance of the various types of crystal used for detectors varies enormously, and if you can get a piece exactly suitable for the telephones in use, the result is an appreciable increase in volume or sensitivity.

RADIO CHRISTMAS PRESENTS

(Continued from page 887.)

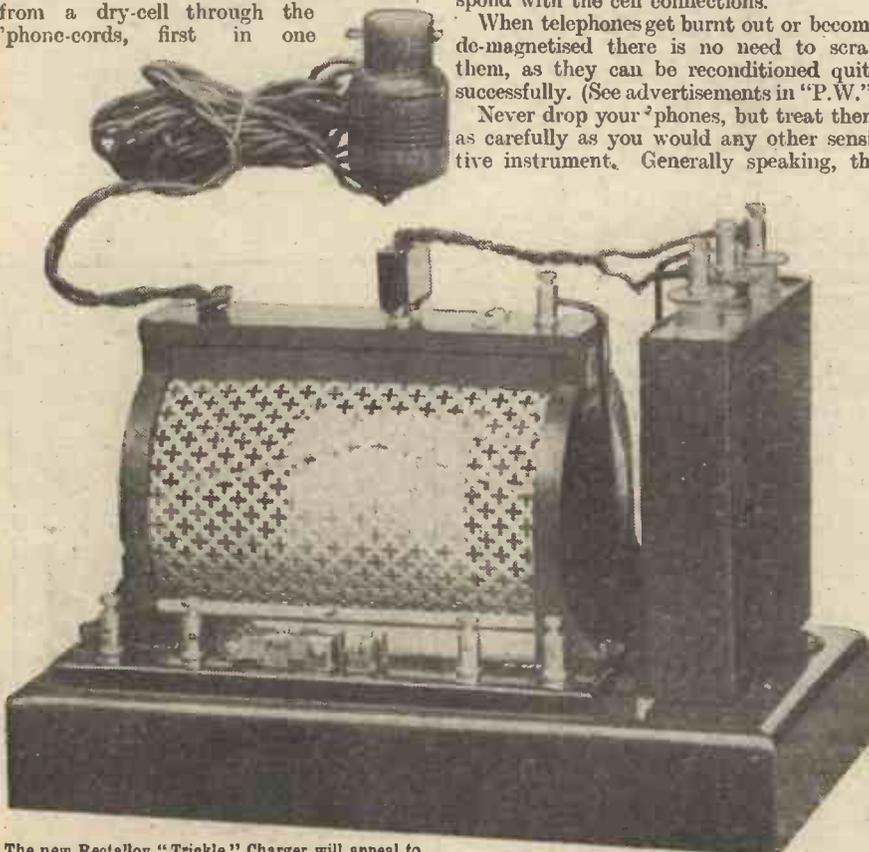
Valve set people would not be very pleased with 6-volt valves if they were in the habit of using 2-volters; suitable valves are difficult to choose unless a hint is forthcoming from the intended recipient as to what sort he likes and what he wants—if any.

Speaks for Itself

Loud-speaker set owners can always do with two loud speakers, more especially if the additional one provided in the way of a Christmas present is a really modern, up-to-date instrument. It is well worth mentioning in passing, that a radio gift is not a silent menace, as is a pair of red slippers, an art ornament, or a tie or pair of socks of vivid hue; it is liable to lift up its voice whenever its donor is present and speak for itself in no uncertain tone! Opportunities for taking such a terrible revenge must not be allowed to occur! One more argument in favour of quality.

This must not lead would-be radio present seekers to believe that purchasing wireless apparatus is a hazardous business fraught with danger; once again, if branded goods, strongly for preference "Made in England," are chosen, the strong chances are that all will be well.

Novel permanent and automatic crystal detectors; crystal sets; valve sets; telephone receivers and loud speakers; accumulators, valves and component parts; patent aerial insulators and earth pins; gadgets—there is limitless choice. Turn to the "Radio Gifts Supplement" to commence with; you may find something there that will solve at least one or two of those present problems right away.



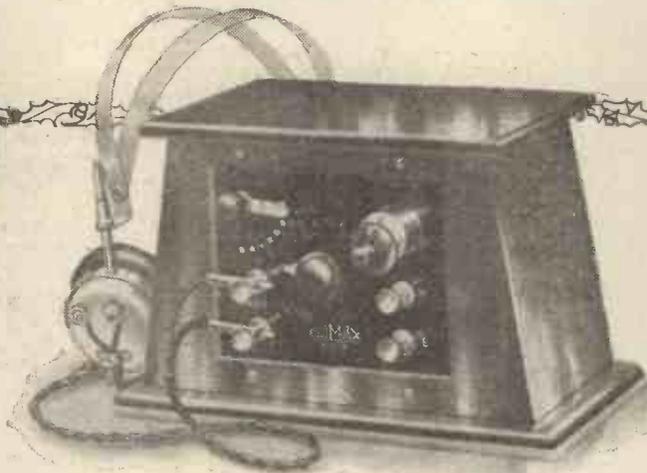
The new Rectalloy "Trickle" Charger will appeal to all valve-set owners who have A.C. lighting mains available. (Rectalloy, Ltd.)

Suitable Radio Gifts

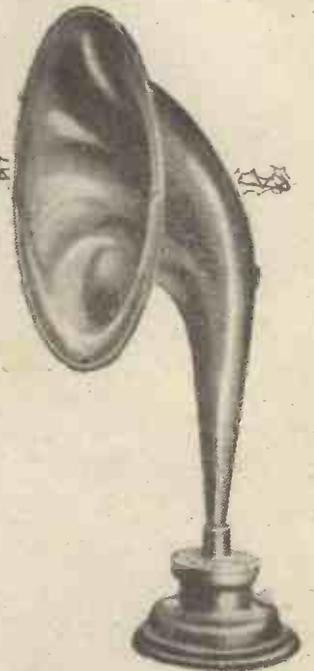
What some of our Advertisers are offering in the way of Christmas Wireless Presents.



A popular "Brande," Loud-speaker model



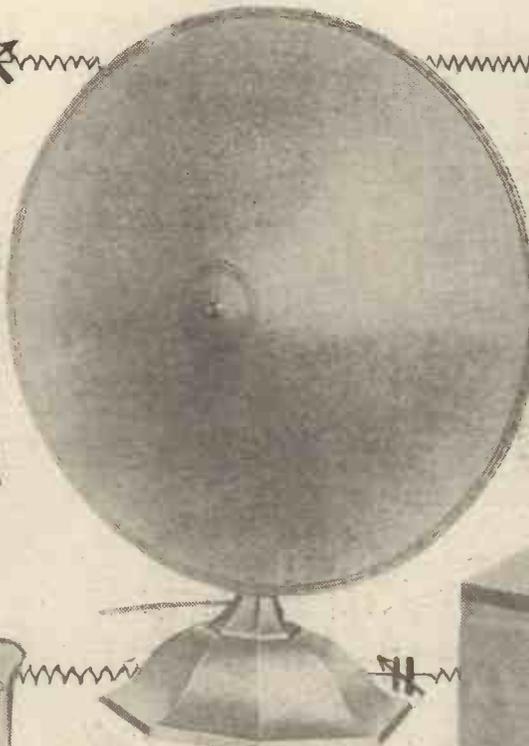
The Climax Junior De Luxe Crystal Set Price £1:1:0



The T.M.C. Concert Grand. Price £6:10:0



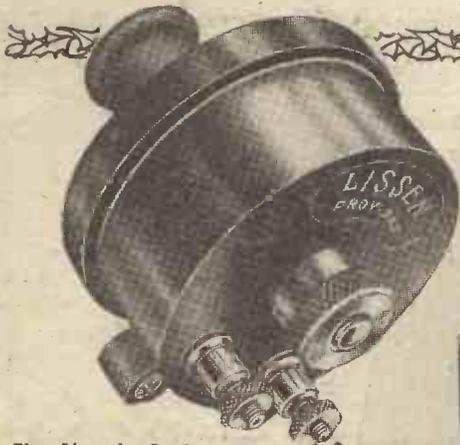
4-Valve Set (Type B). (Messrs. Ward & Goldstone.) Price £18:18:0



The Kone Loud Speaker (Standard Telephones & Cables, Ltd.) Price £6:6:0



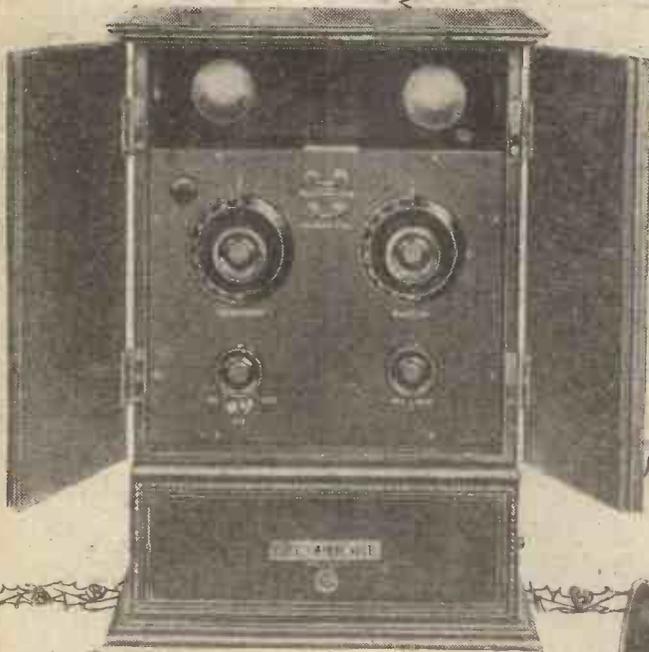
The Dubilier Buzzer Wave-meter. Price £5:5:0 } For wave-lengths from 100 to 3,000 metres.



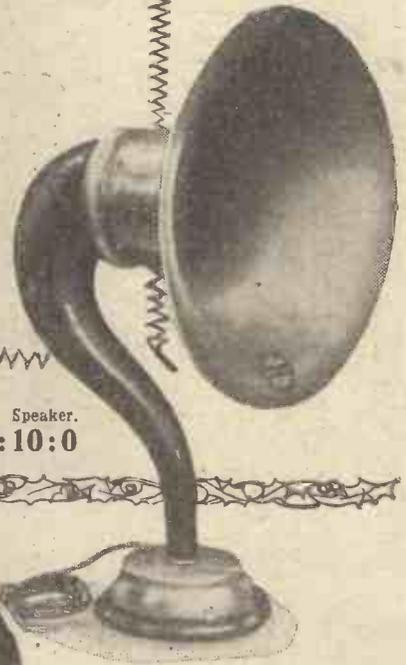
The Lissenola Loud-speaker
Unit. (Messrs. Lissen,
Ltd.) Price 13/6



The
Revophone Crystal
Set.
Price £2:10:0



The General Electric Co.'s
"Gecophone" Receiver.
Price £10:10:0



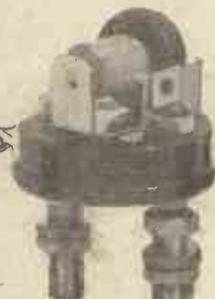
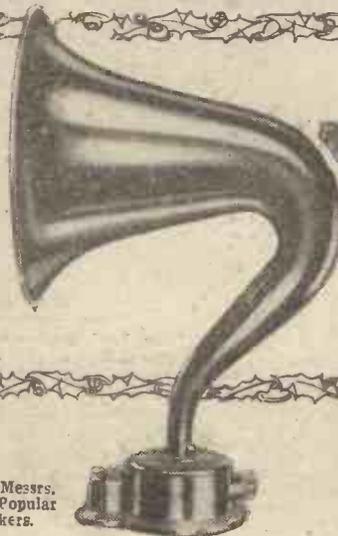
The Silvervox Loud Speaker.
(The Silvertown
Co.) Price £3:10:0

Price
35/-

Exide Battery, Type W.H.
(24 volts).



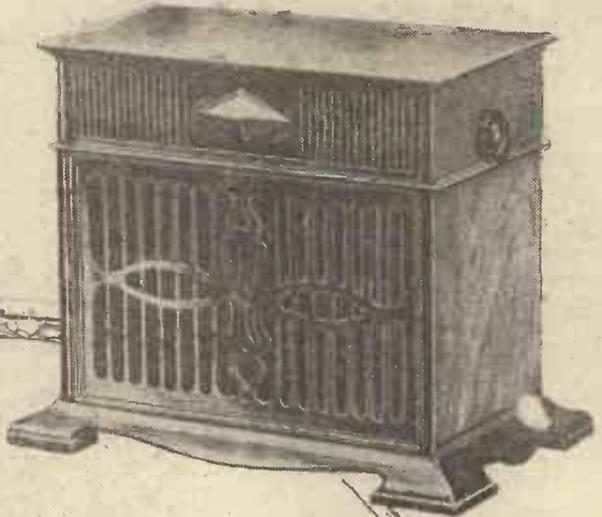
One of Messrs.
Brown's Popular
Loud Speakers.



The Harlie Crystal
Detector.

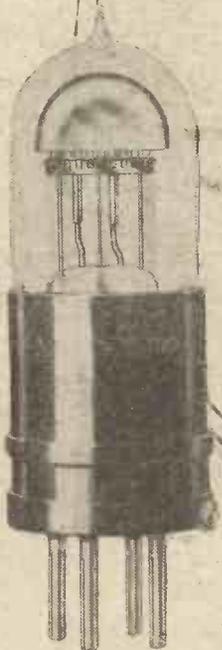


The Burndent Ethophone III. Receiver.



The A. J. Stevens Cabinet Loud Speaker
Price £4:15:0

The Two-Valve "Seymour" Efescaphone Set (Falk, Stadelmann & Co.)



The Cossor "Wuncell" Dull Emitter Valve. Price 14/-



The Ediswan ARDE (Dull Emitter Valve). Price 14/-



The Metropolitan Vickers "Cosmos" Crystal Set. Price £1:5:0

The Vanicon Double Condenser.



'Radio Lux.'
One of the latest Amplion Loud Speakers (in lacquer). (Messrs. Alfred Graham & Co., Ltd.)
Price £13:13:0



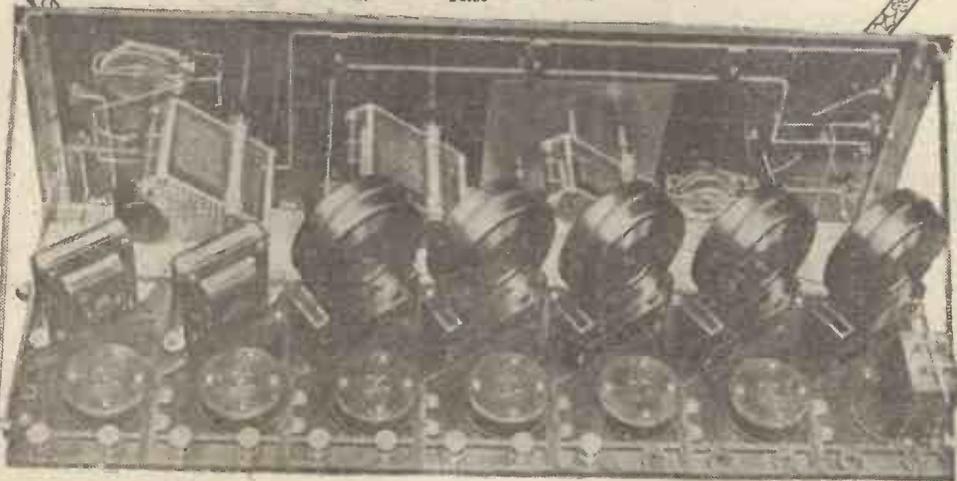
The Ormond Engineering Co's L.F. Transformer.



The P.M. 4 Dull Emitter for L.F. Amplification. (Messrs. Mullard.)
Price 22s. 6d.



One of Messrs. Oldham's 2-volt Accumulators for Dull-Emitter Valves.



The Iranian Supersonic Heterodyne Receiver Unit. Price £15:15:0

MAN is ever finding new uses for wireless, and his latest idea is to use wireless as a substitute for himself.

It so happens that a gigantic man-carrying rocket has been designed which the inventor claims will easily reach the moon, but, quite naturally, no human being is anxious to make the journey (although at least one scientist has offered to go—under certain conditions). So it has been decided that a special wireless transmitting set will go instead.

It is hoped that by means of this set we shall be able to follow the journey of the rocket through space, for, if everything goes well, the set will automatically send out wireless messages at certain intervals on the way.

In addition to this, the very idea of sending a wireless rocket to the moon is likely

A RADIO ROCKET TO THE MOON.

Wireless Photographs of Other Worlds.

By G. H. DALY.

is approximately 300 miles deep, so that once the rocket has passed out of the earth's atmosphere there will be no matter to hinder the wireless waves until they reach the edge of the earth's atmosphere, and so the distance which a comparatively small set in the rocket can transmit is greatly in excess of that which the same transmitter could send on earth—how great we cannot as yet tell.

Some there are, of course, who will say that the Heaviside layer will prevent wireless waves from the rocket reaching the earth, but this is hardly likely, for we have now every reason to suppose that the only waves which will be stopped by the Heaviside layer are those which strike the latter at a reflecting angle, which is for electromagnetic waves generally about 45 degrees.

But how is the rocket to be fitted with wireless and how is the set to be made to radiate automatic wireless messages?

In the first place a special chamber is to be constructed in the rocket—a padded cell, as it were. The wireless set itself will consist of a standard continuous wave wireless set. The filament of the valves are to be lit by non-spillable accumulators, and the high tension current is being supplied from a large number of dry cells.

Amazing Possibilities.

The rocket will be equipped with a strong trailing aerial wire which will be released automatically as the rocket is shot off from the earth.

The transmitter will be operated by a special clock which will be set going shortly before the rocket leaves the ground.

The natural sequence of shooting a rocket to the moon is shooting one to Venus or Mars—the planets in the solar system which are nearest the earth and which are possibly capable of supporting life.

If certain germs were stored in the rocket we might even populate these planets in this way, but this is beyond the scope of wireless.

Some day, however, when wireless photo-

transmit. Take for instance the tiny amateur sets which get over to New Zealand on about the same horse power as is required to run a sewing-machine.

A 500-watt continuous wave set in the rocket with its very limited aerial system may be heard by us on earth long after it has covered a considerable portion of its 300,000 mile journey to the moon.

A fact also to be considered is that wireless waves radiated from the rocket will not be exactly the same kind of waves as those radiated from an earthed transmitter such as we generally use.

To put it briefly, in the case of an earthed transmitter, it is said that only half the waves are radiated through the air, the other half of the waves being propagated underneath the surface of the earth, and this latter half tending to drag back the other half which is passing

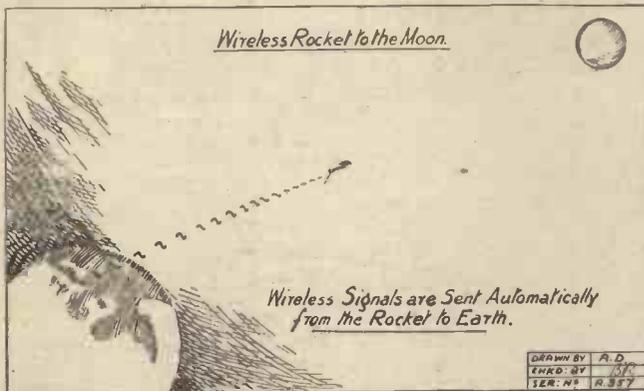
through the air; thus to a certain extent the earth hinders the wave by damping it out.

In the case of the rocket wireless set the waves radiated will be pure space waves or complete loops instead of half loops as radiated by the earth transmitter. It is therefore reasonable to suppose that the complete waves from the rocket will be propagated for a much greater distance than the half waves used by us with earthed transmitters. It should be added that it is practically impossible to radiate complete waves from earthed transmitters even if they have a balance capacity instead of earth, and indeed it is necessary for any aircraft to be at least 10,000 feet high before anything resembling a pure space wave can be radiated. The rocket, of course, will radiate complete space waves almost instantly on leaving the earth owing to its great velocity.

Through the Heaviside Layer.

Scientists have recently shown that the presence of matter even in the form of a very thin gas tends to hinder or damp out wireless waves.

Now the air or gas surrounding the earth



to open up other possibilities, hitherto unimagined even in the minds of H. G. Wells or Jules Verne. These possibilities will be outlined later. In the meantime we will dwell upon the manner in which it is proposed to equip the rocket with wireless, and the way in which the set will send these automatic messages from space.

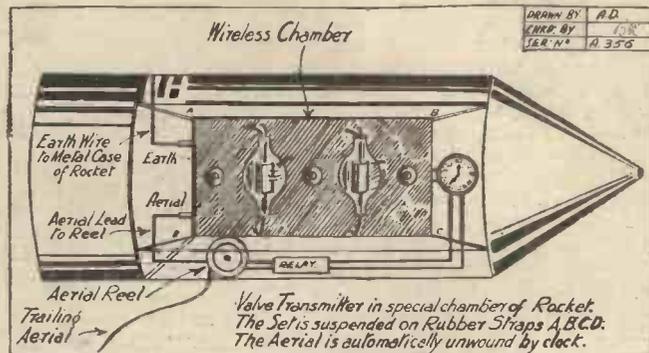
The moon is roughly about 300,000 miles from the earth, yet the farthest distance which we have been able to send wireless messages is 24,000 miles—i.e. the circumference of the earth. This transmission was carried out by one of America's most powerful transmitters, and if the reader will pause a moment he will see that the only place on earth which could be 24,000 miles away from that particular transmitting station, is the station itself.

Radiating Space Waves.

In fact what happened was that a certain wireless signal was radiated from this station and picked up at the same station after it had travelled right round the earth—i.e. 24,000 miles.

This experiment, as mentioned before, was carried out from one of the largest wireless stations in America with its attendant huge aerial system, and obviously to fit a rocket with apparatus of a hundredth of the power is out of the question. As a matter of fact, the rocket set will be in the vicinity of 500 watts, which on earth has a normal range of about 500 miles for continuous wave telegraphy.

However, the power of a wireless transmitter is no criterion for the distance it will



graphy and television are perfected, it may be possible to equip a wireless controlled rocket with automatic wireless photographic or televista mechanism which will send or bring back to us earth photographs and pictures of these other worlds. This is undoubtedly quite within the bounds of possibility.

Meanwhile we can listen in for the moon rocket and endeavour to pick up the messages as it travels on its lonely way through the darkness of space.

GEARY'S AMAZING XMAS NIGHT.

By HIGHAM BURLAC.

How an old friend established Two-Way communication with the Shining Lights of History.

"NO, Aloysius," I said, "I don't want you to talk about Christmas. Christmas is the season of goodwill, but if there were many more like you it would develop into a pogrom. Take your hand off that chunk of galena, and hand back that little condenser you've just slipped into your vest pocket. Thanks! You cheap Raffles, you're a human tax-collector—always robbing poor citizens, friend and foe alike."

"You Really Must Listen—"

This monologue occurred in my laboratory, where Geary had strayed, evidently to see, as usual, what he could attract in the way of small parts. His aim in life seems to be to construct an eight-valve set out of parts collected from other men, wood stolen from a baby's toy, and ebonite wrenched from a blind woman's piano.

"But, Higham," protested Geary, "you really must listen to this one—there's your crystal; I was only looking at it—this is absolutely a winner. It's unique in the annals of indigestion. It's got all the ghost yarns and nightmares knocked base over apex, and only fit for the Children's Hour. B-r-r! It makes me shiver to think of it—'In Two-way Communication with the Tomb.'"

"Well, I suppose you have been reading some of Dr. Cohn Andoil's yarns," I said. "Fire away—and then go away!"

Johan of Spitzbergen.

This is what Geary told me.

"Being Christmas, we had a bit of a party last night. Boys and girls and engaged couples, just to keep the kissing games lively, and save the gas in the back parlour. Both the grannies, with their dear old caps and their well-known stories of birth, marriage, illness, and death in the days of dear Prince Albert. Also several of those unmarried ladies of unwhispered age, who get so frightfully bucked over half a glass of cheap port. It was all quite good fun, but I was somewhat preoccupied and impatient because I had an appointment at ten-thirty with Johan Oliessen, 3 PZ, of Spitzbergen. I always have half an hour with Johan at Christmas. He's the son of Johan Oliessen, a blubber-boiler in a large way of business. He once chipped in and saved me from bumping off my transmitting valves in an attempt to log the Brownsonian Expedition at the North Magnetic Pole. He relayed my messages in Morse *au Esquimaux*, and sent me a baby seal as a memento. We called it Johan. Johan is now dead, and his overcoat is used as a radiator muff for my Ford.

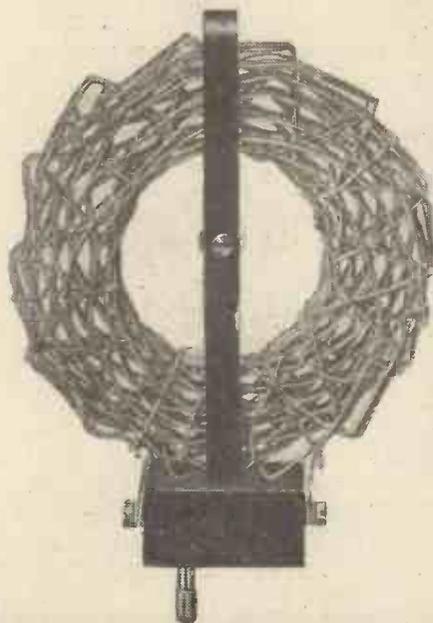
"But, as I was saying, I had my mind occupied with Johan and the clock and a new microphone, and did not notice particularly what I ate and drank. Usually my Christmas fare is dry toast and cocoa,

but I must have eaten a number of amateur mincepies of my daughter's manufacture, and some cold Christmas pudding, besides drinking whisky, port, sherry, ginger wine, raspberry cordial, olive oil, vinegar and coffee.

"I am Socrates."

"With that cargo stowed below, I stole out of the room during Granny Geary's famous story of the parson's ulcerated leg, and sneaked up to the wireless room. I fixed things all ready, though I must say that the plugs and sockets seemed uncommonly awkward, and it took me seven minutes to find H.T. + However, I got the juice into the aerial, and howled for Johan good and loud, thinking how lucky I was to feel so snug while he, poor chap, was kicking Polar bears off with one foot, and knocking the icicles off the generator with the other.

"No, that's all wrong," I said. "Johan's only got one foot. 'Tother he lost to a shark. Told me so. Over th' wireless." I must have been half-asleep, but I jolly soon came to the alert when I heard a voice, clear and strong, calling. *'γεαρ.'*



Coils make acceptable Xmas gifts for wireless amateurs. Here is the "Mars," unorthodox in appearance but efficient in operation.

"That made me sit up, I can tell you. Nothing greasy or Polar or Esquimaux about that. The voice made me feel like I did when I visited the giant refrigerator at Smithfield. Thinking to infuse a little warmth into the proceedings, it being Christmas and what-not, I tapped the mike and said:

"Hello, me jolly old top! How is my mod? Six FH over!"

"The voice—by Jove, that fellow could modulate!—came as clear as a Klaxon.

"*'γεαρ'*, I am Socrates!"

"What of it," I replied, thinking, "Anyway, this bloke died long before Queen Anne, if I know anything about history—which I don't."

"We Are Cæsar."

"*'γεαρ'*, we are both liars," came the reply, but before I could switch over to tell him what he was, another voice broke in and said:

"*'Geario, quo vadis?'*"

"This is awful," I thought. "I've struck some blooming school of Esperanto or else the Tower of Babel."

"Six FH calling," I replied. "Geary owner, and who the deuce are you? Berlitz or Hugo or what?"

"The reply was:

"We are Cæsar! Julius calling!"

"B'gosh, are you!" I called back. "I've read all about you in Shakespeare. How's Brutus and the gang?"

"When I sloshed the Belgæ at—I forget where—this wireless would have enabled me to do it in half the time and without the loss of that Fourth Legion. I've Napoleon here. Would you like a word with him?"

"Sure!" I replied. "Shove on the First Consul."

Real DX.

"Attend!" The voice had a sergeant-major's flavour about it that I didn't like. *Attendez!* You are ordered to take note that had my admiral possessed the instrument *sans fil* in 1805, your Nelson would have saved his *sopig* life and my *bateaux* their hulls. Marconi was born too late to alter my destiny!

"Bee-enn," I said, in fluent French, "but it's no good your trying to dicker with the history books. How's my modulation?"

"Another voice butted in:

"Baron Munchausen *hick*. Keary, who der vireless invented?"

"I did!" I yelled.

"Take my diploma," said the baron. "I thought I *meinselluf* der cratest inventor vos. But I vos wrong. Take also mein medals and reputation. Dot Socrates vos right. Ve all liars are."

"Just as I was about to reply fittingly—for I had got my goat out properly—a gentle voice broke in:

"Say, Geary, what about this child?"

"Oh, let 'em all come!" I growled. "I suppose you are either King Tut or the Missing Link. I don't know what DX is coming to."

"Nay, friend, I am Benjamin Franklin."

"Good!" I answered. "Did you invent wireless, or do you want to excuse yourself something because you had no wireless, or do you want to call me a liar? This is getting monotonous."

Back to Earth.

"Nay, friend, came the voice, a nasal voice, 'I am a one hundred per cent American. We do not invent. Except stories. But say, stranger, didst ever hear the story of how I held a conversation with Jupiter. Now, mark you, I had nothing but the electric fluid and a jack-knife. Cost me two dollars, less two and a-quarter for cash. Well, I ups and I—'

"Bang!"

"Well, Higham, I must have gone to sleep, for I found myself on the floor, still holding the plug with which I had been hunting H.T. plus. And the amateur pies must have done the rest."

"Geary," I said, "my vote goes to old Socrates. And if you will replace the ammeter you have just hidden in your muffler, you may go in peace. It being Christmas and what-not, as you would say."



What we think about them

Members of the N. Thusiast family give their views concerning "Britain's Most Dependable Valves."



Old Mr. N. Thusiast passes an opinion

"—of course, a grand-dad can hardly be expected to hear as well as youngsters. But when he *does* hear, he's a jolly sight more critical, eh? At one time I didn't at all fancy music being served up with buzzing and booming and crackling. But, bless your hearts, since Tom fitted those Ediswan Valves . . . such music. Those dance bands might be in the room—not a note's spoiled. Talk about rejuvenation treatments. You should see me dancing round with Elsie!

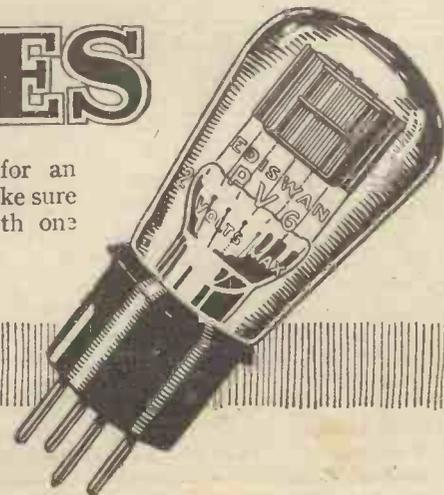
Every member of the family appreciates the fact that

EDISWAN VALVES

WILL IMPROVE ANY SET

THE VALVES TO USE		
Rec.	Acc. or Batt Volts	Power
A.R.	4	P.V. 5
A.R.D.E.	2	P.V. 6
A.R. '06	3	P.V. 8

will secure faithful reproduction for an unusually lengthy period. Only, make sure of using them in conjunction with one another—as shown here.



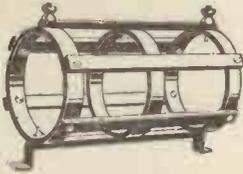


ANTIPONG VALVE HOLDERS

Low Loss, Shock Absorbing, non-microphonic, universal fitting. They protect your valves and improve the quality of reception. Use them for Dull and Bright Emitters. Price Each **3/-**

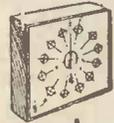
LOW LOSS COIL FORMERS

Skeleton Formers should always be used to ensure efficiency, especially on short wave-lengths. The Bowyer-Lowe series covers most amateur needs. Prices from **5/-**



STUD AND SERIES PARALLEL SWITCH PARTS

Complete sets of parts to construct Stud Switches with 1 in. radius arms. Boxes containing complete Switch Arm with real Ebonite Knob, Bush, Contact Plate, 10 Studs with 2 Nuts to each and 2 Stops, lacquered finish; Drilling Template, enabling purchaser to construct any size switch from 2 to 10 way. **2/3**



Series Parallel Switch Parts Complete **4/-**

EVERY ONE GUARANTEED FOR A YEAR

Buy Bowyer-Lowe Components because they never let you down. Every one is guaranteed for a year. If within that time it shows any defect in construction or performance it will be exchanged free. Bowyer-Lowe Low Loss Parts are built by expert radio engineers to give results of the highest efficiency. Use them in all your sets.

Complete Catalogue free on application to—
The Bowyer-Lowe Co. Ltd.
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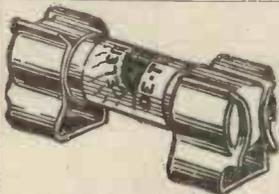
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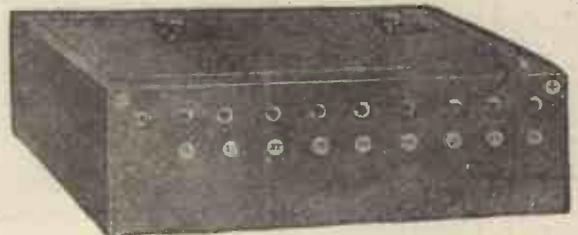
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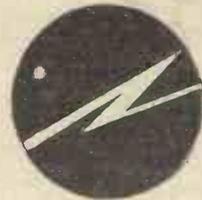
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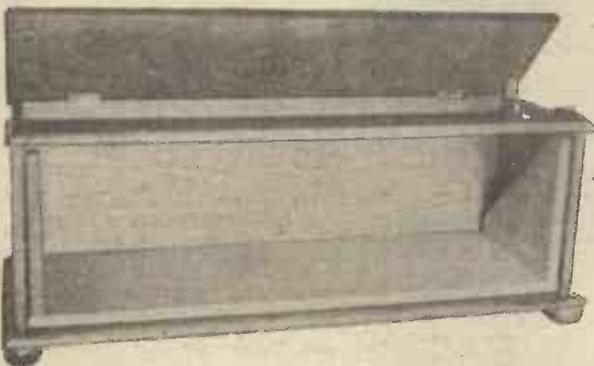
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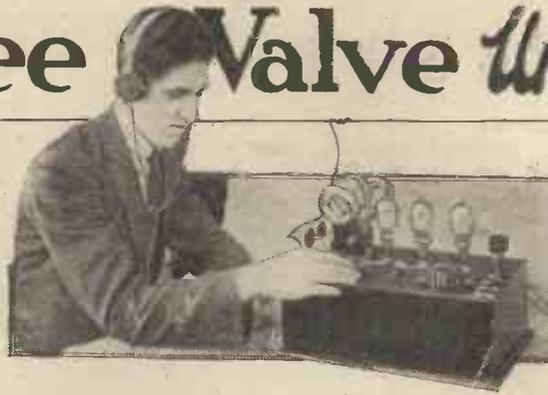
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A Three Valve Unidyne Set

MOST of the readers of "P.W." will need no introduction to the Unidyne circuit, which was first introduced to readers of "Popular Wireless" in the summer of 1924 through the columns of that journal.

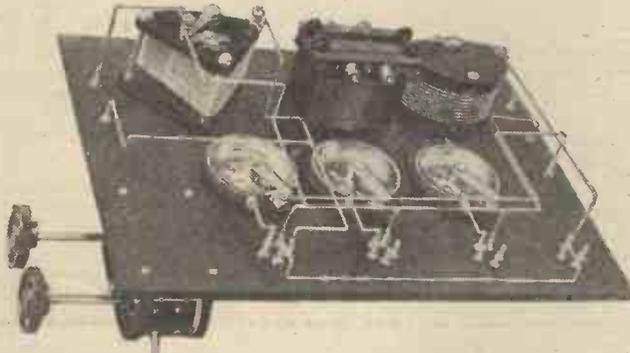
For the benefit of new readers the principle of the receiver can be stated in a few words by remarking that whilst the circuit design conforms more or less to standard arrangements, the Unidyne circuits work efficiently and reliably *without any H.T. battery*. This result is obtained using ordinary apparatus such as can be



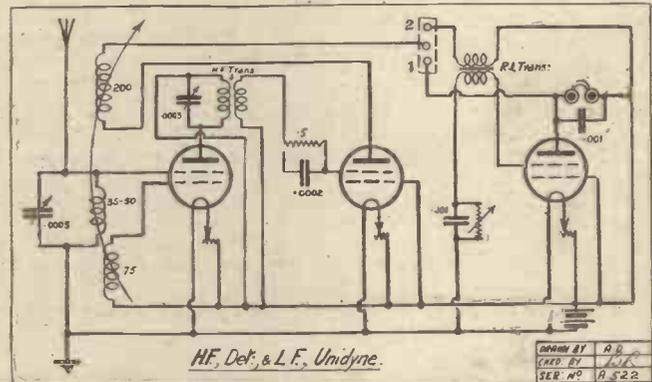
The Set Invented and Described by **G. V. DOWDING** and **K. D. ROGERS**. (Technical and Assistant Technical Editors "Popular Wireless.")

The success of the one-valve and two-valve Unidyne circuits has been so great that there has been an insistent demand for a three-valve set on similar lines. To meet this demand the receiver now to be described was constructed.
A glance at the

circuit which is coupled to the aerial coil. The third valve is a Unidyne L.F. amplifier which can be switched in or out of circuit at will, making the set an H.F. and Detector, or an H.F., Detector and L.F. circuit. The method of attaining reaction in the first valve's circuit will be seen to consist



A photograph of the 3-valve Unidyne taken after the filament and aerial and earth connections had been completed.



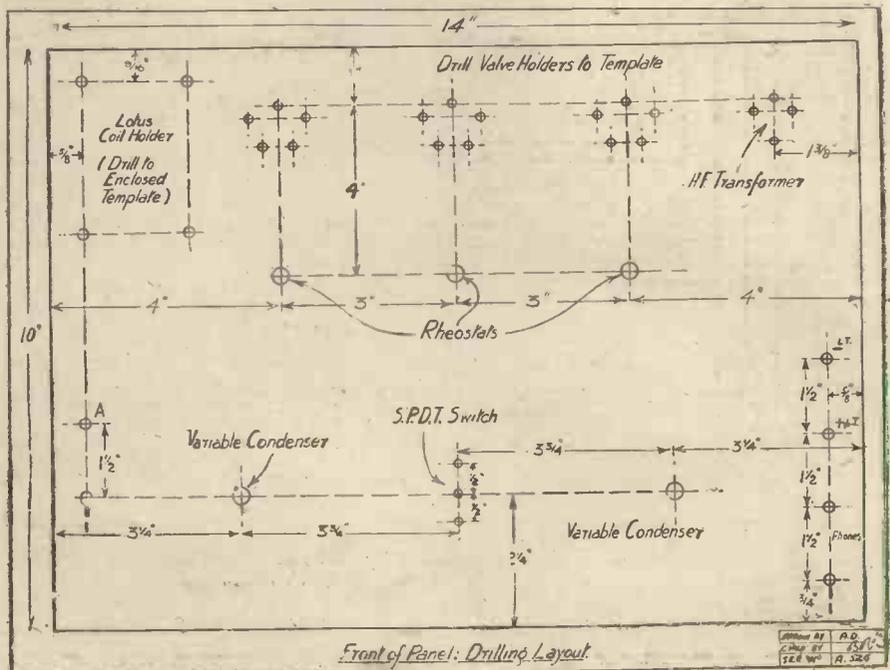
found on any H.T. set, the sole exception being the type of valve employed. All the Unidyne circuits employ a valve having two grids. The outer or main grid corresponds more or less in its action with the grid of an ordinary three-electrode valve. The extra grid (which is sometimes called the inner or auxiliary grid) is the electrode which is connected in such a way to the rest of the circuit that the H.T. battery becomes unnecessary.

theoretical diagram (Fig. 1) shows that the first valve acts as an H.F. amplifier, and is coupled to the secondary valve by means of an H.F. transformer. The second or detector valve has a large reaction coil in its plate

of a grid coil, which is connected between the inner grid and positive. This form of reaction is in addition to the normal reaction coil connected to the plate of the
(Continued on page 900.)

LIST OF COMPONENTS.

	s. d.
One panel, 14" x 10" x 1/4" (Peto-Scott)	19 8
With cabinet to fit 5" deep.	
One R.I. L.F. transformer	25 0
Three Burndept rheostats (15 ohms)	15 0
One Bretwood variable grid leak	3 0
One Lamplugh .0005 variable condenser	12 0
One Wates K type .0003 variable condenser	7 9
One Watmel fixed condenser, .002	2 6
Do. do. do. .001	2 6
One Dubilier do. do. .0002	2 6
One Dubilier grid leak, .5 megohm	2 6
One Lotus 3-way coil holder	10 6
Nineteen brass valve sockets	1 7
Six terminals	0 9
One Nesthill S.P.D.T. switch	1 6
Wire screws, transfers, etc.	1 6
Two 4" condenser dials (Radion)	5 0



A THREE-VALVE UNIDYNE SET

(Continued from page 899.)

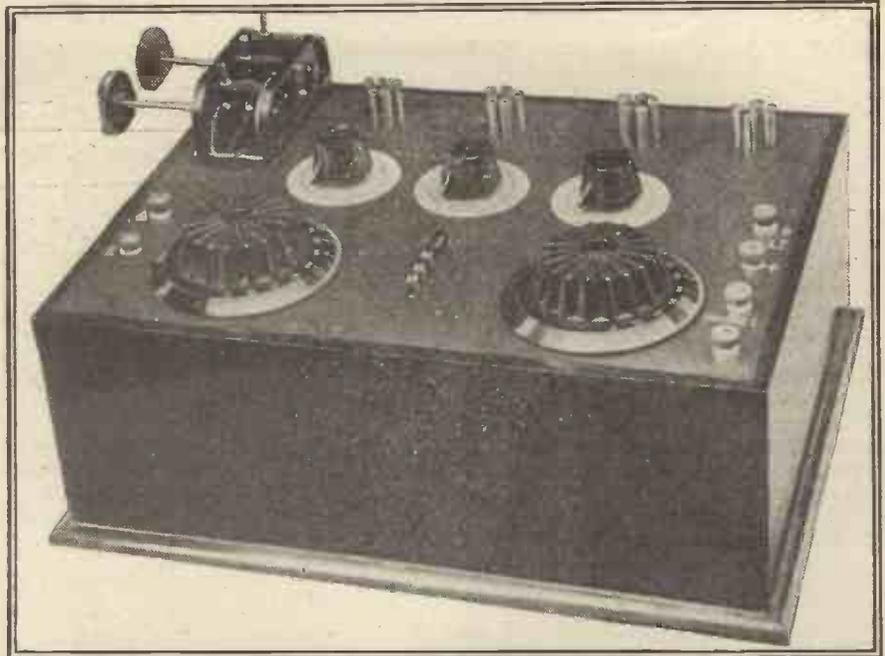
detector valve, and is a refinement in reaction-control which gives singularly good results when tuning long-distance stations.

The operation of the set is quite straightforward, and, for ordinary broadcast listening, the position of the grid coil can be roughly adjusted and left alone whilst tuning is carried out in the ordinary way. When searching for long-distance stations or resolving a weak carrier wave, the effect of the grid coil becomes very apparent, and it will be found to afford a critical and valuable aid to fine tuning.

Concerning the Components.

The construction of the set is commenced by a careful overhaul of the components, as in a set of this type where there is no H.T. battery it is essential that all the parts should work smoothly together. In the list of components on page 899 is shown the actual apparatus used on the original set, and constructors are advised to conform with this if possible. This is especially true of the L.F. transformer, the grid leaks, and the value of the fixed condensers.

The drilling of the panel is carried out in accordance with the drilling diagram on page 899. It will be noted that in the five-pin valve of the type used, the valve sockets for the filament connections are placed very close together, and great care must be taken



The complete receiver has its appearance greatly enhanced by the use of large condenser dials which also greatly assist in the easy control of the tuning. All controls are placed where they are most accessible to the operator.

to drill these accurately. With each of the valves a template is supplied by which accurate drilling can be carried out, and great care should be taken over this part of the construction.

Four valve legs, placed to correspond with those of an ordinary valve, are used to hold the H.F. transformer, but an ordinary three-electrode valve holder (of the four-pin type)

can be used instead, if desired. When the panel has been drilled the best method of mounting is to screw in and tin the ends of the terminals. Then mount the valve legs, taking great care that the panel is perfectly clean between the filament legs and that no shorting takes place at this point. The S.P.D.T. switch and terminals are then mounted, then the rheostats, and then the remainder of the components in the most convenient order.

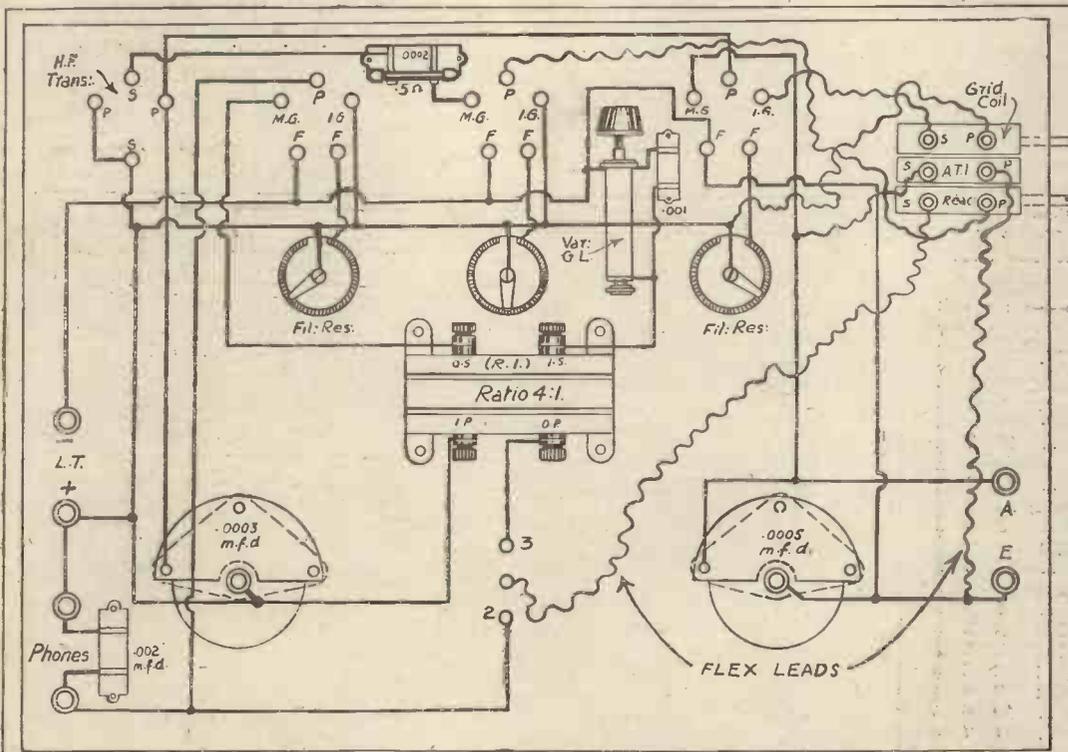
There is no need to secure the fixed grid-leak and condenser to the panel, as the soldered wires to this component are quite sufficient to hold it securely in place. Similarly, the fixed condensers across the telephones and the resistance in the L.F. grid circuit are secured in place by their connections.

Smooth Control.

One feature of the original set which is worthy of remark was the smooth control afforded by the use of extra large dials on the tuning condensers. This would appear to be a small point, but in practice it afforded just that little extra fineness of variation which makes all the difference to long-distance listening.

The R.I. transformer was fixed in position on the panel by means of 4-B.A. screws tapped into it. If desired, the holes can be drilled right through the panel and the bolts secured by screws

(Continued on page 901.)



Wiring Diagram: 3 Valve Unidyne.

Drawn BY	A.D.
ENK'D BY	SLC
SER. NO.	A.525

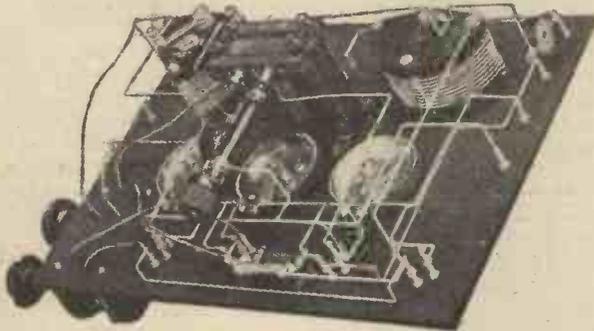
A THREE-VALVE UNIDYNE SET

(Continued from page 900.)

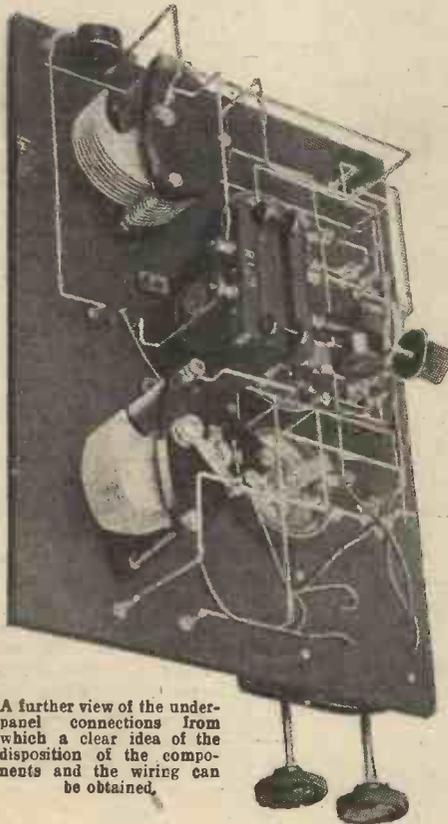
on the face of the panel. The only disadvantage of this is that it certainly impairs the appearance of the completed set.

Wiring-up the Set.

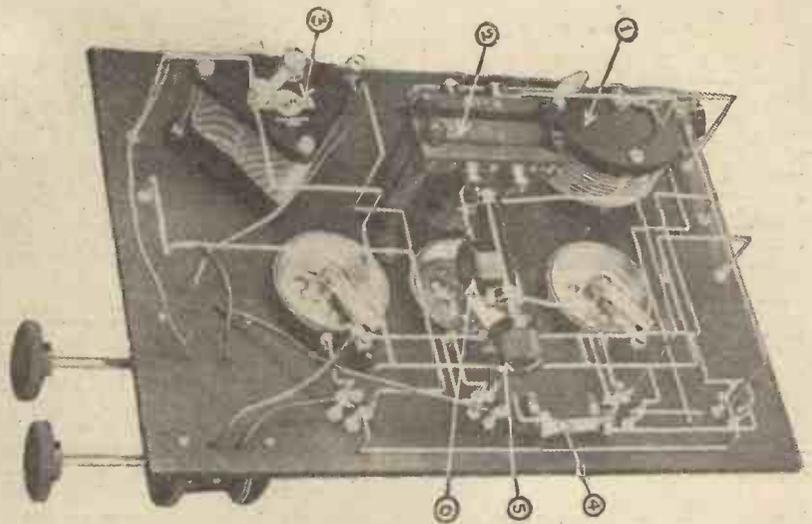
As the set is perfectly straightforward the wiring should present no difficulties if the wiring diagram on page 900 is carefully followed whilst the work is being carried out. When the wiring is completed it should be checked over by the list of connections which is given on this page. The panel should be given a final overhaul and dust, and it need hardly be said that no traces of flux should appear upon it. This can be quite easily prevented in the first instance if the constructor makes a point of wiping over each joint with a clean rag as soon as it is soldered. Whilst the metal is still hot the flux can be removed easily



This photograph shows how well spaced are the connections between the various components—a feature that makes for easy control and efficient operation.



A further view of the under-panel connections from which a clear idea of the disposition of the components and the wiring can be obtained.



A view of the wiring of the finished receiver. The numbers denote the following components: (1) .0003 v. condenser, (2) R.I. transformer, (3) .0005 v. condenser, (4) grid leak and condenser, (5) variable grid leak for L.F. valve, (6) .001 fixed condenser.

and effectively, but if this operation is left until the flux has cooled, it will be extremely difficult to remove it.

When finished, the set can be connected up to a 6-volt accumulator and tried out. It is interesting to note that, unlike most of the Unidyne sets, this particular instrument did not appear to be unduly critical as to the coils employed. Almost invariably in Unidyne sets the best results are obtained with home-made basket coils of the single-layer type, or Lissenagon coils. In this

set it was found that other coils could be used, and excellent results were obtained using the Tangent coils shown in the photograph.

The handling of the set is very similar in principle to an H.T. set of the same type, but it will be found to be exceptionally responsive to the various controls.

The H.F. Transformer.

In addition to the Bowyer-Lowe transformer which is recommended, other makes were tried, and good results were obtained with a Discol and a McMichael. It should be noted, however, that in the case of the former (Discol) the primary connections do not correspond with the "filament" connections of the valve holder, but are placed instead across the plate and grid pins. If, therefore, the Discol transformer is to be used, the connections which at present go to "grid" and "plate" sockets should be taken to the right and left "filament" sockets respectively, and the remaining connections should be made to the "grid" and "plate" sockets instead of to the "filaments."

A brief consideration of the results obtainable with this set will leave the constructor impressed especially by its long-distance abilities and by the perfect clarity of its tonal reproduction. The volume obtainable from the L.F. side is perhaps hardly equal to

POINT-TO-POINT CONNECTIONS.

(Looking at back of panel—valves at top.)

Aerial terminal to fixed plates of .0005 variable condenser, socket of fixed coil holder, and main grid of first valve.

Earth terminal to moving plates of .0005 variable condenser, to Negative, and plug of fixed coil holder.

Negative is connected to the left-hand filament socket of each valve holder, the right-hand socket of each is taken to one side of its rheostat, the other side of the three rheostats being connected together and to Positive. Plate of first valve to O.P. of H.F. transformer, and to fixed vanes of .0003 variable condenser. I.P. of H.F. transformer and moving vanes of condenser to Positive. O.S. of H.F. transformer is connected to one side of the grid leak and condenser, other side of grid leak and condenser to main grid of second valve.

I.S. (H.F.) is connected to positive lead, plate of second valve to plug of reaction coil holder, socket of reaction coil holder to centre contact of switch.

Top contact of switch to O.P. of L.F. transformer, I.P. of which goes to positive lead, O.S. of L.F. transformer to main grid of third valve, I.S. to one side of the variable grid leak, the other side of which goes to Negative. A .001 fixed condenser is connected across the variable leak.

Plate of third valve to one side of 'phones, also to bottom contact of switch.

The other 'phone terminal is connected to Positive. A .002 fixed is connected across the 'phone terminals.

The inner grid of the first valve is connected to the socket of the top moving coil holder, the plug of same being connected to positive lead, as are the inner grids of the second and third valves.

(Flex leads are used for all connections to the coil holder.)

that produced by an H.T. set using a specially designed L.F. valve with "plenty on the plate," but there is no doubt of the superiority of Unidyne quality. This, with its absence of scraping and hissing due to the H.T. battery, will be a revelation of what broadcasting is capable of when reproduced unaccompanied by a noisy background.

SOME USEFUL EXPERIMENTAL PANELS.

By OSWALD J. RANKIN.

Being a short supplement to the series of articles entitled "An Experimental System," in which is described some additional panel-units of great utility.

READERS who have adopted the panel-and-frame experimental system recently described by the writer, and who may desire to introduce a few further refinements in order to facilitate operations

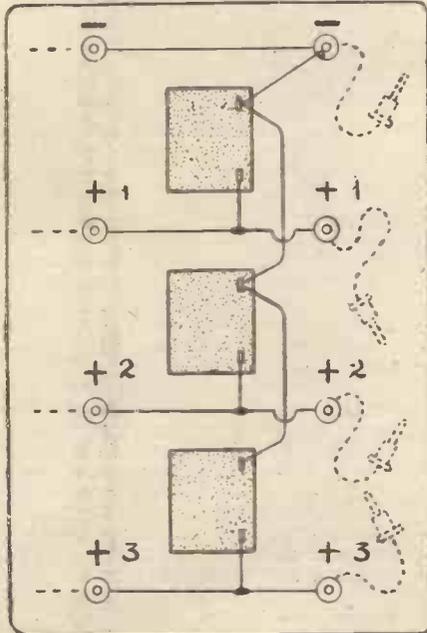


Fig. 1.

covering a still wider range, will find in the following examples some simple and really useful additions which by no means constitute added complications.

Figs. 1 to 3 show a simple shunting panel for the H.T. battery, a very desirable unit

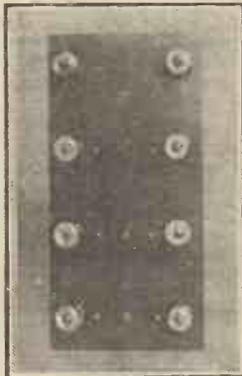


Fig. 2.

which every valve experimenter requires at some time or other. The circuit arrangement is shown in Fig. 1, the top and under-panel views of the made-up unit being shown in the photographs Figs. 2 and 3. The unit comprises a 6 in. by 3 in. ebonite panel, the thickness of which will of course be identical with that of all other panels, three Mansbridge fixed condensers of 2 mfd. capacity, and eight terminals. Fig. 1 may be taken as a guide for wiring-up the panel, all connections being

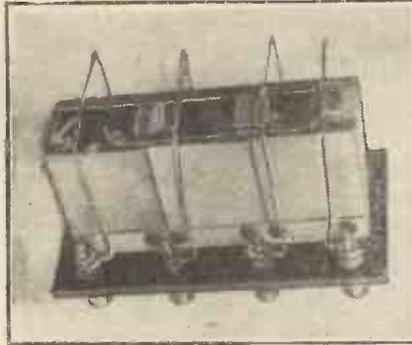


Fig. 3.

made exactly as shown, and the terminals marked correspondingly.

The idea is to provide a separate shunting condenser for each battery tapping, a practice which is now becoming very common, and rightly so, since a single condenser can only effectively shunt one section of the battery. The diagram (Fig. 1) is self-explanatory.

In use, the unit is extremely convenient; the H.T. positive leads from the H.F., detector, and L.F. circuits are simply connected to the left-hand row of terminals, the flexible wander-plug leads being fitted with spade terminals and connected to the right-hand row of terminals, so that, in effect, the panel is simply connected in series with the various circuit leads to the H.T. battery, the wander-plugs (shown dotted), which

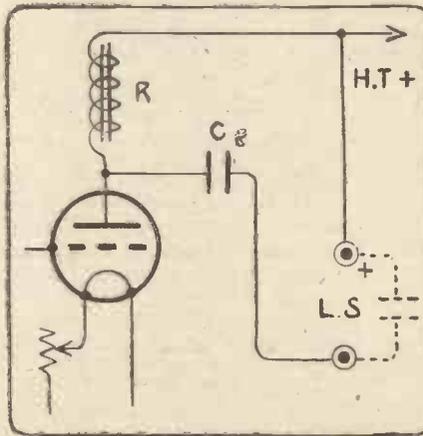


Fig. 4.

would otherwise be connected direct to their respective circuit leads, being now connected to the extension terminals on the right of the panel, and the necessary shunting capacity between each positive tapping and the common negative (or otherwise each section of the battery) being provided by means of the condensers connected as shown. The condensers are firmly attached to one longitudinal edge of a strip of hardwood which is afterwards screwed to the panel.

Fig. 4 shows a simple filter circuit for use in conjunction with high-resistance headphones or loud speaker, when using a fairly high plate voltage on the last L.F. amplifying valve. The idea here is, of course, to protect the delicate windings of the H.R. phones or loud speaker. The steady plate current is quite unnecessary for the working of same, and it is well to block this by means of a 2 mfd. Mansbridge fixed condenser, C, and to provide a resistance path (a standard

L.F. choke coil, R) for passing this current direct to the plate of the valve.

The fluctuating currents pass through the condenser and operate the magnets of the H.R. headphones or loud speaker, providing the H.T. voltage to the last L.F. valve is suitably increased.

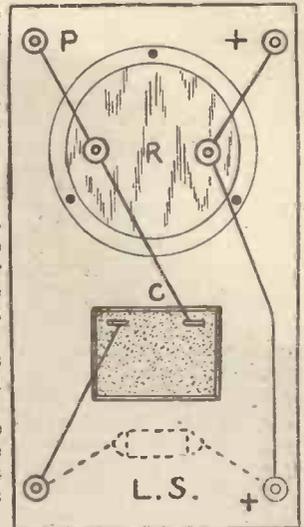


Fig. 5.

Fig. 5 shows the method of mounting and wiring the choke coil and the condenser to the under side of the 6 in. by 3 in. panel. A pair of clips to take the Wates "K" type fixed condensers should be fitted to the two loud-speaker terminals, the clips being arranged as described in a previous article dealing with the L.F. transformer units. It is most important that the positive terminal of the loud speaker (or headphones) should be connected to the terminal which is common to the H.T. positive.

Figs. 6 shows the circuit arrangement of a telephone distributing panel, this being a modification of an excellent little device described by Mr. W. S. Sholl in a recent

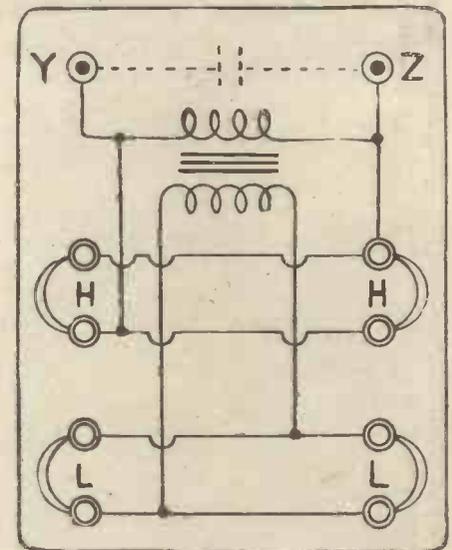
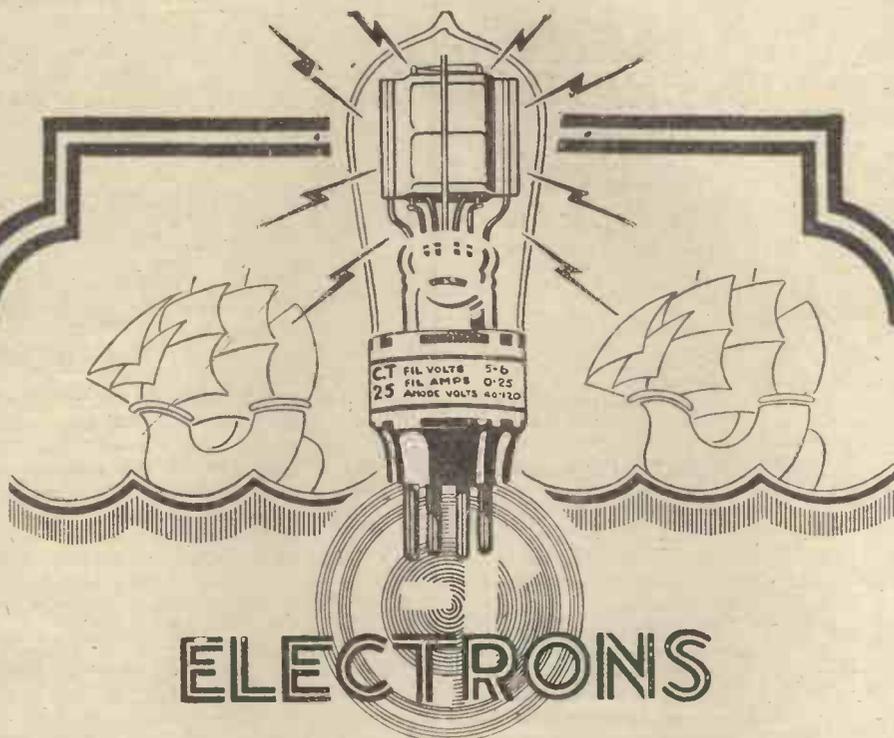


Fig. 6.

issue of "P.W." The unit comprises a 6 in. by 3 in. panel, a telephone or "step-down" transformer, and ten terminals. It will be seen that both H.R. and L.R. phones may be used, and since both diagrams are self-explanatory, it is only necessary to add that the terminals marked Y and Z (input) should be connected to the plate of the last L.F. valve and the H.T. positive in the usual way, and preferably fitted with clips to take the "K" type fixed condensers.



ELECTRONS

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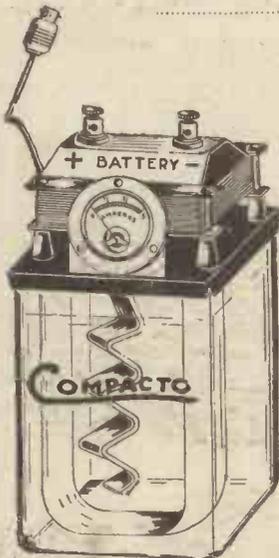
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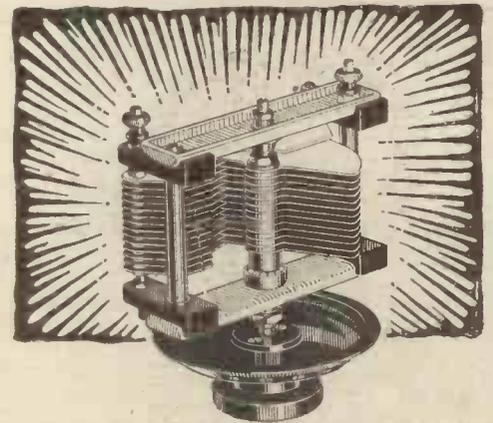
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To the Wireless Amateur,
Great Britain.

“LOTUS WORKS”
Broadgreen Road,
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Dear Sir,

December 5th, 1925.

You will no doubt be interested to know that the Lotus Vernier Coil Holder has been declared the most popular Coil Holder on sale to-day.

The recent Wireless Exhibition organised by the Manchester Evening Chronicle was probably the most successful wireless exhibition ever held in Great Britain.

One of the outstanding features of the exhibition was a Ballot for the most popular Wireless component, each visitor to the exhibition being handed a Ballot paper for this purpose and for which prizes to the extent of £100 were offered by Messrs. Franks, Ltd., of Manchester, for the most accurate forecast.

Our Lotus Vernier Coil Holder headed the poll.

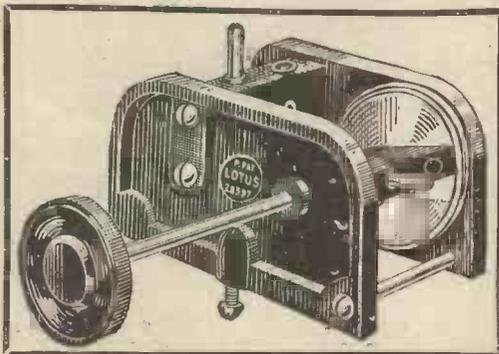
We take this opportunity of thanking those visitors to the exhibition who helped to place our Coil Holders in that proud position.

This verdict recorded in Manchester is also borne out by the Amateur users throughout the country, by the fact that the Lotus Coil Holders have to-day the largest sale of any type of Vernier Coil Holder.

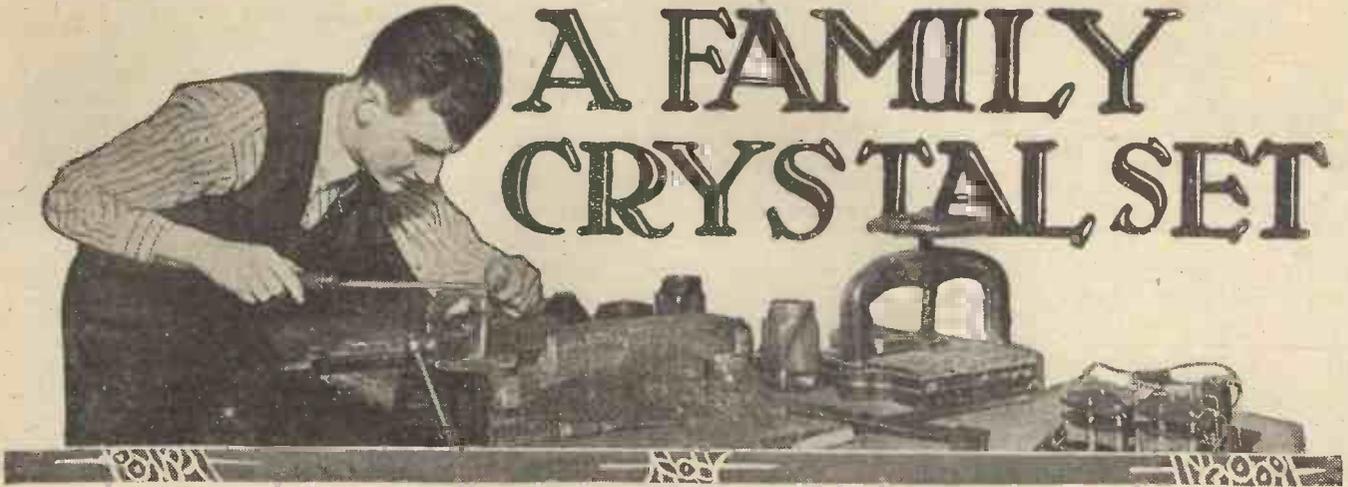
Follow up the Manchester verdict by fitting a Lotus Vernier Coil Holder to your set, and you will quickly realise that you have the component that makes an ideal Xmas gift for your less fortunate wireless friend.

Yours Faithfully,

Garnett, Whiteley & Co., Ltd.



A FAMILY CRYSTAL SET



Built, Photographed and Described by E. M. KNIGHT.

BBROADCASTING has been the means of bringing inestimable joy and pleasure to the aged, the infirm, and invalids by placing within their hearing concerts, popular talks, theatre and other transmissions. To them the difficulties

associated with the adjustment and tuning of the receiver are often very trying, and in the receiver here illustrated (Fig. 1) and described an effort has been made to produce a crystal set that will give loud results without any of the difficulties associated with tuning suitable for presentation to an invalid or the "old folks."

Once it has been adjusted there are no control knobs to worry about, and it remains permanently tuned ready for broadcast reception. A detector

of the permanent type is employed and, when required for use, all that is necessary is to plug into sockets the aerial, earth, and telephone leads, a simple operation in which no one can go wrong.

First Steps.

The wave-length to which a wireless receiver will tune is dependent on two factors, the amounts of capacity and inductance in the aerial-earth circuit. If one is increased, the other must be decreased for a given wave-length, and vice versa. When capacity is at a minimum, inductance is increased to a maximum, with a resultant increase of signal strength; and if the inductance coil itself is made with thick wire, high-frequency resistance

(Continued on page 908.)

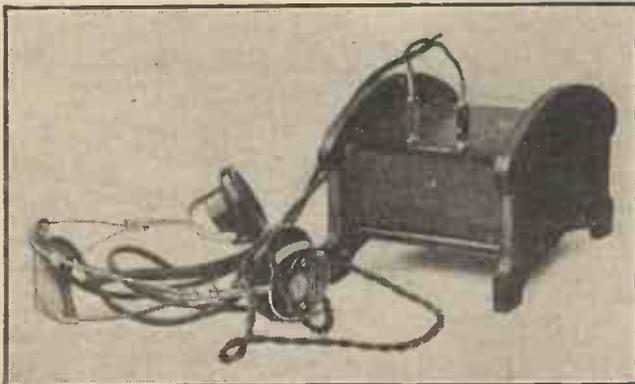


Fig. 1. The compactness and neat artistic appearance of this receiver makes it an ideal Xmas present.

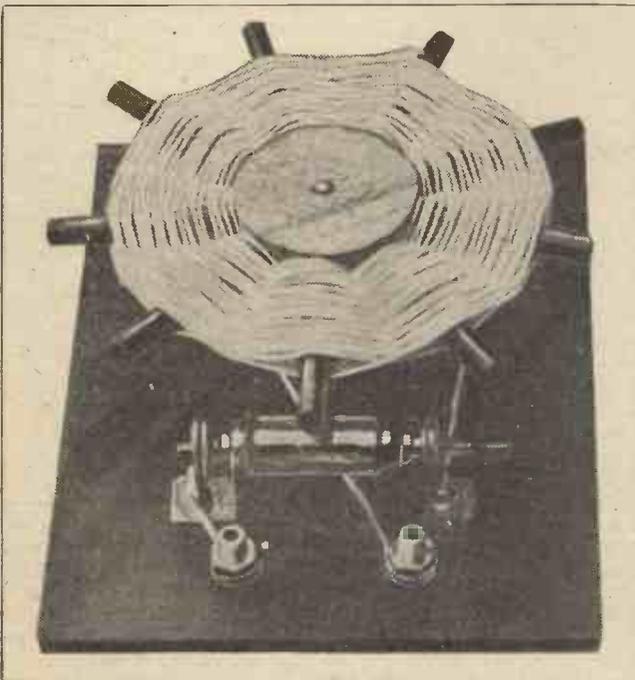
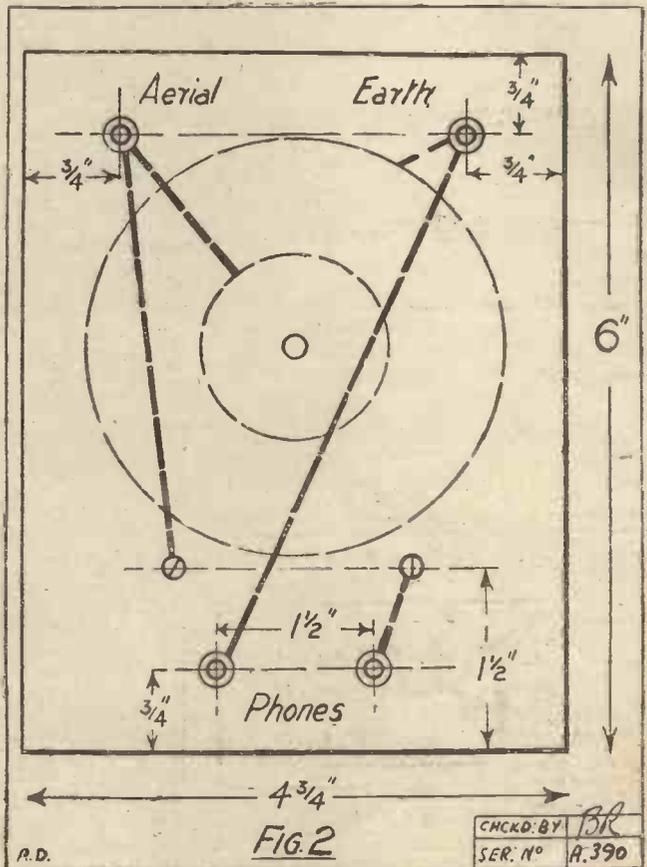


Fig. 3. There are no under-panel complications as this photograph clearly shows.



A.D.

FIG. 2

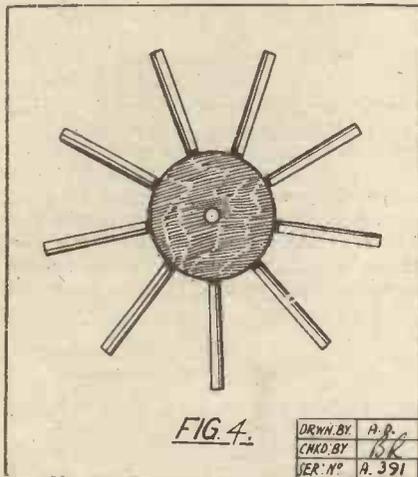
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A FAMILY CRYSTAL SET.

(Continued from page 907.)

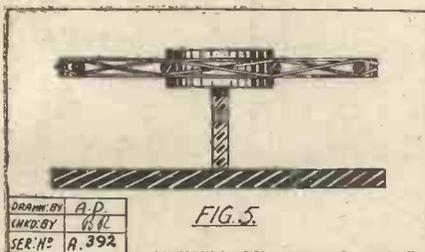
is reduced to a minimum and still louder results are obtained.

This is applied to the present receiver. A basket coil with a minimum self-capacity is wound with a fairly thick wire by experiment to the exact wave-length of the B.B.C.



station to be received, and no further tuning is then necessary while it remains in the same aerial-earth receiving system.

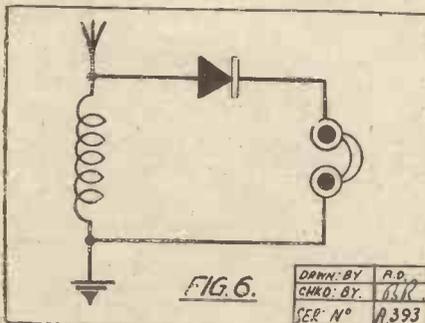
As a preliminary to construction, the aerial should be erected and the earthing system arranged so that the receiver may be tested during construction under the



conditions in which it is to be permanently used.

The Detector.

Making the receiver itself is quite simple. Everything is mounted on the back of a 1/8-inch ebonite panel 6 in. by 4 1/2 in. Fig. 2



shows dimensions, and Fig. 3 is a photograph showing the panel back. Instead of terminals, plugs and sockets are used for simplicity in making connections. The position of the holes for mounting the detector will be decided by the type used. This may be one of the permanent types now fashionable, such as the R.I., which is very efficient.

As an example of the permanence of this detector, a receiver accidentally fell from a shelf to the floor, about four feet, with telephones attached. It was still in perfect working order when picked up.

Winding the Coil.

The basket coil is wound with No. 22 D.C.C. wire on a former consisting of a hardwood centre 1 1/2 in. in diameter and 1/2 in. thick, into which nine 2-in. lengths of 1/4-in. ebonite rod are fixed at equal distances round the edge (Fig. 4). Six inches of the wire is left at the start for connections, and it is then wound in and out between the spokes in the usual way until the required number of turns are put on.

The end of the wire is secured by passing through a small hole drilled through one of the ebonite spokes. No shellac is required on the coil. The correct number of turns is found by experiment, the constructor judging by local conditions of aerial, wavelength, and previous constructional experience, etc., the approximate number of turns required. The writer used 38 turns for 2 L.O. Extra turns are taken off one at a time till the best result is obtained.

When correct the coil is permanently mounted in position by means of a short length of 2 B.A. rod, screwed into holes in the hardwood centre and ebonite panel (Fig. 5).

Very Simple Wiring.

Wiring connections are quite simple, and are better if done with stout wire and well-soldered. One end of the coil winding goes to the aerial socket, and the other end to the earth. The aerial socket is also joined to one side of the detector, the other side of the detector to one 'phone socket, the second 'phone socket to earth.

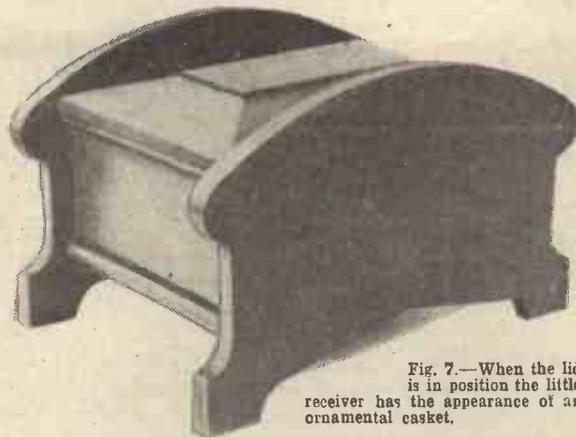


Fig. 7.—When the lid is in position the little receiver has the appearance of an ornamental casket.

These are shown with dotted lines in Fig. 2, and in the theoretical circuit, Fig. 6.

Describing the Case.

The completely enclosed receiver (Fig. 7) is quite attractive. With the lid in position it forms an ornamental little casket,



Sectional View Fig. 8.

occupying but little space. The case can be made in oak, walnut, or mahogany, and nicely polished. An idea of its construction is given by Figs. 8 and 9. The ends are grooved into the sides; the bottom fits between them. The ebonite panel is fixed to the ends with small screws. Two small shaped strips of wood, fixed at the ends of the lid, prevent it from slipping off.



End View Fig. 9.

The receiver photographed was constructed for an aerial 35 ft. long in S.W. London, 4 1/2 miles from 2 L.O. Results are very loud in the telephones. Bands from 2 L.O. can be heard quite clearly in an average-sized, quiet room when a General Radio loud speaker is joined direct to the receiver.

"P.W.s." GREATEST XMAS NUMBER

THIS issue contains 104 pages, including cover, and represents the finest value in Radio Journalism ever offered for 3d.

We would particularly draw the attention of our readers to the many fine and artistic advertisement pages, which reflect the greatest credit on the progressive spirit of our numerous advertisers.



* In this useful article Mr. C. E. Field, B.Sc., Staff Consultant to "P.W.," describes and clearly explains the intricacies of the famous Neutrodyne Circuit. *

THE neutrodyne circuit, introduced recently in America by Professor Hazeltine, is rapidly gaining popularity, because it possesses the many advantages of conventional H.F. amplifying circuits, without their drawbacks and limitations.

Let us see, then, what are the troubles encountered in connection with H.F.

Referring to Fig. 1, this is what takes place. Signals in the aerial produce voltage impulses on the grid, G_1 , of the first valve. Amplified variations of current are passed out from the plate, causing voltage impulses to be applied to G_2 . Similarly, by the action of V_2 , still greater impulses are handed on to G_3 , resulting in an output varying from V_3 , very much in excess of the original current in the aerial. The reaction coil now comes into operation, for currents flowing out from V_3 , through this coil, produce similar currents in the aerial to which it is coupled.

"Howling."

If the reaction coil is correctly connected, the additional currents produced in the aerial will add to those already there, the result being that each group of waves is given an additional supply of energy, which enables it to exist for a longer time before dying away. This additional energy is passed through the valves, and causes still more current to flow in the reaction coil, which in turn still further lengthens the life of each wave-train in the aerial.

amplification, and how they are overcome by the neutrodyne principle. In Fig. 1 is shown a two-valve H.F. amplifier and detector, employing tuned anode coupling.

Readers who have experimented with such a circuit will know that it is very unstable and difficult to operate, and that if reaction is employed to increase the range and selectivity it becomes almost impossible to keep the circuit from howling.

When reaction is introduced, the cause of the oscillation is easy to see if we understand the nature of the signals being received. Telephony signals are rather complex, but they may be regarded as consisting of groups of waves, or electrical impulses, the frequency with which the groups follow one another being dependent upon the note being transmitted.

What Reaction Does.

The strength of the signals depends very largely upon the number of waves in each group, and if we want to obtain strong signals from a valve, much will depend upon the extent to which we can prevent the individual groups of waves from dying away. A wave-train dwindles very rapidly if it has to encounter high resistance, and for that reason we make our aerials, tuning coils, etc., of thick wire when practicable. This is not sufficient in all cases, however, and so we use reaction, which actually lengthens the groups of waves,

which enables it to exist for a longer time before dying away. This additional energy is passed through the valves, and causes still more current to flow in the reaction coil, which in turn still further lengthens the life of each wave-train in the aerial.

At length a point is reached at which one train is still in existence when the next one commences, so that an unbroken stream of waves is produced, giving rise, generally, to a howl in the telephones.

A reaction coil is not necessary, however, to make a set oscillate, and the circuit shown in Fig. 1 could easily be made to howl without any reaction coupling, whilst if three or four valves were similarly coupled, oscillation would be practically unavoidable. This is brought about as follows.

Inside each valve is a plate and a grid—i.e., two pieces of metal insulated from one another. This, we know, constitutes a condenser, so that in each valve there is a means by which H.F. currents can pass between the plate and grid, independently of the electrons from the filament. It is rather difficult to obtain a mental picture of electricity flowing from the filament, through the grid, to the plate of a valve, and at the same time passing by condenser

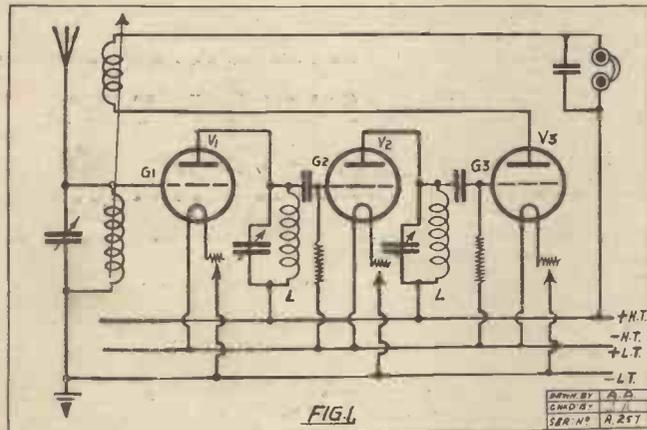


FIG. 1

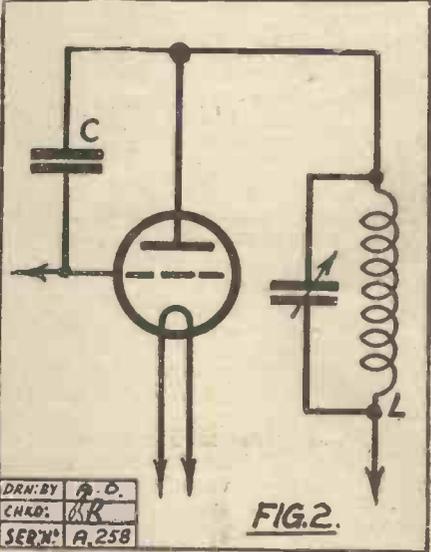


FIG. 2

action from the plate to the grid. The action would be just the same, however, if the capacity were outside the valve, instead of being inside, so that we could represent a single valve, as in Fig. 2, the condenser connected between the grid and plate leads representing the valve capacity.

A Counteracting Effect.

We have now just the same action taking place as when we used a reaction coil, for we are transferring energy from the plate to the grid circuit, and so lengthening the

life of the trains of impulses falling on to the grid. When two or three valves are employed, the self-capacity of each adds a little more to the length of the wave-trains, until eventually the conditions previously outlined are obtained, and continuous oscillations are set up.

How can this be prevented?

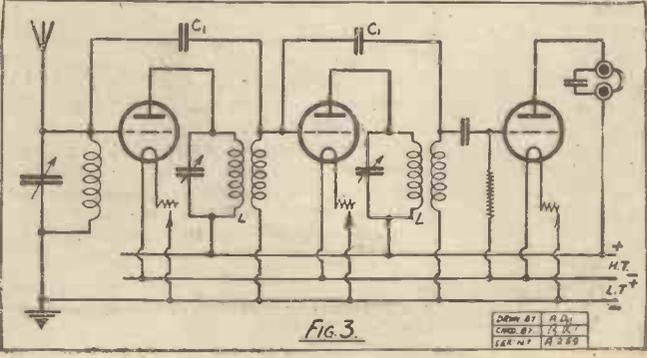


FIG. 3

(Continued on page 910).

HARD CIRCUITS MADE EASY.

(Continued from page 909.)

Since the oscillations are set up by the transference of energy from plate to grid, the most direct way of counteracting the effect would evidently be to transfer just as much energy at the same time, from grid to plate.

A "Balancing Capacity."

We require some means, therefore, by which the fluctuating current flowing through the coil *L* in the plate circuit, can produce exactly the opposite effect to that which it normally produces, as far as its influence upon the valve grid is concerned. This can very easily be brought about, for if *L* is made the primary winding of an intervalve transformer, it will induce in the secondary winding currents which at any instant flow in the opposite direction. Hence if we connect the top of the secondary winding to the grid of the valve through a condenser *C*₁ of about the same capacity as that between the valve electrodes (*C* in Fig. 2), the two capacities will tend to transfer equal amounts of energy in opposite directions at the same moment. This is shown carried out in Fig. 3, which represents a three-valve neutrodyne receiver, the capacities of both H.F. valves being balanced.

The neutrodyne principle has been applied by a well-known radio scientist to single-circuit, or tuned-anode, coupling, as shown in Fig. 4.

Here it will be seen that a coil *L* is introduced for the sole purpose of carrying the reversed currents which pass through the neutralising condenser. As it is necessary to have this and the anode coil fairly closely coupled, the two may comprise the windings of an H.F. transformer. All that is necessary, therefore, to convert the Fig. 3 circuit into that in Fig. 4, is to transfer the leads to the second and third valve grids from the secondary to the primary transformer winding, and insert the usual grid leak and condenser which are necessary for tuned-anode coupling.

Reaction Seldom Necessary.

It is, of course, possible to employ reaction in the usual way with a neutrodyne receiver, but when several H.F. valves are employed its use will seldom be found to be necessary. The capacity of the neutralising condensers is naturally very small, and must be variable so that it may be adjusted to balance exactly the capacity of the valve to which it is connected.

By tuning in a station with the filament of, say, the first valve turned out, the neutralising condenser for that valve can be adjusted till signals disappear. This will indicate that the capacity of the valve has been balanced, and the process can then be repeated with each of the other valves in turn.

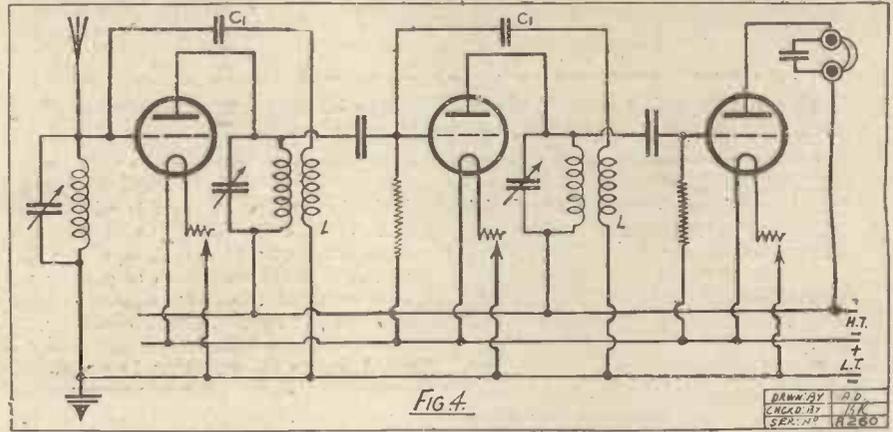
Many firms now manufacture special condensers for neutrodyne sets, but a variable condenser on variable lines, consisting of one moving and one fixed plate will be found quite satisfactory. A very neat little condenser can be made in this way by using semi-circular plates about one inch in diameter, separated by an air space of $\frac{1}{8}$ in.

The actual capacity required will be something approximating 000001 mfd., but it will vary with individual valves. When a valve is changed the balancing process generally requires to be repeated. It is, however, by no means a difficult operation.

A neutrodyne receiver is extremely selective, and for purity of reproduction is to be preferred to the super-heterodyne,

although, of course, the natures of the two systems are by no means similar. In fact, it is not impossible to neutrodyne a super-heterodyne receiver!

Finally, it should be remarked that the neutrodyne is neither a "super" nor a "stunt" circuit, but bids fair to become the conventional H.F. amplifying system of the future.



WHAT ACCUMULATOR SHALL I USE?

FROM A CORRESPONDENT.

THIS is a question that a good many prospective set-owners are considering, and much depends upon getting a correct answer. To purchase an accumulator without knowing how long it will last upon your set before requiring recharging is obviously unwise; but if the following simple rules are borne in mind, there is no need to rely upon other people's opinion, for you can work out accurately what type of accumulator is required, and how long it will last.

The current which a valve takes out of an accumulator is reckoned in amperes. Some of the bright-emitter valves take half an ampere or more to light them. Other valves of the semi-dull emitter type take about a quarter of an ampere, whilst the most economical type of all are the ".06's," which, as their title implies, take only six-one-hundredths of an ampere—i.e. three-fiftieths.

A Simple Calculation.

When several valves are used at once, their respective current consumptions must be added together, to find out how much current the set will need. For instance, three of the .06 type will take a total of .18 ampere, whilst two valves, each taking .25 ampere, followed by a power-valve taking, say, .5 ampere, would take a total of one ampere (more than five times as much).

As every valve-maker indicates the valve's current-consumption upon the valve-box, it is a very easy matter to determine the current required by any given number or type of valves. Then simply multiply this figure by the number of hours which the accumulator must run without recharging, and you have arrived at the class of accumulator which is required. To make this perfectly clear, let us take the

case of a four-valve set, which is to be worked from, say, Cossor Wuncells. We will assume the owner lives in the country, and can only charge his accumulator once a fortnight, and that he will use the set for an average period of four hours per day.

Determining Required Capacities.

Consulting the valve-maker's specification, we find that each valve is rated at .25 ampere, so that four valves will consume a total current of one ampere. We have to multiply this by the number of hours which the accumulator must run without recharging, in this instance $14 \times 4 = 56$. The required accumulator, then, must deliver one ampere for 56 hours—i.e. it must have a capacity of at least 56 ampere-hours. The nearest obtainable figure would be 60 actual-ampere-hours, which would just give a little necessary margin.

If the set had been only a two-valve set, the figures would have been halved, the figures in this instance being $.25 \times 2 (= .5)$, multiplied by 56, = 28 actual ampere-hours.

Our final example, worked in the reverse direction, will make the principle perfectly clear. How long would a 20 actual-ampere-hour accumulator last without recharging, if used upon a set employing two bright-emitter valves, each rated at .7 ampere?

The total current required by the set would be 1.4 amperes, and this number must be divided into the 20 actual-ampere-hours of the accumulator, as follows:

$$\begin{array}{r} 20 \\ - 1.4 \\ \hline = 14.28 \\ 1.4 \end{array}$$

This shows that the accumulator would only last about fourteen hours without recharging so an accumulator with a greater capacity would be necessary, or, better still, dull-emitter valves should be employed instead.

Hook up an Ericsson Super-Tone Loud Speaker to anyone of these Sets and you'll hear radio at its very best. Beautifully mellow and pure. Dull black enamel finish on wood base. 18" high. 2,400 ohms resistance **63/-**



To meet the demand for a loud-speaker of equal purity to the Senior, we produced the Junior Super-Tone of wonderful volume for a loud speaker 15" high. **32/6** complete with lead.



for a perfect
Radio Xmas
choose perfect
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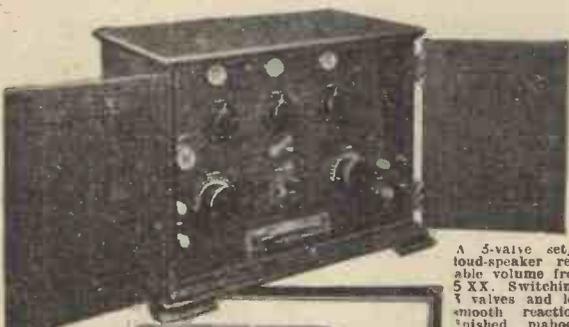
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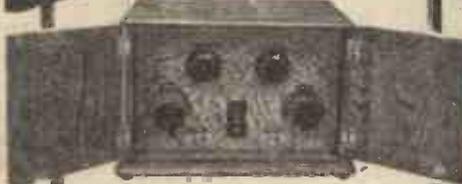
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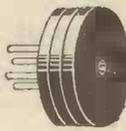
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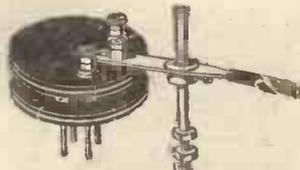
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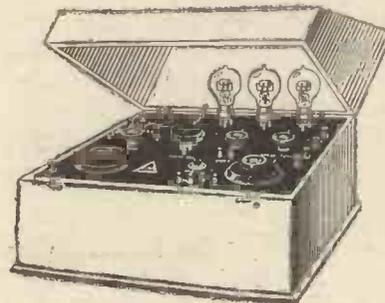
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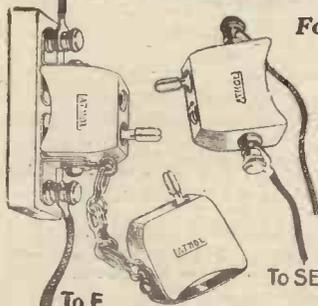
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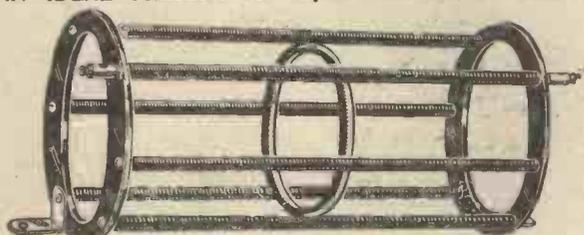
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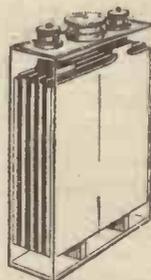
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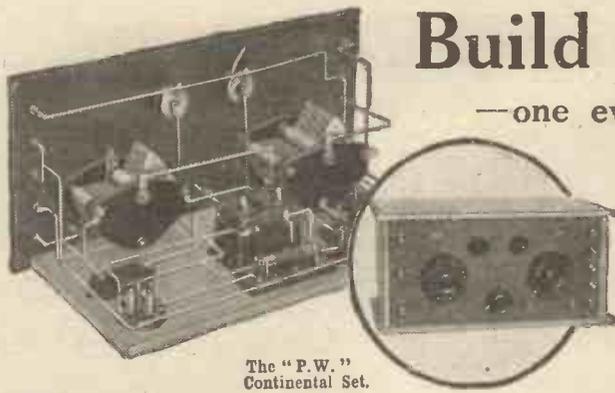
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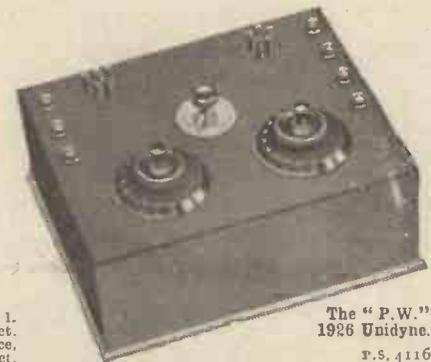
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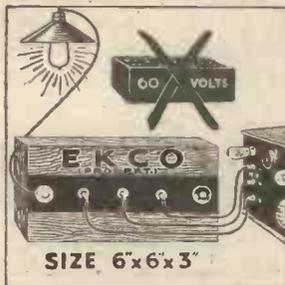


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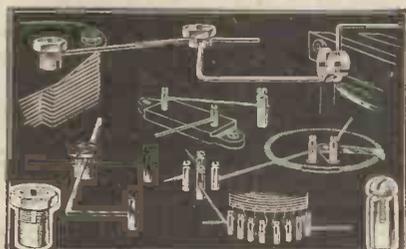
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HOW TO MAKE A PAPER DIAPHRAGM LOUD SPEAKER.

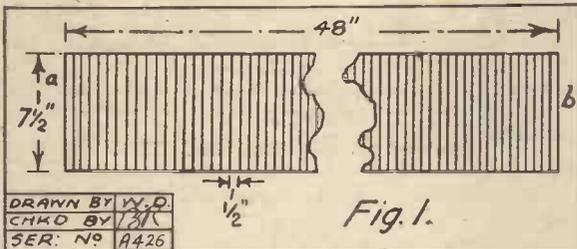
By R. J. GRIFFEN.



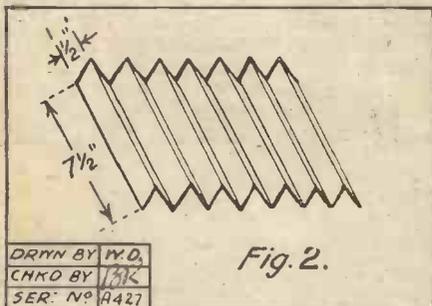
The completed instrument has a very artistic appearance.

HAVING received so many letters asking for further particulars of the construction of my paper diaphragm loud speaker, a photo of which, together with a letter, appeared in "P.W.," No. 164, of July 18th, from all over the country as well as over seas, I intend to give in the following article as clear details as possible, together with sizes and sketches of various parts, so that anyone may follow them. This is apparently what a good many people have been looking for for some months past.

The first part to make is the pleated paper diaphragm. This appears to have given most of the trouble; some people have



even tried to cut a circle out the required size and then to pleat it. A moment's consideration will show this is impossible. The diameter of the finished diaphragm must first be determined—in this case 15 in.—the radius, viz., $7\frac{1}{2}$ in., is then the width of the paper. The circumference may be found by the usual formula: $\pi d.$ —i.e. $3.14 \times 15 = 47.1$ in., which is the length of the paper, allowing a bit to spare and



for lap, which can be cut off if necessary after pleating. Allow 48 in.

Therefore a strip of paper 48 in. \times $7\frac{1}{2}$ in. is required—Fig. 1. I am using good quality drawing paper, but parchment may be

used. It will perhaps be found impossible to obtain paper this length, but two strips may be neatly glued end on end, overlapping about $\frac{3}{16}$ in.

Both edges of the 48 in. sides should then be accurately divided into $\frac{1}{2}$ in. sections starting from the same end for each edge, so that if one of these points were joined up by a line to the corresponding point on the opposite edge this line would be exactly at right-angles to either of these edges and parallel to the ends, as shown in Fig. 1. As a matter of fact, these points are all joined up in this manner, but not with a pencil, but with some blunt pointed instrument such as a very blunt compass point, just to bruise the surface of the paper along these lines.

Pleating the Paper.

The paper is now ready for pleating, which is done by folding the first $\frac{1}{2}$ in. strip one way and the next one the opposite way, as in making a fan. When finished it should look like Fig. 2. Care must be taken to press each crease well.

The ends *a* and *b*, Fig. 1, are now brought together while the diaphragm is held quite flat. It should now look like Fig. 3, a circle 15 in. diameter. The ends *a* and *b*, Fig. 1, are shown joined at *a*. If the paper is about the right length the outer edge should be almost flat without the pleats showing, the pleats of course gradually getting more expanded from the centre, which

of course should be $\frac{1}{2}$ in. thick, as shown in Fig. 3. If it is found that the outer edge is too "crinkled," a piece of paper across the whole width may be cut off one end until this edge is flat, allowing, of course, about $\frac{1}{8}$ in. lap to glue the two ends together, *a*, Fig. 3.

It will be found that a hole about $\frac{3}{8}$ in. diameter is left in the centre, the use of which will be seen later.

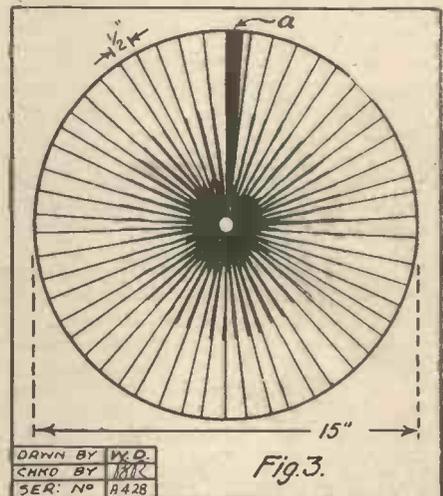
Any design which is painted on the diaphragm to relieve the plainness must of course be done before pleating. My own, as shown by the photo, has two brown and two green dragons.

Mounting the Diaphragm.

The diaphragm is now ready for mounting as soon as the frame is made, which can be made from any well-seasoned hard-wood. The actual design, of course, can be left to the maker's own choice; the one in question has an over-all height of $18\frac{1}{2}$ in. Fig. 4. The base is a flat oak board 16 in. \times 6 in. \times $\frac{3}{4}$ in., into which the three legs of the front part of the frame are morticed and glued. The shape of the front frame can be seen in the photo, while the back part is just a plain wooden ring which is screwed and

glued to the front part with the diaphragm between, as shown at *a*, Fig. 4.

The inside diameter of the frame is 14 in. and the outside 16 in., so the width of the frame is 1 in., the thickness of the wood $\frac{3}{4}$ in., allowing the paper diaphragm to be held all round by $\frac{1}{2}$ in. between the frames. The back ring fits exactly over the front frame, excepting the legs. Of course it should be arranged so that the grain of the back ring is across that of the front. The diaphragm should be stretched out and kept quite flat while the frames are screwed and glued up tightly; at least 8 screws should be used round the frame so that the paper has not the least play at



any point between the frames, otherwise undesirable vibrations will be heard at certain frequencies of the music or speech being received; this vibration or "rattle" will always occur at the same frequency in the same loud speaker once it shows itself.

The Telephone Unit.

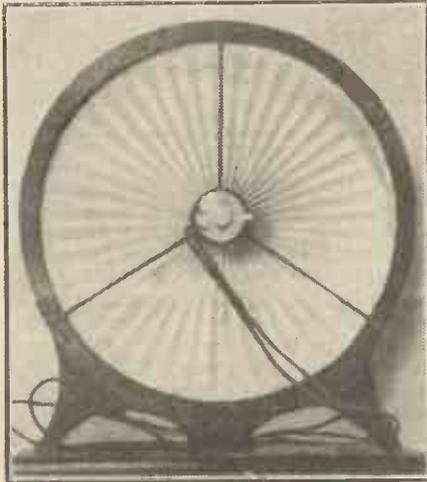
The next part to be made is the support, ing collar, etc., for the 'phone, but just here I had better describe the type of 'phone used. It is not a gramophone attachment, as is generally supposed, but one of the well known "A" type headphones made by S. G. Brown, Ltd., Acton, who now sell these single earpieces of any ordinary resistance for this purpose.

These 'phones differ from the ordinary ones in that the diaphragm is cone shaped and has a very small screw at its centre to screw it to the "reed" which forms the armature of the 'phone, and therefore is the part which vibrates; the screw and diaphragm are removed, they not being required. The hole in the reed (the one in which the transmitting post is fixed and which will be referred to later) will be found to be exactly in the centre of the

(Continued on page 916.)

A PAPER DIAPHRAGM LOUD SPEAKER.

(Continued from page 915.)



A view of the back of the pleated diaphragm loud speaker.

'phone. A milled knob, *e*, Fig. 4, on the back of the 'phone adjusts the distance between the magnets and the reed. Printed directions for the use of the adjusting knob are supplied by the makers with each 'phone.

Fixing the 'Phone Unit.

The chief point to be remembered when mounting the 'phone is to keep it parallel with the paper diaphragm with the screw hole in the reed exactly behind the centre of the hole in the paper diaphragm. A brass collar, *b*, Fig. 4, is turned up, so the ebonite cap on the 'phone fits tightly in it. The inside diameter for this purpose should be about 2 1/8 in., and the thickness anything from 1/8 in. to 3/8 in., and 5/8 in. wide.

Three holes are then drilled at equidistances round the collar. A No. 23 or 5/32 in. drill should be used so that the holes may be tapped 2 B.A. It is found advisable to drill these holes near the edge towards the diaphragm, as shown at *b*, Fig. 4. These tapped holes, of course, take the radial arms; their positions are seen in the photo of the back of the loud speaker and at *c*, Fig. 4, which may consist of three ordinary 2 B.A. screwed rods, although a plain rod with one end screwed looks rather better. These rods must be long enough to reach from the edge of the wooden frame and to screw into the brass collar when in position. In this case they should be about 6 1/2 in. long, according to the angle at which they are bent after leaving the collar, *c*, Fig. 4, to allow the 'phone to stand away from the diaphragm, Fig. 4. The outer ends of these arms are flattened and drilled with a No. 25 or 5/32 in. drill to allow a 4 B.A. screw to pass through.

The "Transmitting Post."

The ebonite cap must have its central hole enlarged to 1/4 in. to allow the transmitting post free access. It is then pressed tightly into the collar, when a drill through each of the three holes just "dots" or dents the ebonite so the cap is held lightly in position by the radial arms screwing right

into it; if a nut is put on the arms before they are screwed into the collar it will lock them in position.

The radial arms, when each are bent equally, are now bolted to the wooden frame by 4 B.A. screws passing right through the frame and the arms, the nuts showing at *d*, Fig. 4.

The transmitting post, Fig. 5, is now made and on this depends very largely the tone of the loud speaker. I found the best material to use was a piece of straight-grained oak which, in my case, is several hundred years old, having been taken from the beams of an old house we recently pulled down; it is therefore very dry and well seasoned. It is about 2 in. long and 3/16 in. diameter at the largest end, *a*, and tapering to a fine point. This post is now glued in the hole in the centre of the diaphragm, with the flat end, *a*, flush with the front of the diaphragm. This will allow the point to pass through the hole in the ebonite cap, and be practically flush with the back edge of the cap. It is rather a good idea to screw the 'phone into the cap one or two turns, so the point of the post rests in the hole of the reed, which, by the way, is its permanent position later, until the glue sets and fixes the post in this position. The 'phone is then removed, and it should be seen that the post does not touch the ebonite cap when passing through it. A small spot of glue is then put on the point, and the 'phone is screwed in gently, making sure the point goes in the screwed hole of the reed, as it should do if great care has been taken throughout. As the 'phone is screwed into place the diaphragm will be pushed out at its centre by the transmitting post, and will stand out as shown at *f*, Fig. 4. This should not be very far, but just so the pressure between the diaphragm and the reed would keep the post if it were loose in position. The central button, *f*, which is of the same wood as the frame, i.e. oak, is about 3/4 in. diameter, and is glued to the end of the post and surrounding pleats, its chief function being to finish off the centre.

"Perfect Results."

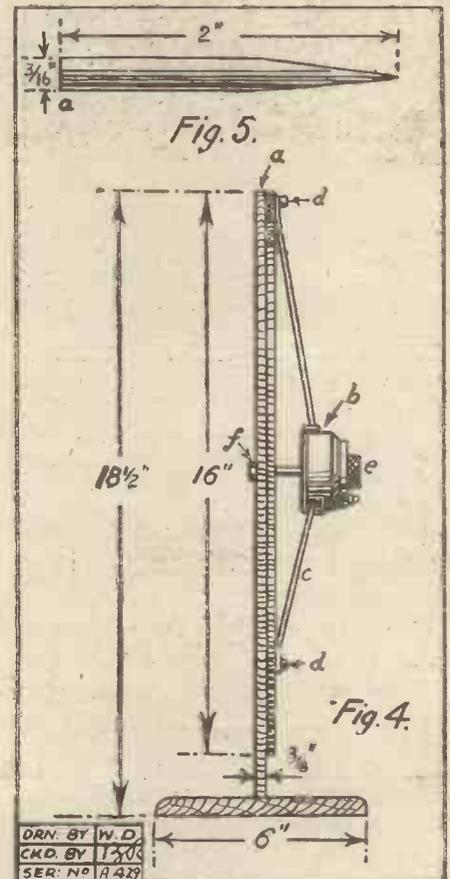
The loud speaker is now finished and ready for testing, and is connected in the usual way to the receiver, the milled knob being adjusted for best results as before described, and if the foregoing instructions are carried out carefully there is no reason why the reader should not obtain the perfect results which are enjoyed every evening from the one described, provided, of course, the receiver is properly designed, and is being handled by someone who can get the best out of it. I don't altogether mean volume or "quantity," but quality, as, personally, I think the reason why so many people run down loud speakers, of any sort, for that matter, is that they have either heard one on a receiver which is not designed for loud-speaker work, or on a good set, the operator of which does not know his job.

I have been asked, does the diaphragm vibrate? Of course it does, and it can be felt when working. The amount of vibration and therefore the volume of sound reproduced depends, apart from the variations of the incoming signals, on the size of the diaphragm, so the larger the diaphragm within reason the more noise.

The resistance of the 'phone used should be 2,000 ohms, although one of 60 ohms

could be used in conjunction with a telephone transformer, which some people prefer to protect the windings. I may say here that mine is 4,000 ohms, and although it is in direct series with 120 volts H.T., it is still going strong after several months' constant work.

I have tried this against the standard



disc type; the difference is hardly appreciable in comparison with the ordinary hard type of loud speaker. It is quite as loud in an ordinary room, because it spreads the sound all round, and so is better for that, but does not throw it so far.

EARTH CONNECTIONS.

ONE'S attention is often drawn to the external aerial connections, but rarely to those of the earth system. Parasitic noises in the telephones or a falling off in signal strength can often be traced to the earth connection, especially where it is made just above ground and open to the atmosphere.

Clean Contacts.

It is advisable to clean the wire occasionally, and to wrap it with insulation tape to protect it from the damp air. Especially is this necessary when water is often poured over the connection.

Where connection is made to a water-pipe it can be very effectively cleaned with emery paper.

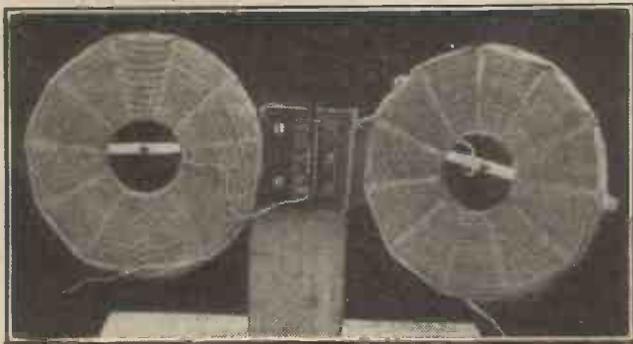


Fig. 4. Two large coils operating as a variometer.

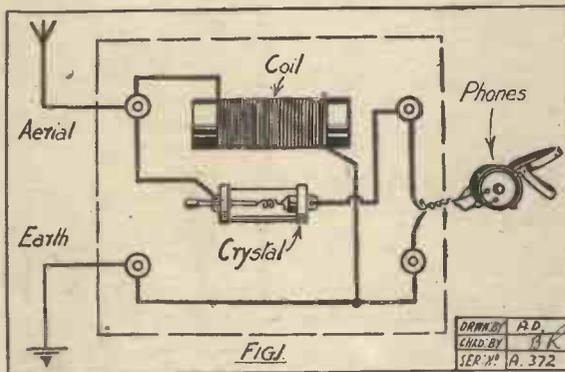
HOME-MADE COILS FOR DAVENTRY.

By S. N. SEDGWICK.

Listeners to 5 X X will find the practical tips given in this short article of considerable value.

NOW that Daventry opens the door for thousands of new crystal-set users, an account of three quite different sorts of coils which can be made or built up at home by a novice may be useful.

The three coils (strictly four, it is true, since the third consists of two joined in series to make a variometer) have been



used in home-made crystal sets at a distance of 90 miles from 5 X X with complete success, the circuit employed being of the simplest possible character. (Fig. 1.)

No. 1 is a coil that when once complete requires no tuning, but is always adjusted to receive 5 X X. (Fig. 2.) It is built on a low-loss former of a unique description. Four threepenny combs, 7 in. long, made of ivorine or some similar non-conducting substance, were purchased, and mounted on a rectangular strip of wood. Twelve ounces of No. 22 D.C.C. wire were used. A hole was drilled in the wood at one end, through which about six inches of the wire was passed for connecting purposes, and then the rest of the wire was wound,

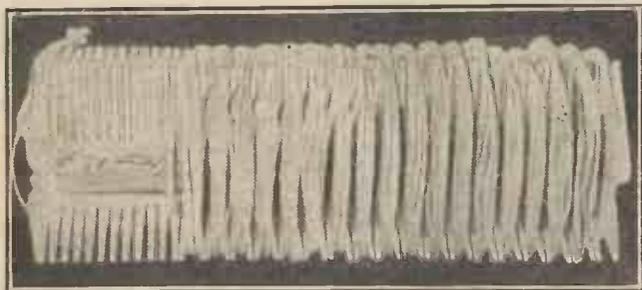


Fig. 2. The "low-loss" coil wound on a former consisting of four combs.

as the photograph shows, between successive pairs of teeth, about 15 to 18 turns in each set of slots. Nineteen slots were thus brought into use. It was discovered that 12 ounces of wire was sufficient to bring in 5 X X at full crystal strength on a good aerial. The coil on its former can easily

be mounted in a box, or on two wooden supports, one end of the wire being brought to the aerial terminal, and the other to the earth terminal.

"Tapping" Experiments.

If, for any reason, the signals should be faint, and the coil should need tuning to the particular aerial to which it is to be connected, the tuning is accomplished by baring a little of the outer wire on the 17th and 18th sections, and then leaving the end of the wire unconnected to the terminal, a small piece of wire is fixed on the terminal, using the other end to touch one or other of the bared places on the coil, so completing the circuit. By experimenting in this way, it is easy to find the spot at which signals come in strongest, and the wire should be cut at that place, the portion not required being removed from the former, and the new end of the coil being brought down to the terminal.

If care is taken that there are only ten turns in the first five slots, and then the rest of the slots are wound full, the wire may be scraped from the 10th, 20th, 30th, 40th and 50th turns, which will be the outer turn on each of the first five slots, and there will be no difficulty in finding the exact place where the coil gives the strongest signals.

The second coil, Fig. 3, was wound on an ordinary commercial brass former. It consists of 3½ ounces of No. 28 D.C.C. wire, wound in the following way.

The brass former, obtainable at any wireless shop for about 1s. 6d., has two rows of 23 spokes, set on a brass barrel 2 in. in diameter, about ½ in. between the rows. The first thing is to have the barrel cut in two, and to mount the two halves on a round wooden rod, such as the end of a curtain pole. This enables coils of different widths to be wound, and also the spokes to be "staggered," or set parallel to one another, as required. (Fig. 5.)

"Spade" Tuning.

The coil in question was wound in the following way. A ring of thin cardboard ¾ in. wide was placed on the former in such a way as to be held firmly by the

spokes, the two rows of which were "staggered"—i.e. the spokes in one row came opposite the spaces between the spokes in the other row. The wire, started on one row, was passed round the 5th spoke in the opposite row, then round the 9th in the first row, and so on, four spokes being missed each time, until the former was full. Then the coil was prevented from unravelling by sewing black thread round the edges, as shown in the photograph. The spokes being removed from the former, the coil slipped off easily, and was ready for mounting.

This coil can be tuned by means of a shield or spade. An aluminium disc 4 in.



Fig. 3. A coil which can be used for 5 X X, tuning being carried out with a "spade."

in diameter, moved slowly in front of the coil, brings in Daventry when about three parts of the way across.

Two Commercial Coils.

A piece of copper is equally good; and if no such thing is available, a threepenny ring of ordinary bare copper wire, such as is used for hanging pictures, can be used instead. This should be mounted just as it is, on a thin slab of wood.

Fig. 4 shows how two ordinary commercial coils can be used to tune in Daventry. The coils are mounted on two ebonite or fibre strips which are hinged together; the hinge serving as a connector. The inner end of the wire on Coil No. 1, and the outer end of the wire on Coil No. 2, being fastened to the hinge. (The other two ends going to the aerial and earth terminals of the set.)

(Continued on page 918.)

USES FOR FIXED CONDENSERS.

From a Correspondent.

FIXED condensers are used in such a variety of ways in a receiving set, and there are such a variety of receiving circuits employing fixed condensers in ways peculiar to themselves, that it is almost impossible, in a short note, to deal with all the uses of fixed condensers. There are, however, certain uses to which they are put which may be said to be more or less common to all circuits.

"Low-loss" Requirements.

In the first place, a fixed condenser is used in the aerial circuit frequently, for the purpose of shortening the natural wavelength of the aerial: for this purpose, it should be placed in series with the aerial. As this condenser is in a tuned circuit, or approximately a tuned circuit, it is very desirable that it should be a low loss condenser, that is, that the dielectric should be of a good grade—air or mica.

The condenser will be used in series with the aerial when the inductance of the tuning coil, or the self capacity of the aerial, is too great for the reception of the desired wave-lengths. Consequently, the capacity of this fixed condenser depends upon the self-capacity, or natural capacity, of the aerial, upon the minimum value of the inductance of the coil, and upon the wave-lengths which it is desired to receive.

The grid condenser, which usually has a value somewhere about 0.0002 mfd., serves the purpose of blocking the grid current in the detector. The value assigned to this condenser is largely a matter of habit. The best value depends upon the type of valve and upon the way in which it is operating, upon the value of the grid leak, and upon the strength of incoming signals.

Concerning Grid Condensers.

If a comparatively low-resistance grid leak is used, the value of the grid condenser should be correspondingly less. If a high-resistance grid leak is used, or if the incoming signals are strong, it may be better to use a larger grid condenser. It is common to employ a fixed grid condenser, although a variable grid leak is popular. It is quite a good plan, however, to use a variable condenser for the grid, as well as a variable grid leak, at any rate until the best value of grid condenser has been found, and even then, as the foregoing remarks will show, the value of the grid condenser, for best results, should be adjusted according to requirements. The smaller the value of the grid condenser, other things being equal, the more sensitive the detector. The limit is when the grid blocks.

The by-pass condenser, of the fixed kind, is well-known for use across the headphones for the purpose of providing a low impedance path for the H.F. currents. The same kind of condenser is generally used across the primary of the first L.F. transformer, for the same reason. Generally it may be taken that the fixed by-pass condenser is for the purpose of providing an easy path

for H.F. currents across a piece of apparatus which is primarily designed for L.F. currents. It is important to remember that a by-pass condenser should not be larger than the value required for the purpose in view.

By-pass Condensers.

For example, if a by-pass condenser is used in the plate circuit of the detector, to pass the H.F. current across the primary of the first transformer, it should generally not be of greater value than .001 mfd. If the circuit will not oscillate with this condenser, it is probable that the trouble will be found with the valve or with the tuner.

If the circuit will oscillate over the entire range required, without the use of any by-pass condenser, then it is better to do without the latter condenser.

For condensers across H.T. batteries the larger the value the better, and moreover these condensers need not be of the low-loss kind, although they must be free from any danger of actual breakdown. Paper insulation condensers of 1 or 2 mfd. are often used for this purpose. They overcome the coupling effects due to the development of resistance in the H.T. battery with advancing age, and generally improve the performance of the battery.



The Savoy Orpheans both "on" and "in the air" during recent aeroplane broadcasting experiments.

HOME-MADE COILS FOR DAVENTRY.

(Continued from page 917.)

By swinging one coil towards the other, the tuning is effected without difficulty, and if the hinge is not too easy, the coil will

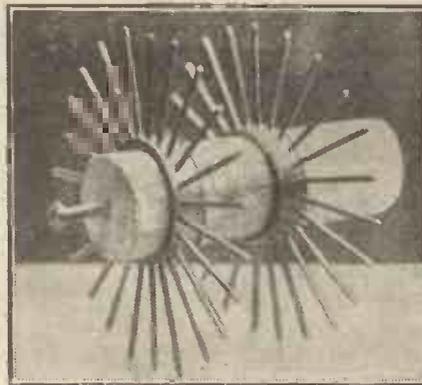


Fig. 5. Showing how the commercial coil winding former is divided and mounted.

remain where it is placed in relation to its neighbour.

In the photograph, the coils depicted are two Ledion 5 X X coils; but any of the

5 X X basket coils, obtainable for 1s. 6d. each, will suit admirably.

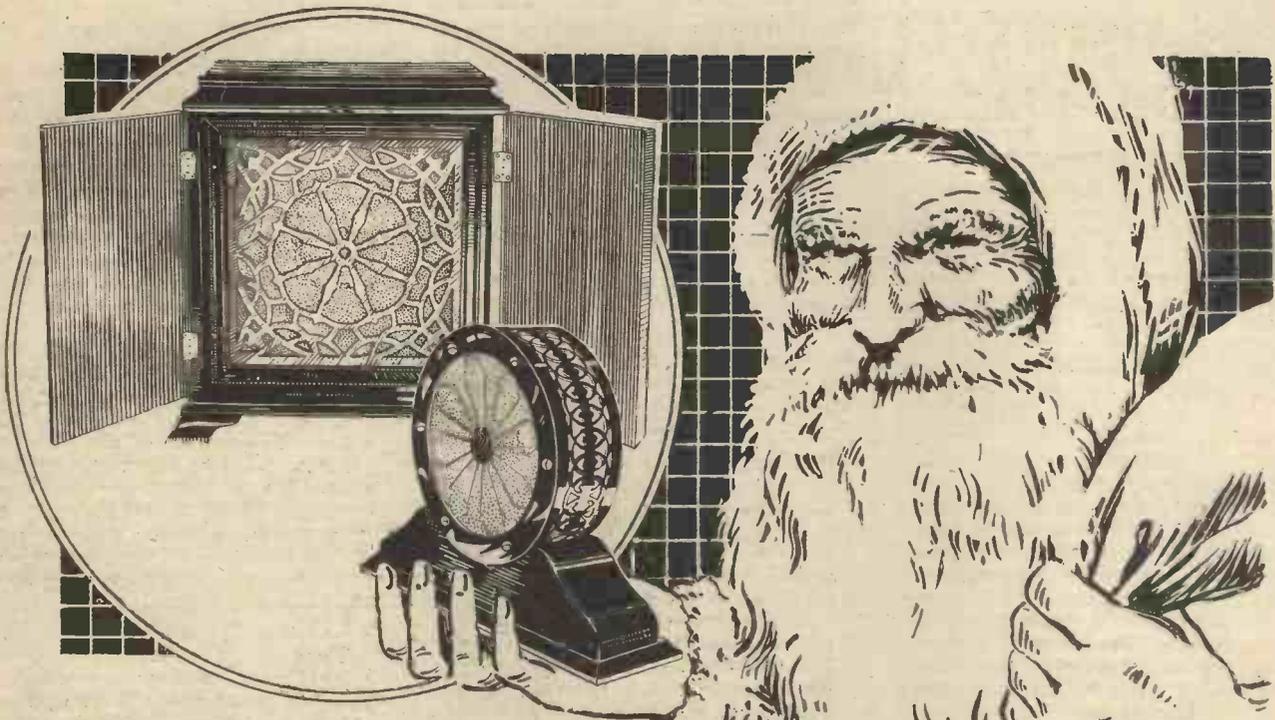
Mounting the Coils.

Note how they are mounted. Each one lies on a strip of ebonite, and a piece of a bone or vulcanite knitting kneedle is passed through two of the sections. Where it shows in the centre, a hole is drilled, and a screw passes through to the back of the ebonite, where it is held in place by a nut. In this way the coils are held quite solidly, but can be dismounted immediately by removing the centre screw. The photograph shows the twin coils mounted on a block of wood: but if a neat cabinet is made, they can be placed either within or at the back, according to taste.

TO BE PUBLISHED SHORTLY

A Special Article of Interest to all Unidyne Constructors

By CAPTAIN H. J. ROUND
(Chief Research Engineer, The Marconi Co.)



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The gifts that please are the gifts we all wish to give our friends. What more acceptable gift could there be than the latest and most up-to-date hornless loud speaker that is made—

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Mahogany £5 5 0 Oak £5 0 0

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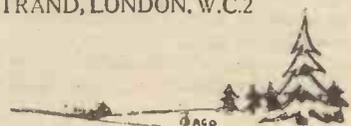
52/6 & 55/-

These models can be obtained at Harrods, J. Barker & Co., Whiteleys, Gamage's, Lewis' Ltd., Manchester and Liverpool, etc

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BECO





Traders and manufacturers are invited to submit wireless sets and component parts to the "P.W." Technical Dept. for test. All tests are carried out with strict impartiality in the "P.W." Test Room under the supervision of the Technical Editor, and the general reader is asked to note that this weekly article is also intended to provide a reliable and unbiased guide as to what to buy and what to avoid.—EDITOR.

A LOW-CAPACITY valve holder of interest is the F.A.V., a product of Messrs. F. Brown, Ltd., Langley Works, Long Acre, London, W.C. 2. A minimum of metal is employed, but nevertheless such is its design that smooth yet perfect contacts are possible even if, as is often the case, a valve's pins are slightly out of truth. The "self-cleaning" spring contacts are well sunk in order to prevent "H.T.-filament" tragedies, and it can be mounted either beneath or above a panel by means of one countersinking central screw. The F.A.V. sells at 2s., and can be thoroughly recommended.

The new Ferranti L.F. transformer, the A.F.3, is really excellent, and we congratulate Messrs. Ferranti, Ltd.; they have produced something that will set a standard

that many other manufacturers will have great difficulty in following. We were all the more impressed by the operation of the new Ferranti because it was tested under abnormal conditions. Subsequently to ordinary laboratory tests which amply corroborated the statements set forth in a leaflet accompanying the component, it was introduced into a certain receiver. Now, this receiver had not been giving the results expected of it, and naturally all its components were under a very black cloud of suspicion. The Ferranti, as a matter of interest, was substituted for one of the L.F. transformers in use, and the effect was surprising. Weak distorted signals were transformed into healthy, pure reproduction. Seldom have we experienced such a definite demonstration of efficiency. The high primary impedance and the low self-capacity of

the Ferranti in a circuit in which those factors are an important requirement, no doubt contributed in no small degree to the excellent results obtained. The A.F.3 has a ratio of 1 to 3.5, and is suitable for either first or second stages. It is retailed at 25s. and, in our opinion, is well worth the money.

Fixed condensers of useful shapes are "Paragon" one piece mica condensers. Standing on their edges, as it were, they occupy very little room on either baseboards or behind panels. They are provided with moulded casings so that they are absolutely protected from damp or the effects of normal changes of temperature. The makers, Messrs. The Paragon Rubber Manufacturing Co., Ltd., Sculcoates, Hull, recently sent us a number of samples of various values. These on test all proved to be very efficient. They held their charges well and showed but inappreciable errors from stated capacities. With every Paragon sold a guarantee is given, and this is so comprehensive that the purchaser is completely protected for an indefinite period against anything except faults arising from misuse.

There are but few crystals as sensitive as natural galena, and crystal enthusiasts will no doubt be interested to learn that selected specimens of a useful size are now being marketed under the name of "Sylverex" Radio Crystal Test size at 1s., complete with suitable cat's-whisker. Messrs. Sylvex, Ltd., of 41, High Holborn, W.C.1, inform us that they intend to carry out a vigorous advertising campaign in connection with

(Continued on page 922.)

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LET YOUR XMAS GIFTS THIS YEAR BE OUT OF THE ORDINARY AND ENSURE YOUR FRIENDS PLEASURE AND SATISFACTION THE WHOLE YEAR ROUND BY PURCHASING



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Obtainable at your usual trade house, or the Manufacturers—

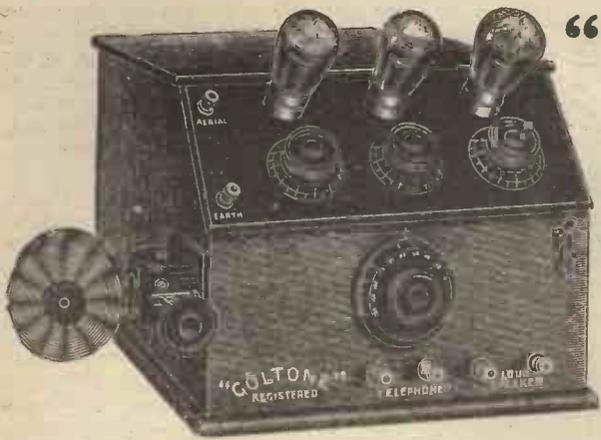
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Complete with ALL Accessories including "Goltone" Junior Loud Speaker, "Sampson" Accumulator, "Volex" Battery, Valves, Aerial Set, Plug-in Coils, Marconi Royalties. No extras required.

TWO-VALVE "B" SET. Gives Loud Speaker Reception within 40 miles of the main B.B.C. Stations and 150 miles from Daventry High Wave Station. **£12:2:6**

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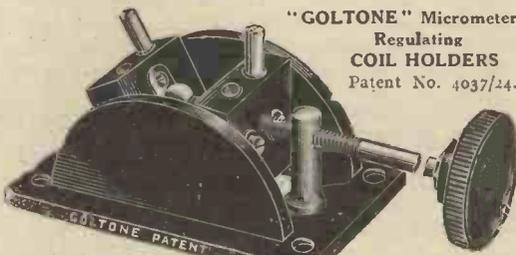
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DEALERS should enclose Business Card for Trade Terms. "Goltone" Specialities are stocked by the Leading Radio Stores. Write direct if unobtainable.



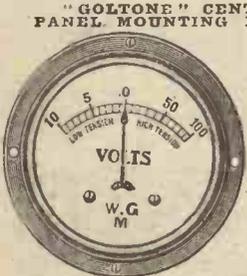
A handy Gift to every Crystal Set Owner. Enables 4 additional pairs of Telephones to be connected up simultaneously. Moulded insulated base, ebonite finish, nickelled terminals. Price 3/6.



The Best of all Coil Holders. Adds considerably to the Selectivity and Efficiency of the Receiving Set.
Two-Coil Type .. 7/-
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Refuse Inferior Substitutes.



Fine adjustment Condenser, permitting extremely critical tuning. Price 2/8.



Records the voltages of the high and low-tension batteries. Reading 10 Volts and 100 Volts. Price 12/9.
Panel Mounting Push Buttons 16 pair. Price 10/6.
Pocket Type Radio Meter. Price 10/6.



One-hole panel fixing. Sweet action. Ball contact. Complete as illustrated.
6 ohms .. 2/8 each.
12 ohms .. 2/9
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64 IN LONG OVERALL
TO HIGH & LOW TENSION PANEL TERMINALS.
4-way, providing 2 High-Tension and 2 Low-Tension Conductors. Price 3/- each.
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Firmly refuse substitutes and see the Trade Mark on the box



High-grade instruments wound on solid Ebonite Formers.
No. Metres.
R12/60 .. 80-150 }
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Patent Applied.
Should be attached to every valve set. An effective safeguard against the risk of Fire due to Accumulator faults. Price 1/- each.



Also at LONDON & GLASGOW.

APPARATUS TESTED.

(Continued from page 920.)

this crystal. We have carefully tested the several samples sent us, and there is no doubt that it is of very high quality and retailers need have no hesitation in bringing it to the notice of their customers.

Messrs. The Ludgate Radio Co., 56, Ludgate Hill, London, E.C.4, have sent us a number of their Thorpe K.4 valves for test. These valves were, of course, specially designed for Unidyne receivers and have been adopted the world over as standard for these sets. The samples sent us were carefully tested on aerial and gave extremely satisfactory results. The price of the Thorpe K.4 has for some time been reduced from 17/6 to 12/6, and at the latter price is obtainable from most dealers, or post free from the above concern.

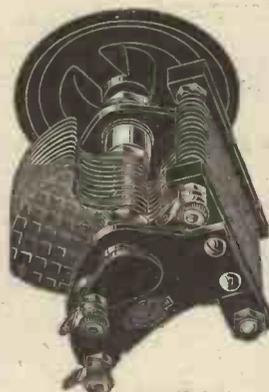
It would appear from our tests that this considerable reduction in price has in no way reflected upon the workmanship or efficiency of the valve.

In these circumstances we have no hesitation in recommending it to the attention of Unidyne enthusiasts.

A little component that should become very popular is the new Ediswan grid leak. It comprises a resistance element contained within a small vacuum tube. Its overall size is no greater than that of any ordinary grid leak. The result of this

method of construction is, of course, that the leak remains constant in value whatever are the atmospheric conditions and, within limits, whatever the applied voltage. Silent working is, therefore, guaranteed when one of these Ediswan leaks is in use, or, at least, should noises develop then one component can be ruled out as the cause. Even when we held a spirit lamp under the leak for a few moments while it was under test not the slightest resistance variation was recorded. Five sizes are available—0.5, 1.0, 2.0, 3.0 and 6.0 megohms at the standard price of 2s. 6d. each.

Ball bearings cannot be used indiscriminately in variable condensers, for the last thing we want is a dial that will swing round with the ease of a bicycle wheel. Nevertheless, carefully employed, the result is excellent—instance the ball-bearing Lamplugh variable condenser. Quite recently, it will be remembered, we reported upon the Lamplugh square law ebomite end plate model; now we have before us the higher-priced low-loss Lamplugh straight line variable. It is provided



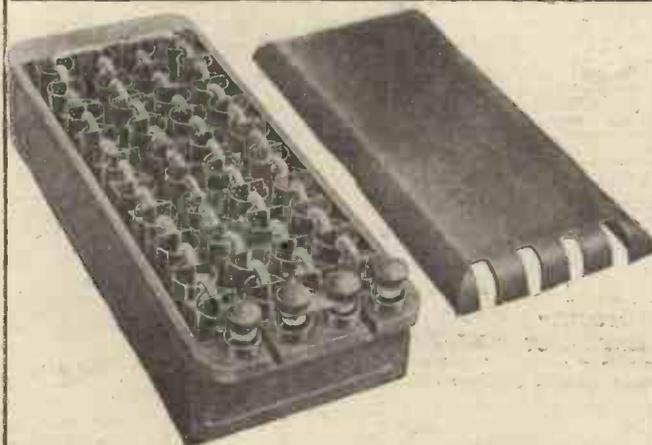
with metal end plates, shorted through a "pigtail" to the moving vanes, the fixed vanes being isolated by a minimum of ebomite. All this is most sensible practice, and we can only wonder why it is not more widely adopted. By means of the above-mentioned ball bearings a smooth, silky movement is obtained. Our report on the cheaper Lamplugh was to the effect that it was a good job, mechanically and electrically. The one at present under review is the same—de luxe.

Messrs. Autoveyors have sent us samples of their "Clix" Twin Plugs. Here we see one further adaptation of those popular little connectors, Clix. Two Clix are coupled neatly together to form one double plugging unit for H.T. and L.T. battery connections, or for telephone receivers, etc. The plug, complete with adapters (sockets for panel mounting), is retailed at 1s. With justification, Messrs. Autoveyors can claim that Clix are universal. There isn't much they cannot do in the way of connecting.

The new Lissen loud speaker unit, details of which have already appeared on our back cover, is truly excellent value for money. Its low price is startling in comparison with the price of other makes of loud-speaker gramophone attachments. That it is a Lissen, which is a guarantee of its quality, makes it all the more surprising. We have tested the sample sent us, and very good were the results that we obtained. Truly a quality loud speaker is now within the reach of all amateurs; the main item is the unit, which, as per Messrs. Lissens Lissenola, costs but 13s. 6d.

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The New C.A.C. HIGH-TENSION ACCUMULATOR.
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Three Types: "Regular" Type from 12/6; "Safety" Type from 17/6; "Self-Filling" Type (with patent Lever, as illustrated), No. 52, 17/6; No. 54, 22/6; No. 53, 27/6; No. 56, 32/6; No. 58, 42/- Clip cap, 1/- extra. Presenta-

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Use Waterman's Ideal INK—best for all Pens.



Hear the Programme through without a break on the new **Polar** Guaranteed Crystal

There are no interruptions for re-adjustment of catswhisker, with this new trouble-free Crystal, which has a flat surface composed of a large number of very small Crystals mounted together. On this surface your catswhisker or other contact more readily remains in position—vibration does not affect it, and the great number of sensitive facets makes adjustment easy. The Polar Crystal Detector, illustrated below, consists of a silver contact and the Polar Crystal, each fitting into a socket, mounted on your panel by two nuts (template provided).

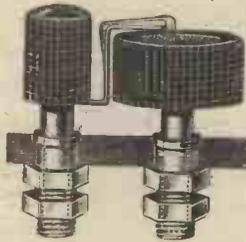


Showing Crystal partly removed from cup.

The Polar "Crystal" is sold in an ebonite cup, with mounting screw and nuts complete. From all Radio Dealers. Price **1/6**

The Crystal is interchangeable, and screws into the crystal cup—perfect contact ensured without woods-metal.

Price of complete Detector, in highly polished ebonite with sockets and nuts, all nickel-plated **3/6**



The following report on the Polar "Crystal" is reprinted from the "Manchester Evening Chronicle":—

It is significant of the numerical importance of the crystal user, that the Radio Communication Company, which has equipped some of the largest broadcasting stations in the world, should have thought it worth while to devise a crystal detector, one of which has been sent for test.

This is a beautiful little component. The Crystal and contact are separate units, and fit in the panel by means of two valve pins and sockets.

In place of the usual whisker a small plate of very thin and springy metal is used. The Crystal also is unique, it being a very fine-grained deposit on a circular metal plate.

The pressure and position can be varied all over the Crystal, and on actual tests on a low-loss

crystal set, this detector gave a remarkable reading of 160 microamps. on the transmission from 2ZY.

It can be recommended as a sound mechanical job and an ornament to any set.

There is one very noticeable point about a large number of present-day components. They are so beautifully made that it seems a pity to place them under the panel out of sight.

Probably after the present fashion of placing everything except the condenser dials under the panel, we shall have the usual reaction and find everything on the top. If this does occur the panel will not be disgraced, as components by recognised makers to-day have a beautiful finish and ultra efficiency.

RADIO COMMUNICATION CO., Ltd.,

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- Fadeless Love . . . Brahms
- I Will Not Doubt . . . Cowen
- Orpheus with His Lute . . . Sullivan
- Top of the Hill . . . Samuel
- Thou Art so Like a Flower . . . Schumann
- Once . . . Hervey
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- The Guardian Angel . . . Lehmann
- The Golden Vanity . . . Traditional
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- etc., etc., etc.

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- Valse in D Flat . . . Chopin
- Fifth Symphony, 3rd Movement . . . Beethoven
- Consolation . . . Arensky
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CURRENT TOPICS.

By THE EDITOR.

A Radio Christmas—Sir Arthur Stanley and the Future of Broadcasting—Post Office Control?

ONCE more we have the opportunity of wishing our readers a happy Radio Christmas and a prosperous New Year. It is pleasant to think that radio will undoubtedly bring real joy to many thousands of people this Christmas. We have but to think of the hospitals to realise how great a boon a wireless set must be to those unfortunate patients who, by sickness or injury, are prevented from enjoying the spirit of Christmas by the family fireside. Think again of the countless children to whom the festivities of Christmas are but a legend and to whom a pantomime is an unattainable fantastic joy. Yet broadcasting will carry its message of pleasure and comradeship to many a child this year who, in other circumstances, would have passed but a cheerless Christmas.

Sir Arthur Stanley and Broadcasting.

We seldom indulge in newspaper sentiments, but in this issue we feel readers will join us in a sincere appreciation of the benefits broadcasting can bestow this Christmas. And should you feel urged to help, why, any hospital will thankfully receive that which you give to help along the fund for Wireless in the Hospitals.

Sir Arthur Stanley, president of the

Wireless League, recently gave his views on the future of broadcasting.

Sir Arthur thinks the present broadcast service has been well built up, the programmes being good and including items to suit all tastes; whilst on the technical side transmission has been brought to a high standard.

Sir Arthur, however, still regards the B.B.C. as a monopoly, and he says, "A monopoly is apt to create public prejudice, and there will probably have to be some change in administration.

The Word "Monopoly."

"A central control is essential. A system of competitive programmes would not be to the advantage of the listener. Money from licences would have to be divided, and it would not be possible for anyone concerned to be able to afford the high fees necessary for the best artistes.

"It is probable that the future system of broadcasting will be run on the lines of the B.B.C., but as a Government monopoly instead of a private monopoly, functioning so that it will be answerable to public opinion."

It is too late in the day to reiterate the arguments that the B.B.C., as at present constituted, is not a real monopoly. Critics of the B.B.C. have used the word monopoly

with but little discrimination; the word has been distorted in order to fit in with the arguments of those who dislike the constitution of the B.B.C.

In our opinion, and, let it be said, in the opinion of many expert financial, political and economic critics of the B.B.C.—that company is not monopolistic. We invite Sir Arthur to again closely examine the constitution of the B.B.C., and then to compare it with a Government monopolised concern.

A Possible Disaster.

It is Sir Arthur's forecast of the future of the B.B.C. that we dislike, yet, at the same time, feel instinctively that some such system as he mentions will be brought into force when the B.B.C.'s licence expires.

As a Government monopoly Sir Arthur says that the B.B.C. will be "answerable to public opinion." Theoretically it will—in practice we doubt if it will. We have a first-class example of Government monopoly in the telephone, and if there is any monopoly which answers so slowly—both in the actual work carried out by its 'phone operators and by its organisers and chiefs when public disapproval is expressed—we should be glad to hear of one.

Frankly, the greatest disaster which could overtake British broadcasting is that of Government control. If any of our readers belong to the Wireless League, and are invited to ballot on this question, we urge them to consider the proposition very carefully before they vote. Review the B.B.C. impartially and ask yourself, "Could any Post Office or other Government department equal it for efficient service?" The answer is an emphatic "No!"

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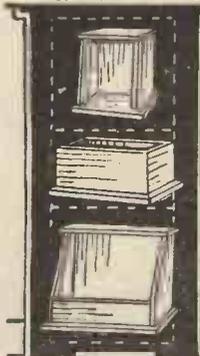
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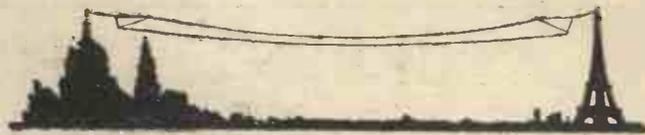
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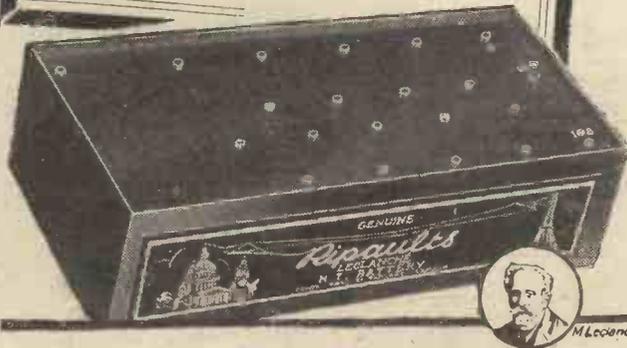
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London, E.C.4. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

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

TECHNICAL QUERIES.

Letters should be addressed to:
 Technical Query Dept.,
 "Popular Wireless,"
 The Fleetway House,
 Farringdon Street,
 London, E.C.4.

They should be written on one side of the paper only, and **MUST** be accompanied by a stamped addressed envelope.

Queries should be asked in the form of the numbered questions: (1), (2), (3), etc., but may be accompanied by a short letter giving any necessary additional particulars as briefly as possible.

For every question asked a fee of 6d. should be enclosed. A copy of the numbered questions should be kept, so that the replies may be given under the numbers. (It is not possible to reproduce the question in the answer.)

IMPORTANT.—If a wiring diagram, panel lay-out or list of point-to-point wiring is required, an additional fee of 1/- must be enclosed.

Wiring diagrams of commercial apparatus, such as sets of any particular manufacture, etc., cannot be supplied. (Such particulars can only be obtained from the makers.)

Readers may submit their own diagrams, etc., for correction or for criticism. The fee is 1/- per diagram, and these should be large, and as clear as possible.

No questions can be answered by 'phone. Remittances should be in the form of Postal Orders.

Questions and Answers

GRID LEAK.

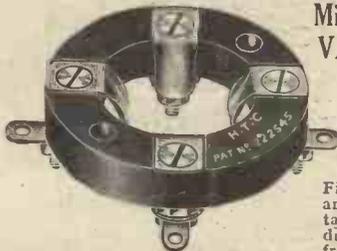
A. H. C. (Bolton).—Could you please give me full particulars of a wire-wound grid leak having a resistance of approximately 1 megohm (10,000 ohms)?

A suitable grid leak would be constructed as follows: A piece of ebonite rod 1½ in. in diameter should have eight grooves ¼ in. deep and ⅜ in. wide. Each should contain 1,000 turns of No. 38 "Eureka" wire, preferably D.S.C. It is not necessary to take any pains to ensure that the grid leak windings shall be non-inductive, as no great advantage is

(Continued on page 928.)

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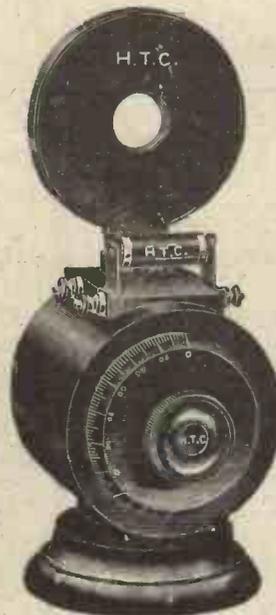
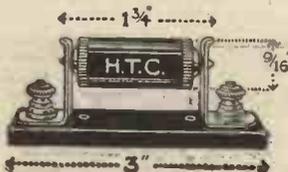


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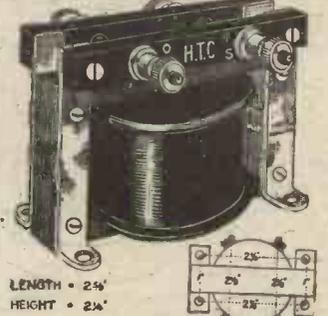
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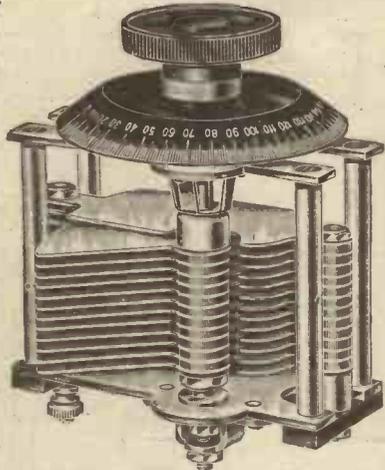
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RADIOTORIAL QUESTIONS & ANSWERS.

(Continued from page 928.)

trouble in making the valve oscillate when the L.F. valve is switched in. With the detector only, everything is quite O.K., but on switching the L.F. in I find very tight reaction coupling is necessary before the set will oscillate. Amplification seems to be O.K., and changing the connections of I.P. and O.P. and O.S. and I.S. of the transformer only decrease the amplification without assisting in the oscillation problem.

In all probability you would find that a .002 mfd. fixed condenser across the I.P. and O.P. connections of the transformer would assist matters, while the reversal of the transformer itself may be beneficial. This means leaving the connections to the transformer as they are at present, but moving the whole instrument so that the secondary side faces where the primary used to face, and vice-versa. It has been found that occasionally the field of a transformer will oppose reaction, and until the transformer has been reversed all efforts at obtaining satisfactory reaction have been fruitless.

THE N. CIRCUIT.

"JOLFER" (Belgium).—When will Sir Oliver Lodge's new circuit appear?

The circuit is, we believe, still the subject of experiment.

LEAKAGE FROM ACCUMULATOR.

A. H. L. (Montreuil).—The acid from my accumulator is leaking from the bottom edge of the celluloid. How can this be prevented?

Amyl-acetate may be used for cementing together celluloid. Some shredded celluloid should be dissolved in the amyl-acetate to a consistency of thin cream, and this cement then applied to the parts that require uniting. Note that this material is highly inflammable and should therefore not be used near a naked light.

WORKING OUT INDUCTANCES.

E. F. (Woodford Green).—How is the inductance of a coil calculated? Give example.

The following formula is an approximate method of calculating the inductance of a coil:

$$L = 4\pi \frac{A^2 N^2}{l} \times 10^{-9} \text{ henries}$$

A = sectional area of the coil in sq. cm.
N = number of turns.
l = length of coil in cm.

For instance, with a coil of 10 cm. diameter, 100 cm. long, with 2,000 turns, the sectional area will be πR^2 , so that

$$A = \frac{\pi}{4} \times 5 \times 5 = \text{sq. cm.}$$

$$A = \frac{550}{7} \text{ sq. cm.}$$

Substituting the formula given above:

$$L = \frac{4 \times \frac{550^2}{7^2} \times 2000^2}{100} \times 10^{-9} \text{ henries}$$

$$L = \frac{1936000000}{4^9} \times \frac{1}{10^9} \text{ henries}$$

$$\text{and } L = \frac{1,936}{49,000} \text{ henries}$$

= 0.039511 henries or 39,511 microhenries approximately, ignoring for simplicity the correction factor.

SAFETY FIRST.

"NERVOUS" (Partington, near Manchester).—Is an aerial dangerous to erect because it also acts like a lightning conductor? Would a separate lightning conductor on the mast be a safeguard?

The aerial itself forms an efficient lightning conductor, and is therefore actually a safeguard if it is directly earthed. The down lead should go to earth in a straight line without entering the house, and this can easily be arranged with an outdoor switch (which connects up the instruments when desired but is normally "shorting" between aerial and earth leads). In the circumstances a lightning conductor on the mast is hardly necessary, but, of course, it can be erected if desired.

EARTHING ARRANGEMENTS.

F. S. E. (Bootle, Liverpool).—I am not satisfied as to the best way to make an earth connection. Should the earth-wire be insulated, and is a water-pipe earth really a good and satisfactory method?

The earth wire does not require insulation, but should be as short and as stout as possible. A water-pipe makes a really first-class earth connection, although a large plate of metal or a long metal rod buried in fairly moist earth is to be preferred, if it can be arranged. The earth wire should be soldered to its earthing point, if possible.

REFLEX RECEIVERS.

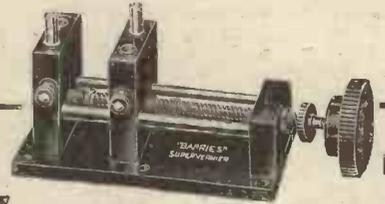
A. R. I. M. (Leytonstone).—What is a reflex circuit arrangement, and how does it work?

The simplest form of reflex circuit makes use of one valve and a crystal. The incoming oscillations are passed through the valve and are amplified in the usual way, and then they are rectified by a crystal. After rectification they are passed, via an L.F. transformer, back to the grid circuit of the valve. This means that the L.F. impulses are passed through the valve and the valve now acts as an L.F. amplifier. Finally, the L.F. currents are passed through the telephones.

The result of this arrangement is that the one valve is made to do the work of two, that of an H.F. amplifier and also that of an L.F. magnifier. As a matter of fact the results obtained are a little less than those achieved by a three-valve set, because the valve, though acting as a dual amplifier, does not perform both the amplifications to such a degree as would two valves.

A valve can only pass a certain amount of current, and therefore the amplification of either the H.F. or L.F. currents has to suffer slightly. The set, however, is very efficient, and forms one of the most economical one-valve receivers yet devised.

With a well constructed and handled single-valve reflex circuit—they are very easily constructed and operated—loud-speaker signals strong enough to be heard all over a small room should be obtained at distances up to 15 miles from a broadcasting station. Reaction upon reflex circuits does not seem to have its usual effect, and it is only useful for fairly long-range reception. At close range or on loud signals reaction appears to paralyse the circuit and cause a loss of signal strength; at any rate, it does not give an appreciable increase in the loudness of the received signals.



7/- "BARRIE'S" SUPER VERNIER **7/-**
EACH TWO-WAY COIL HOLDER. EACH

NO SPRINGS. NO GEARS. NO BACKLASH. SUPER VERNIER MOVEMENT. UNIVERSAL FIXING.



EMC
FILAMENT DIMMER
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VALVE HOLDER
COMBINED.

REGISTERED DESIGN NO. 714339

PRICE, COMPLETE—

0-5 OHMS	5/9
0-10 "	6/-
0-20 "	6/3
0-30 "	6/6



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AS USED IN "P.W." 4-VALVE SET.

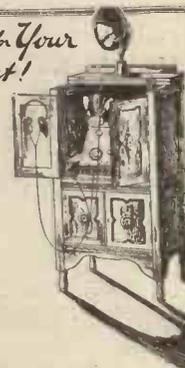
Wholesale only

ENTERPRISE MFG. Co. Ltd., Wireless Dept.,
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Telephone: GERRARD 3018, 3019, 4191.

The Home for Your
Wireless Set!

From £4.15.0

An Ideal Christmas Gift



No better present can be given to the Wireless amateur than the "Morris" Standard Wireless Cabinet in which any receiver or panel can be accommodated up to 30" x 18". For an outlay of about £5 the value of any wireless installation is increased ten-fold, and think of the comfort and safety it provides. We supply from stock the best cabinet on the market, guaranteed perfect workmanship. No plywood used. Net weight of smaller size 56 lbs.

Write at once for further particulars to:—

MAKERIMPORT CO.
(Dept. 5.)
Melvill Chambers, 50a, Lord St., LIVERPOOL

GENUINE BONTONE ORIGINAL PHONES

Britain's best, clear as a bell. Beware of spurious imitations offered by miscellaneous dealers. Buy the best and improve your Crystal set, as per testimonial just received.

31, Cressingham Road,
Lewisham.

I beg to acknowledge receipt of Bontone Phones. I am perfectly satisfied with them; they are perfect value for the money. They have made reception on my crystal set two-fold as strong. (Signed) W. R. Lillington.

PRICE 11/6 POST FREE Sold under Guarantee. We will replace if phones do not give complete satisfaction. British made throughout.

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STOP, Local Station PASS, Distant one!

Clarke's "ATLAS" Aperiodic Coupler effectively controls the crowded ether. To know what ultra-selectivity *really* means, simply slide one into the core of any make of coil. The troublesome station vanishes, and the wanted one comes in with an ease that's certain to please.

Suitable for all wave-lengths from 200 to 600 metres, it is an indispensable aid to the experimenter. Stations can be logged and the set calibrated quite independent of what future changes may be made to size or type of aerial.

Prod. Pat. No. 15753.

"CLARKE'S" ATLAS APERIODIC COUPLER

Write for New Radio Catalogue H.

Sole Manufacturers: **H. CLARKE & CO. (Mcr.) LTD.,** Atlas Works, Old Trafford, MANCHESTER.

7/6
EACH



IMPORTANT NOTICE

THE MAXEL WANDER-PLUG TERMINAL IS NOW ON SALE. This is a fitting that should be on every set and battery where a quick change of connections is desirable. **NON-CORROSIVE.**

Trade enquiries invited. April 25th, 1925. Extract from "Popular Wireless." The tops of the terminals, which can be used in the ordinary manner if desired, form sockets into which standard wander plugs can be inserted similarly to an H.T. battery. This is an improvement which is decidedly a brain-wave, and one of those obvious little things which are overlooked until some genius brings it to light and then everybody wonders why everybody did not think of it.



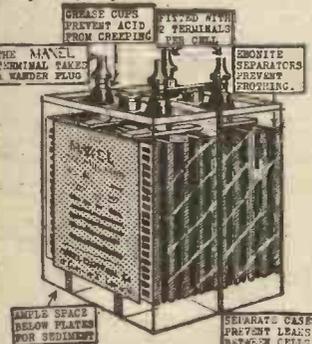
PROV. PAT.
4^d POST EACH FREE.

The New MAXEL Accumulator

Specially designed for Wireless GUARANTEED TWELVE MONTHS. If you live too far away to call and see the Battery Mail your Order to us for the size you want. We will willingly return your money if you are disappointed. Now fitted with NON-CORROSIVE Wander Plug Terminal.

	AMPS			
	40	60	80	110
2 VOLT	7/6	9/6	11/9	14/6
4 VOLT	15/-	18/-	22/6	28/6
6 VOLT	22/6	27/9	33/6	39/-

Packing 1/- extra per battery.



H.T. BATTERIES 60 VOLT—POST 7/6 FREE

What Maxel users say!

Maxel Electrical Co. Belfast, 5/9/25. Dear Sirs.—I am not in the habit of writing firms in praise of their products, but your accumulator and battery which I have received urge me to do so. I only wish to say that you, the Maxel Electrical Co., live up to every point you advertise. It is one thing to look at the advertisement of your accumulator and quite another to look at the article itself, and, above all, use it. It is then that one can appreciate all the smart points of the Maxel, and realize just what an accumulator should be. I shall recommend them to anyone I know who is wanting a battery. Yours, etc., E. A. B. **MAXEL ELECTRICAL CO., 28, Clipstone Street, Great Portland Street, W.1.** Telephone: MUSEUM 708.

FAULTY INSULATION!



Solder those joints with FLUXITE, and they become one unbroken piece of metal. You will be surprised at the improvement in the quality of your reception.

FLUXITE SIMPLIFIES SOLDERING and makes it easy for every wireless enthusiast to ensure maximum results from his set.

Ask your Ironmonger or Hardware Dealer to show you the neat little

FLUXITE SOLDERING SET

It is perfectly simple to use, and will last for years in constant use. It contains a special "small space" Soldering Iron with non-heating metal handle, a Pocket Blow-lamp. FLUXITE, solder, etc., and full instructions. Price 7/6. Write to us should you be unable to obtain it.

Price 7/6



FLUXITE SIMPLIFIES SOLDERING

All Hardware and Ironmongery Stores sell FLUXITE in tins, price 8d., 1/4 & 2/8.

Buy a Tin To-day. **FLUXITE LTD. (Dept. 324), West Lane Works, Rotherhithe, S.E.16.**

ANOTHER USE FOR FLUXITE. Hardening Tools & Case Hardening. **ASK FOR LEAFLET on improved methods.**

We three make your efforts successful

WE THREE are built by "Energoproducts, Ltd." We've been made specially to add volume and selectivity to any receiver. Whatever your circuit, you only need to incorporate us to get the best possible results. You can buy us from any good Dealer and each one of us is guaranteed for 12 months.



THE ORPHEAN.

A Shrouded L.F. Transformer of unique design, the "Orphean" gives remarkably distortionless reproduction throughout the complete range of audible frequencies. Combining purity of tone with reliability and extreme mechanical strength it should be in every experimenter's and music lover's receiver. That it is used by a number of leading receiver manufacturers is additional proof of its superiority.

Ratio 1-3, 19/6 Ratio 1-5 21/- Other Ratios, 21/- Open Type, 15/-

'ENERGO' TUNING COILS.

Ebonite Shielded. Specially designed low-capacity coils, they add selectivity and distance to any receiver.



Prices:

No. 20	3/9
" 25	3/9
" 35	4/-
" 50	4/3
" 75	4/6
" 100	5/6
" 150	6/3
" 200	7/3
" 250	7/6
" 300	8/-
" 400	8/6
" 500	9/-

'ENERGO' BATTERY SWITCH.

For perfect battery control, H.T. or L.T., neat, simple, and efficient. No



extra wires, no holes in panel, no loss of current, no trouble. Just screw it on your L.T. or H.T. terminal. 1/3

Send for illustrated list of our many products, including H.F. Transformers. Of all dealers. If you cannot obtain, send direct:-

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Telegramme: "Energofad, Smith, London."
Telephone: Clerkenwell 7360.

BROADCAST NOTES.

(Continued from page 882.)

in widely differently situated parts of the country for more of the London programmes to be relayed.

When Daventry started an endeavour was made to put out a proportion of programmes alternative to London. Thereupon the agitation against the innovation at once took form, and has now reached considerable proportions.

It is only right that our broadcasting authorities should be responsive to the movement of public opinion, but sometimes I think that the B.B.C. is perhaps too sensitive, and is inclined to "spoil" its listening public. But, anyway, it is a failure on the right side, and I hope never to have to accuse our broadcasters of rigidity or Napoleonic policies. In this connection, I shudder to think what might be our fate if broadcasting were incorporated in the telephone system.

End of the B.B.C.?

Having accepted the formula of the British Broadcasting Commission to replace the British Broadcasting Company, the Government Committee is in a state of considerable perplexity on the subject of recommending how the Commission is to be appointed from the so many conflicting interests. There is a possibility of so much trouble in the event of any set of opinions prevailing, that there is now a tendency on the part of the Committee to fall back on a formula which will give the B.B.C. a further tenure of some years while the difficult problem of the future is being thrashed out.

It is just as well that this possibility is being kept in mind. Listeners, no doubt, have reason to criticise the B.B.C. not infrequently, but there would be a general alarm and tremendous dissatisfaction if the B.B.C. were brought to an end without a satisfactory substitute.

Moreover, the much abused wireless manufacturers are following a very wise policy by remaining in the background and threatening nothing. Those who have been engaged in abusing them will perhaps have to come to them on bended knees to continue to exercise the stewardship of British broadcasting. When everybody else quarrels, the manufacturers will have to step into the breach. Anyway, they are not going to be excluded.

SCHOOL STORIES AND ADVENTURE.

ANY of our readers who enjoy a rattling good school story or a stirring tale of adventure will find the new issues of THE HOLIDAY ANNUAL (6s.) and CHAMPION ANNUAL (6s.) packed with entertaining fare from beginning to end. The Boys of St. Jim's, Greyfriars and Rookwood Schools figure in the HOLIDAY ANNUAL. Their exploits are exciting and amusing to a degree. Thrilling adventures on land and sea—at home and abroad—will be found in the CHAMPION ANNUAL. There is not a dull moment in either book. Both Annuals are strongly bound, have superb coloured covers and are fully illustrated throughout. They are now on sale at all booksellers and newsagents.

LIBERTY PERMANENT DETECTOR

The Original One-Hole Fixing Detector.

Stop Fiddling with Cat's Whiskers.

Refuse inferior imitations. Insist on seeing the name "Liberty".

Technical Reports. Amateur Wireless: Popular Wireless: Wireless Weekly:

Every Liberty tested on actual broadcasting and fully guaranteed.

50% more efficiency
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"THE" 100% DETECTOR

The "Liberty" Detector gives more sensitive reception Permanently than a cat's-whisker gives Temporarily. No hunting for that "special spot" lost by the slightest vibration. The "Liberty" is entirely unaffected by vibration, sensitive all over, and that loud spot cannot be lost.

Radiarc Electrical Co., Ltd., Bennett Street, London, W.4. From all dealers or direct **PRICE 3/6 COMPLETE**

RADIO "CROXSONIA" PANELS

Money back guarantee that each and all Panels are free from surface leakage, Meggar test Infinity. 8" x 5", 1/2; 7" x 6", 1/3; 9" x 6", 1/7; 10" x 8" 2/1, 11" x 8" 2/3; 10" x 9", 2/4; 12" x 8", 2/6; 11" x 9", 2/7; 12" x 9", 2/10; 12" x 10", 3/-; 14" x 10", 3/5; 14" x 12", 4/-; 7" x 5", 1/-, 1/2" thick. Post Free. Callers, cut any size, & quote by Post, or Phone Clerkenwell 7853. Sample & prices, post free to the Trade. CROXSONIA CO., 10, South St., MOORGATE, E.C.2.

The **FAMOUS** GENERAL **RADIOPHONES.**

YOURS for **6/-** DEPOSIT

Latest Standard Model General Radiophones (made by the well-known General Radio Co., Ltd.) Super Sensitive and Highly Efficient. Receiver matched in tone. Magnets of highly expensive Cobalt steel. Diaphragms triple tested. Beautifully comfortable, highly finished, weight 7 ozs. Fully guaranteed. Sent on receipt of 6d. deposit. If satisfied, send 2/6 on receipt and balance by instalments of 5/- monthly until only 21/- is paid. Price, full cash with order (or within 7 days of receipt), £1. **SIMPSON'S (BRIGHTON) LTD.** (Dept. 1623), 94, Queen's Road, Brighton, Sussex.

WIRELESS MASTS

50 ft. Complete sections to make 27/6
35 ft. Masts. 33c Elm Rd., Aldershot. 22/6

AGGUMULATORS

Great Opportunity! Large stock to be cleared at great reduction. All renowned makes and brand new. Cash refunded with carriage both ways in case of return.

2v-40a...	8/3	4v-80a...	16/6	6v-40a...	24/6
2v-60a...	10/-	4v-60a...	20/3	6v-60a...	30/1
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2v-100a...	14/1	4v-100a...	27/8	6v-100a...	41/6

Dispatched immediately on receipt of order. We accept responsibility for any damage in transit. **MAUDE RUBBER CO., 58, FRAED ST., W.**

REPAIR SERVICE.

HEADPHONES RE-WOUND and thoroughly overhauled, 4/6. Overhauled 3/-.

LOUD SPEAKERS from 3/6. Valve Sets repaired, altered, or re-commenced. Keen prices. Postage free. Delivery three days.

MIDLAND PHONE REPAIR SERVICE.
56, Branson Street, BIRMINGHAM.

F.W. JOURNALDERS'
EBONITE
PANELS

Correspondence

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed, but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—Editor.

FILAMENT TEMPERATURE.

The Editor, POPULAR WIRELESS.

Dear Sir,—A point which I believe would be of great interest to your readers, and which I have failed to find commented upon in any wireless journal which I have read, is that of filament temperature, especially in its relation to range and reaction.

I use a crystal and one-valve reflex receiver which I made myself—I will not trouble you with the circuit—and I find that when I have tuned to a distant station (Radio-Toulouse, Munster, Hamburg, etc.), I can increase the signal strength by increasing the filament temperature without causing any howls if the reaction coil is not too tightly coupled to the grid coil. Conversely, if the coils are coupled too tightly and a howl be produced, loosening the coupling will cause signals to fade right away, whereas decreasing the filament temperature will eliminate the howl while maintaining signal strength at audible volume.

If this use of filament temperature is bad practice, I should be glad to be told about it, and I dare say that many of your readers would also be glad of the warning. On the other hand, if it is a useful and proper method of control, I am sure there must be thousands of listeners who would appreciate the hint.

I would like to add that since I discovered POPULAR WIRELESS some months ago my weekly expenditure on wireless papers has dropped from several shillings per month to threepence per week.

Yours faithfully, C. J. JACOBS.

Swithland, Thornbury Road,
Osterley Park.

Filament Control should be used on all receivers as long as the valves are not over-run.—TECH. EDITOR.

THE B.B.C. "TALKS."

The Editor, POPULAR WIRELESS.

Dear Sir,—In reading your editorial notes in a recent issue of POPULAR WIRELESS I should like to add my humble endorsement of the criticism of "The New Statesman." He hits the nail right on the head re "the potted science and history." Of course the majority shut down when these talks by indifferent speakers, who more often than not splutter, hesitate, and speak with a plum in their mouth, come on.

The primary object of the B.B.C. is to entertain. Why do they not give us more music of a light and tuneful character? I should like to know.

Take the programmes as obtaining at present. Why should we have to wait till 10.30 p.m. for a bit of dance music, and then sit up till 2 a.m. listening to it?

No, the whole of the present programmes want at least 30 per cent more tuneful music. Why is De Groot so popular? The answer is not far to seek. I know this much—that the one hour's transmission from Radiola, Paris, on Sunday dinner-time is worth all the programme the B.B.C. put out on any Sunday.

Another thing, I take strong exception to your remarks about the B.B.C. being a success. Of course they are a success. If I opened a little general shop next to the Home and Colonial or Lipton's, and the Government forced people to purchase in my shop under the threat of imprisonment, I should be a success. I could not help it.

No, sir, these confounded talks and twaddle have got to be cut out.

I know several who have not paid their licence yet for this reason and it is not because they cannot afford it.

I have taken out three consecutive licences, viz. 1922, 1923, 1924, but not for 1925.

This is not because I cannot afford it or wish to shirk my obligations, but to show my resentment of the B.B.C. programmes.

I have offered the P.M.G. 2s. 6d. as his share of my dues to the State. The matter is in abeyance at the moment, as I only wrote about two months ago. I may have some interesting news for you in another two or three months!

Trusting you will at least see some of my logic.

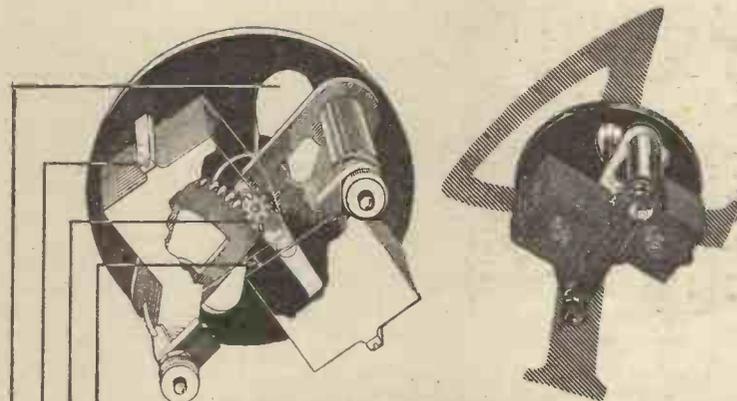
I am, dear sir, Yours faithfully,
R. S. RUDLAND.

30, Gipsy Road, Welling, Kent.

THE BETERTON White Paraffin Wax-filled H.T. Batteries. Renew your H.T. for the Christmas festivities, and so avoid the disappointment of a breakdown by used-up batteries.
45-v. Grid Bias 1/9; 15-v. 2/3; 56-v. 5/1.
45-v. 5/9; 50-v. 8/6; 50-v. 7/6. Wandle plugs, 6d. per pair. Adjustable Phones, 10/6 pair. An ideal Xmas present. Microstats, 2/9. To ensure delivery before Christmas, send at once and we will post your requirements by return.

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The Newey "4 Point" Condenser



REVOLUTIONARY POINTS

- ① NO HAND CAPACITY—The specially designed bakelite plate on which the Condenser is mounted, is slotted to minimise self-capacity and completely isolate the moving vanes from the control knob.
- ② ZERO LOSS—To secure true zero loss all plates are welded into a slotted equaliser bar. Any other method of spacing the vanes results in an appreciable loss. No rubbing contact is employed.
- ③ 360° CONTROL—The moving shaft is connected to the vanes by means of bakelite sectors which are fitted with anti-backlash springs and these sectors insulate the vanes from the control. No vernier is necessary since the condenser drive is geared and calibrated over a range of 360°.
- ④ NEGLIGIBLE MINIMUM CAPACITY. The lowest capacity position of the vanes places them well apart and thus secures the extremely low minimum capacity of only 0.000003 microfarads as certified by the National Physical Laboratories. The complete Condenser operates on the square law principle, is beautifully finished and made by all British Labour in all British Factories from the finest available materials.

PRICE:

Complete with knob and dial.

*0005 mfd. 17/6

*0003 mfd. 15/-

Report in
"BROADCASTER" (Nov.)

"A noticeable feature is the high-class workmanship . . . When tested in critical oscillating circuits no losses were apparent, while on practical test in a valve receiver the actual performance was highly satisfactory."



Newey's

Ask any dealer for the "Newey" Leaflet for full information. If you have any difficulty, write for name of nearest supplier. Wholesale Distributors: FITZGREW & MERRIMAN (1925) LTD. (and Branches), 122-124, Tooley Street, London, S.E.1. Telephone: Hop 134



Pick your Xmas Programme from afar off with the . . . **L & P fine tuning Coil Holder**



Easily fixed in place of your present jerky coil holder. It makes the tuning in of distant stations sure, easy and definite. If unable to obtain locally, write for free book.

LONDON AND PROVINCIAL RADIO CO., LTD., 35, Colne Lane, Colne, Lancs. **8/6**



PATENTS, TRADE MARKS. Inventions Advice Handbook & Consultations FREE.—**B. T. KING, C.I.M.E.**, Regd. Patent Agent (G.B., U.S. & Canada), 146A, Queen Victoria Street, London, E.C.4. 40 years' references.

POLISH YOUR PANELS
with our Ebonite Polishing Paste, gives a brilliant glassy surface, equal to the best, non-metallic, non-conductive. Can be used by anyone, results guaranteed.
1/2 per tin, post paid.
BRAILSFORD BROS., Regent Street South, Barns 1 cy, Yorks.

HEADPHONE REPAIRS
Re-wound, 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.

EBONITE BUSHES
FOR MOUNTING ON WOOD. PERFECT INSULATION. Two required for each hole.
Orders under 1/- send 1d. postage.
NUMBER 1 2 3 4 5
Size of hole 3/8, 2/4, 1/4, 3/16, 3/8"
Price each: 1d. 1d. 1d. 2d. 2d.
DAREX RADIO CO., Standard Works, Forest Hill, S.E.23.

"LYN DIN" Permanent Crystal Detector. Needs No Adjustment.
JOHN WALKER & CO., Lancashire Court, New Bond Street, W.1.

1 VALVES Repaired Quick
Let our valve making plant repair your broken or burnt-out valves efficiently and promptly (most makes). Amplification, radiation, and current consumption guaranteed same as new.
Bright emitters 5/- "D.E.s" (2 and 3 types) 7/6. **RADION Ltd.**, Holington, nr. Macclesfield, Chas. Largest Valve Repairing Firm in the world. List Free.

FOREIGN RADIO NEWS.

From Our Own Correspondent.

Wireless in "Rhineland."
GREAT satisfaction has been caused in German radio circles by the announcement by the Allied authorities that the ban on the use of radio and the Rhineland and occupied districts of Germany has been lifted.
It is expected that one powerful station, at least will be installed, possibly at Cologne or Mannheim, and that thousands of persons will avail themselves of this opportunity to become listeners.

The announcement is taken to be part of the new policy of conciliation consequent upon the Locarno Treaty.

Dairymaid Radio.
Dr. von Stetten, a noted German physiologist, as the result of experiments among the cattle in the high feeding grounds of the Alps this summer, announces that cows give more milk if, while they are being milked, music is played.

The music employed was that broadcast by Swiss radio stations, by means of a loud speaker in the neighbourhood of the cows while the milking process was going on.

A Swiss cartoonist takes the opportunity for drawing a cartoon showing "the latest style of headphone for radio for cows."

Important Radio Appointment.
It is announced that Professor Zickendraht, of the University of Basle, has been nominated for the position of technical adviser to the International Radio Bureau, the seat of which is in Geneva. The bureau is at present still busy on an entire re-organisation of European wave-lengths.

New German Coastal Station.
The German postal authorities announce the opening of a new coastal radio station designed to serve shipping entering and leaving the mouth of the Weser.

The station is in two parts—the receiving station being at the head post-office, Bremerhaven, and the transmitting one at Wuhlsdorf. It will be known as Bremerhaven station, and its call number is K B H.

These letters have been used hitherto by the North German-Lloyd station in the Lloydhalle, Bremerhaven, but the latter will henceforth use the letters K A B.

Belgrade Station Developments.
In view of the rapidly increasing interest taken in radio in Serbia, the Belgrade station announces that it has engaged the well-known Todo Jazz Band, which gives daily concerts in the Palace Hotel, Belgrade. This band, which is well known in Paris, London and Berlin, will play daily for broadcasting at 5 p.m., Greenwich Time.

(Continued on page 935.)

MAKE YOUR OWN "TURRET" AERIAL MASTS.

- PINE POLES: 13 ft. 2 1/2" base 7/9; 16 ft. 2 1/2" base 12/9; 28 ft. (2 pairs clamps) 24/9; 42 ft. (4 pairs clamps) 39/6
- WIRE ROPE 7/20 1/11 100 ft.
- MAST CLAMPS 2/6 pair.
- 7 in. WALL PLATE 1/3
- "Q" WALL CLAMP 2/6
- MANILA HALYARD 100 ft. 5/9
- INSULATORS:
F .. 6d.
E .. 4d.
- GALV. SIDE BLOCKS 7d.
.. SWING .. 7d.
- CLEATS 5d.
- SILICON BRONZE AERIAL WIRE, 7/22 100 ft. 4/6
- THREE WAY WALL BRACKETS 12/6
ANY SIZE 2-WAY, 7/6
- OAK GROUND POSTS 1/9
- 15 in. STRAINING SCREW 11d.
- ROPE SLINGS 1/9
- Spreaders with Aluminium Curled Ends, 4/9 6 ft.

Complete 30 ft. Turret Mast for wall or fence, 39/6
SIMPSON & BLYTHE, 9-9, SHERWOOD STREET, PICCADILLY, W.1. Send for List or phone: Gerrard 2650.

REPAIRS
Headphones re-wound and re-magnetised, 5/- per pr. Any kind L.F. Transformer re-wound and repaired, 5/-.
Loud Speakers re-wound, 5/-. Write for Trade Prices. All work guaranteed and tested on our aerial. Phone: 1795 Clerkenwell.
MASON & CO., 44, East Road, City Road, E.C.4.
ANOTHER WONDERFUL B.L. BARCAIN
AN IDEAL CHRISTMAS GIFT. The Wonderful B.L. Crystal Set including extra coil for High Power Station and pair of Adjustable Phones all for One Guinea. You can't beat it.
The B.L. Transformer Minor 8/-. Absolutely the best that money can buy.
All our goods carry the B.L. Guarantee. Money returned if not satisfied.
BROOK & LENARD, Anclada Works, South Heath, Great Missenden, Bucks.

2-VALVE AMPLIFIER, 35/-
1-Valve Amplifier, 20/-, both perfect as new. Valves, 4/6 each; smart Headphones, 8/6 pair; new 4-Volt Accumulator, celluloid case, 13/-; new 66-Volt H.T. Battery, guaranteed, 7/-; 2-Valve All-Station Set, £4. Approval willingly.
F. TAYLOR, 57, Studley Road, Stockwell, LONDON.

"18 Stations in Half-Hour"
—and it was not a Super-het. In addition to the above our customer says "6 of these were of Loud-speaker strength. The receiver was a "Radiofan" Long Range 2-Valve Receiver. Price £5-5-0. Write for list and particulars of Seven Days' Free Trial!"
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Can You Solder as Well as an Expert—?
Users of **"BRITINOL" SELF-FLUXING WIRE SOLDER** of **CAN and DO**. It is the Safe Solder for Radio. Get a 1/- or 6d. Coil from your dealer, or post free from
BI-METALS, Ltd., Dept. 1a, Sugar House Lane, LONDON, E.15.

ALWAYS USE PLATINITE THE KING OF CRYSTALS 1/-

FOREIGN RADIO NEWS.

(Continued from page 934.)

Every Tuesday and Thursday there will also be, at the same hour, a violin recital of chamber music.

There will be no other afternoon broadcasting by this station as hitherto, the hours being changed from 6 to 7 p.m. to 12.30 to 1.30 p.m.

Switzerland and Bavaria to Relay.

An international relay has been inaugurated, an arrangement having been made whereby Zurich and Munich will relay each other's broadcasting programmes.

New Madrid Station.

The Valencia station, known as E A J 24, which has been carrying on a series of wave-length tests of late, has ceased broadcasting.

The new Madrid station, Prado del Rey, which is under the control of the Government, and uses 150 kilowatts, has started broadcasting on a wave-length of 3,800 metres, and reports have been received of clear reception both by day and by night from as far as Buenos Ayres.

THE "P.W." PREMIER RECEIVER.

(Continued from page 872.)

It is merely an extended branch which rests on the panel and prevents the lead to which it is attached touching another lead, even when pressure is applied. This little scheme is well worthy of applying at all such doubtful points. It does not take long to carry out, and may be the cause of saving the "life" of a valve.

A very careful check, especially of the connections to the Utility switches, should follow the completion of the wiring. All traces of flux, dust and filings should be removed. Coils and valves of the largest sizes available should be inserted, and note taken whether ample clearance is available all round. The grid bias battery should be placed in position, and the necessary leads of flexible wire cut to correct length, and wander plugs fixed on them. The grid bias battery should be one of nine volts tapped at every 1½ volts. It should fit in comfortably in the position indicated in the photographs.

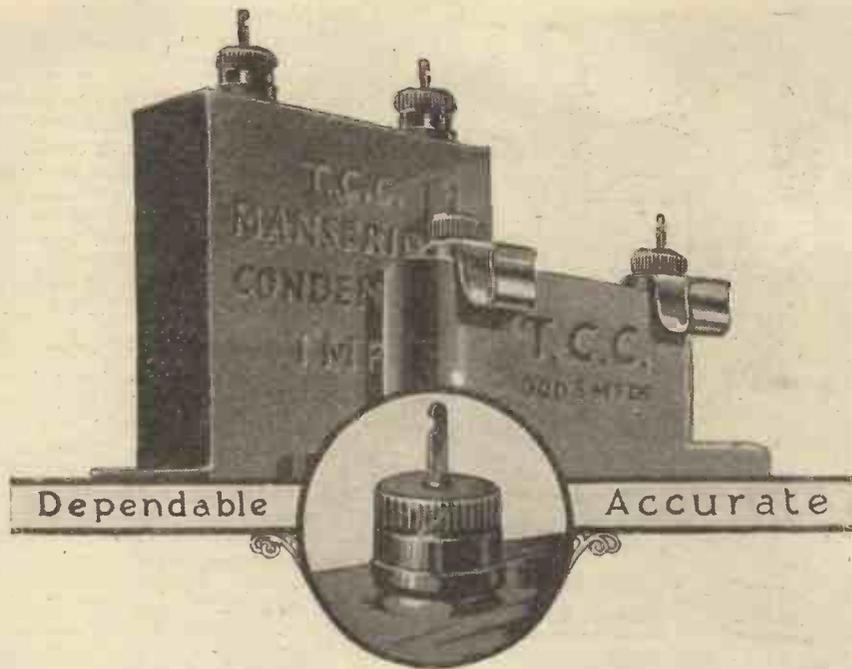
The original model has an engraved panel but, of course, transfers will look quite well and give the receiver a finished appearance.

For 2 L O and most other main stations a 75-turn aerial coil will be required. This is the moving coil in the two-way coil holder. The isolated wire need not be in position for the "2 L O" range. For 5 X X a 250 coil is required.

The 75 and 250 coils can be left in position, and the two ranges on them are available by switching.

Other coil combinations will suggest themselves to constructors. It should be remembered that on the 2 L O range only the one coil is in circuit with 75 turns reaction, while on the 5 X X range 150 turns of reaction is "open" and both aerial coil plugs are in series. Reference to the diagrams will make this clear.

Valves, etc., as specified, will be found quite suitable, although there are others that will operate in the circuit quite well.



Twenty years of knowing how!

THERE'S one thing every manufacturer needs but which money can't buy—experience. It is experience which has brought T.C.C. Condensers to the forefront today. Experience in manufacturing all types of fixed condensers—experience in dealing with the problems peculiar to insulation and capacity—experience in producing millions of condensers, large and small, Mansbridge and Mica.



the passing years. For twenty years the Telegraph Condenser Co. Ltd., have been designing and building all types of Condensers. This invaluable knowledge is now passed on to you in the form of T.C.C. Condensers. By specifying T.C.C. in your next Set you will be assured of extreme accuracy and uncommon dependability. Remember, all T.C.C. Condensers in metal cases are genuine Mansbridge, while those in moulded cases are Mica. Each case is green in colour and bears the sign T.C.C. stamped on its side.

Money could not buy this experience. It can only be obtained by paying the price—the price of

Look for the name T.C.C. Mansbridge stamped on the side of the green metal case

PRICES AND CAPACITIES

Mansbridge, 2 mfd. - 4/8	Mansbridge, '1 mfd. - 2/8
Mansbridge, 1 mfd. - 3/10	Mansbridge, '09 to '01 - 2/4
Mansbridge, '5 mfd. - 3/4	Mansbridge, '009 to '005 2/-
Mansbridge, '4 mfd. - 3/2	Mica, '004 to '001 - 2/4
Mansbridge, '25 mfd. - 3/-	Mica, '0009 to '0001 - 2/4

Every T.C.C. Mica Condenser is contained in a moulded green Case.

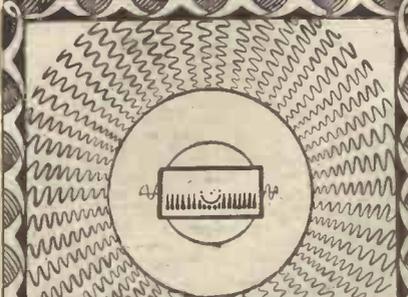
T.C.C. MANSBRIDGE Condensers.

The Telegraph Condenser Co. Ltd., West Park Works, Kew.

Gilbert Ad 1126.

TECHNICAL NOTES.

(Continued from page 868.)



Stop that continued vibration of the filament!

USE the Clearer Tone Valve Holder and float your valves—secure from the ever-present, tone - destroying vibrations caused by street traffic, indoor footsteps and the hundred and one other microphonic disturbances. So thoroughly does this new holder cushion the valve that foreign noises are completely dissipated. The springs, though delicately adjusted, are immensely strong and the tightest valve can be inserted without fear of damaging them. Each spring has one turn only. Bakelite construction of the body of the holder ensures high insulation, low capacity and sturdiness.

each **2/9**

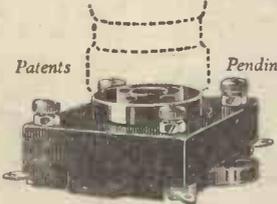


There are terminal connections for the experimenter and soldering tags for the permanent set. The springs themselves form the valve pin sockets. No soldered joints—all one solid metal piece from tag to valve leg. No flexible wire connections. The spring supports are not affected by stiff bus-bar wiring. For good reception with Dull Emitter Valves, Benjamin Clearer Tone Anti-Microphonic Valve Holders are essential.

2/9
each.



Patents Pending.



BRITISH BENJAMIN MADE
CLEARER TONE VALVE HOLDER
(ANTI-MICROPHONIC)

From your Dealer or Direct from
THE BENJAMIN ELECTRIC Ltd.,
Brantwood Works, Tariff Road,
Tottenham, N.17.

The Benjamin Battery Switch gives
perfect current control, 2/- each.

It is stated that it will now be possible thanks to the discoveries referred to above to produce filaments actually of thorium or, at any rate, containing a very much higher percentage of thorium than hitherto. The advantage of such filaments for the purpose of wireless valves will be evident, and it is claimed that filaments giving from 25 to 50 per cent. greater emission than the highest at present in use may thus be made.

Available in Commercial form.

Another important application of the new discovery is in connection with X-rays for medical purposes. The "target" in an X-ray tube, which corresponds to the anode of a wireless valve, is subject to electronic bombardment, and the character of the resulting X-rays emitted from the tube depends upon the nature of the target, or anticathode, as it is sometimes called.

The characteristic X-radiations from thorium are found to be much more useful for therapeutic purposes than those from other metals commonly used, and consequently an important field should be opened up in this connection.

Metallic thorium, produced by Drs. Rentschler and Marden, has been manufactured on the commercial scale in the form of rods, cold-wrought wire, filament, ribbon, bars, discs, and powder.

Question of Interaction.

Although much attention has been devoted to the question of the interaction of L.F. and H.F. transformers, little seems to have been given to the question of a similar effect with variable and fixed condensers. The shrouding or shielding of L.F. transformers is now a matter of common commercial practice. H.F. transformers are designed specially for the limiting of the external field, so as to avoid interaction.

The electrostatic field external to a fixed mica condenser is likely to be small, owing to the extreme smallness of the dielectric thickness between the plates, and consequently we need not seriously consider the effect in the case of a fixed condenser.

But in the case of a variable air condenser, there may be, and usually is, quite a large amount of stray electrostatic field which, apart from the question of interaction, may represent considerable energy loss when the condenser is subject to H.F. potentials.

An Interesting Experiment.

A writer in "Q.S.T.," the official organ of the American Radio Relay League, Mr. L. W. Hatry, a well-known writer on radio subjects, has dealt with this matter in a very interesting way, and points out a number of factors which have hitherto escaped general notice.

In the first place, he remarks that although the metal end-plates of some variable condensers are blamed for losses, this is hardly likely to be seriously comparable with the other losses; the condenser already contains a large number of metal plates, and the addition of two extra ones, which in effect are connected with the rotor, is not likely to make much difference. The distribution of the lines of

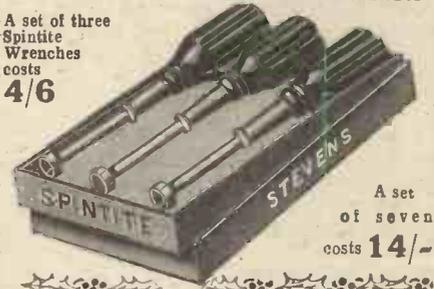
(Continued on page 940.)

Give him a set of
ROCKWOOD TOOLS

There is an exceedingly attractive range from which to choose. Among them the famous Spintite Wrench which few radio constructors can afford to be without; Panel Cutters, Bezel Beaders, Reamaws, Radio Drill and Countersink, etc., your dealer stocks them. If he cannot supply write for our illustrated List P.W.

ROCKWOOD CO., LTD.,
147, Queen Victoria Street, London

A set of three
Spintite
Wrenches
costs
4/6



A set
of seven
costs **14/-**

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SETS, PHONES, TRANSFORMERS.
Approved by Radio Assoc. 24 hours. Lowest Rates.
JOHN W. MILLER, 68, Farringdon Street, E.C.4.
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instead of shillings. It's easy if you know the method. Our booklet will tell you. A postcard brings it free. Don't adopt any system till you have had the booklet that explains all methods.

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LITTLE WIRELESS GADGETS.



MAP
H.T. BATTERY PLUG NO. 73a

MAP Co., 246, Gt. Lister St., Birmingham.

NEW ACCUMULATORS

2 volt 36 amp. 6/- ; 4 volt 36 amp. 11/- ; 6 volt 36 amp. 16/-.

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EASY PAYMENTS

LOUD SPEAKERS. Any make. Your selection. Amplion, Brown, Sparta, Sterling, etc. Quarter deposit. Balance six monthly payments. Headphones and Parts similar terms. Send a list of the parts you are requiring and we will forward you a quotation on the hire purchase system.

ACCUMULATORS. Best quality. Guaranteed.

Three m'tly		Three m'tly	
Cash.	payments	Cash.	payments
4 v.-40	17/6	6 v.-40	25/6
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Carr. and Packing, 1/6 any size.

H. W. HOLMES, 29, Foley Street, Great Portland Street, W. 1. Phone: Museum 1414

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JOHN H. LILE Ltd.,

4 Ludgate Circus,
London, E.C.4.

(Phone: CITY 7261)

and NOT to the Editorial or
Publishing Offices.

"Metal for me"

Take the advice of John the Blacksmith. "There's nothing like metal." He knows.

All the hard jobs in this unfeeling world are given to metal. If it's hard service, or long service, or exact service, then the man who knows says at once "Metal for me."

The Climax Metal-Cooled Rheostats and Potentiometer are metal wound on metal cooling cores. They employ no carbon, no ebonite, no rubber. Except for the bakelite knob and terminal bar they are 100 per cent. metal.



THE CLIMAX METAL-COOLED RHEOSTAT (Prov. Pat. No. 220,124/23) is wire wound on a solid metal rod, and insulated by high temperature vitreous enamel, capable of standing over 2,000 volts. This method of construction is a Climax Patent. No other can be "just as good." The resistance element gives a perfectly smooth adjustment. Cannot be damaged by mechanical ill-treatment or prolonged heating. The resistance value can be cut down practically to zero while a clear, sharp break is obtained at the off position. Every point in the adjustment is definite and steady. The phosphor-bronze contact brush is riveted, thus eliminating the double lock-nut which is a perpetual source of trouble in many rheostats.

The Climax Metal-Cooled Rheostat is undoubtedly the best possible rheostat at the lowest possible price.

PRICES:

- Climax Metal-Cooled Rheostat 30 ohm, universal pattern for all D.E. or bright valves, 4/- each
- 6-ohm heavy duty pattern for one, two or three Bright valves, 3/- each
- Climax Potentiometer, 300 ohms, made on the same patented system, 5/- each

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CLIMAX RADIO ELECTRIC LTD.
Head Office and Works: **QUILL WORKS, PUTNEY, LONDON, S.W. 15.**
Telephone: Putney 2599.

All communications to above address.
Showrooms: 257, **HIGH MOLEBORN, LONDON, W. 01.**
Telephone: Holborn 2538.



Oldham Standard Accumulator

Supplied in 2-volt Units as follows:

10 amp. hours	actual	8/9
20	" "	11/1
30	" "	13/7
40	" "	16/1
50	" "	18/9
60	" "	21/4

4-volt and 6-volt at proportionate prices.

Oldham H.T. Accumulator

An entirely new high-grade Accumulator with cells constructed of stout glass boxes instead of flimsy test tubes. Each cell can be tapped by a wander plug. Assembled in 20-volt Units. Price 20/- per 20-volt Unit and *pro rata*. Particulars post free.

This day twelvemonth will tell you

It is not what you pay to-day in first cost but what you'll have paid in charging fees during the next twelve months that will prove the wisdom of your accumulator choice.

Perhaps you selected haphazardly and chose the first offered to you. Maybe already you have noticed that it needs to be recharged rather more often than when it was new. That's the worst of accumulators built to a price.

We could make an accumulator at half the price but it would not be an Oldham and it would certainly not be made under the Special Activation Process. And after quite a short while you'd be

complaining of its lost power.

So we make the Oldham Accumulator to a definite standard of performance. We make it to hold up under all circumstances. Even if left idle for several weeks on end it must not sulphate. And above all it must deliver up the whole of the electrical energy stored within its four walls.

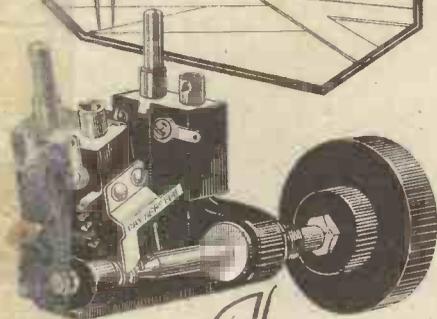
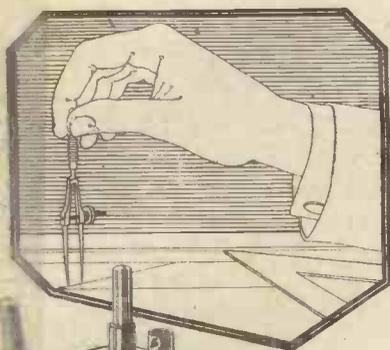
Ask your Dealer to let you examine one. Note its robust case, its specially constructed plates—its generous moulded coloured terminals—its screw-in vent plug.

Compare it with any other Accumulator and you'll inevitably choose the Oldham—none other can compare with it for honest value.

OLDHAM & SON LTD., DENTON, MANCHESTER

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London Service Station: 6 Eccleston Place, S.W.1
Glasgow: 120 Wellington Street





The Newey Vernier Coil Holder

The last word in accuracy and precision in coil-holders. Designed so that it can be fixed in any position, including back of panel, one-hole fixing.

The moulding is Bakelite throughout, ensuring perfect insulation together with high finish. The adoption of worm gearing having a ratio of 8 to 1, gives a vernier movement which is absolutely free from backlash and so necessary for fine critical tuning. Worm gearing further enables the heaviest coil to be used without any fear of its position being altered by a jar or through its own weight.

A special stop is fixed on the spindle which prevents the coils from being overwound, thereby affording complete protection to the teeth of the Bakelite sector. For accuracy, precision and beautiful finish, this coil holder has no equal.

Price 6/6
Newey's

Ask your nearest dealer. If you have any difficulty write direct.

Wholesale Distributors:—

Pettigrew & Merriman (1925) Ltd.,
122-124 Tooley St., London, S.E.1.
and Branches Tel. Hop 134.



You will not hear a more mellow and natural reproduction of broadcast music and speech than that given by a "TrueMusic" Loud Speaker.

Mellow in note, sensitive to weak signals and handsome in appearance, the "TrueMusic" Loud Speaker will be your pride and the envy of your friends.

The secret of this successful reproduction lies chiefly in the horn. The "TrueMusic" horn is built up of copper by a patented electrical process, without straining the metal in any way. Therefore there is none of the distortion and jarring on certain notes so often associated with metal horns, and yet none of the flatness complained of with composite horns. The "TrueMusic" Loud Speaker is straight in shape to avoid deflecting or "bending" the sound waves—the cause of "re-echo."

Concert Grand £6:10:0
Standard - - - 5:0:0
Junior - - - 2:10:0
T.M.C. Minor - 1:1:0

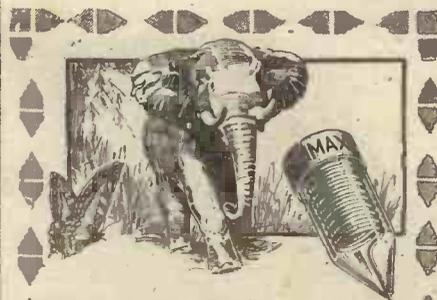
TrueMusic

True to every Tone and Semi-Tone

Demonstrations at the following agents:
Autoveyors Ltd., 84, Victoria St., S.W.1;
L. A. Gardener & Co., Church Lane, Charlton, S.E.7; Harrods Ltd., Wireless Dept., Brompton Rd., S.W.1; Izzard Bros., 13, Upper Clapton Rd., E.5; Kingsway Radio, 7, Railway Approach, Cannon St., E.C.4; Marshall & Snelgrove, Wireless Dept., Oxford St., W.1; Ray's Wireless Service, Norwood Rd., Herne Hill, S.E.24; Saville Pianos, Ltd., 63, Church St., Enfield, 22, High St., Stoke Newington, 527, High Rd., Tottenham, 240, Hoe St., Walthamstow; 142, High Road, Wood Green; Sports & Radio Stores, 30b, Queen's Parade, New Southgate; or authorised T.M.C. agents everywhere

Write for Catalogue.

The Telephone Manufacturing Co., Ltd.,
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Putting His Foot Down

When the mammoth puts down his foot, it stays put.

Don't you wish you could set the catwhisker on your crystal set with the same ease and assurance?

Unfortunately your catwhisker needs a touch as delicate as a butterfly alighting; you may almost hold your breath for fear of disturbing it.

If only it were possible to combine in one simple device these two extremes of pressure, the whole difficulty of adjusting a crystal would be completely overcome.

Put your foot down. Break that wasteful habit of buying spare crystals every month.

The Climax Popular Plug-in Detector is fitted with the Climax Auto-micrometer catwhisker. This famous catwhisker succeeds in automatically combining that essential delicate micrometer pressure with a separate independent hold-on pressure. The setting is easy, permanent and of maximum possible efficiency.

For crystal set constructors the Climax Popular Plug-in Detector is supplied fitted with CLIMAX Auto-micrometer catwhisker and CLIMAX Crystal.

Climax Auto-micrometer Catwhisker (Prov. Pat. No. 21001/25).

Climax Superb Crystal. Guaranteed natural galena. An ideal combination with the Climax Catwhisker.

Climax Popular Crystal Set is fitted with the Climax Popular Plug-in Detector, complete with Climax Auto-micrometer Catwhisker and Superb Crystal.

Deventry Adjustable loading coil.



PRICE 3/6
complete with Sockets.

PRICE 1/-

PRICE 1/-
per box

PRICE 12/6

PRICE 3/6
extra.

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Quill Works, Putney, London, S.W.15

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RADIO

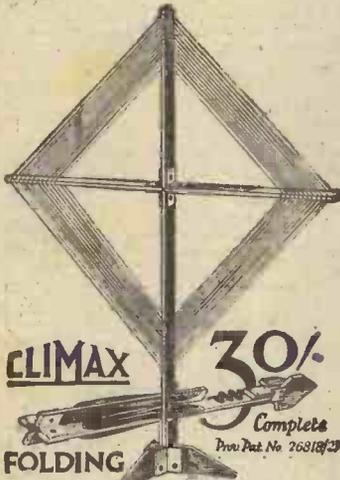
TECHNICAL NOTES.

(Continued from page 936.)

"I am glad I got a genuine CLIMAX"



My new set is a big improvement over my last one. It is a selective set, a long-range set, and, thanks to Climax, I can log up the stations the other fellow cannot get. The Climax Folding Frame Aerial has made all the difference; I can assure you that the Climax is undoubtedly the best Folding Frame Aerial.



CLIMAX **30% Complete**
 Trade Pat. No. 26818/29
FOLDING FRAME-AERIAL

Constructed on an ingenious system, by which it may be opened or folded in a few seconds. The wire folds into the frame or opens out without the least trouble. The winding is arranged in two flat coils which are mechanically and electrically balanced, combining the advantages of the pancake type of winding with the solenoid type. A centre tapping is provided for use with various special circuits.

Very attractive, extremely efficient, remarkably simple, and very easily folded into a conveniently portable form. The stand also folds. Offered at the particularly attractive price of 30/-

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(All communications to above address.)
 Showrooms: 257, FISH HOLEBORN, LONDON, W.C.1
 Telephone: Holborn 2538.

CLIMAX
RADIO

electric force has been snapped out by the writer referred to, as a result of actual experiment, and he has found that there is, in fact, a very considerable spreading out of the electric field owing, to some extent, to the comparatively large distances between the plates.

The capacity of the condenser for a given setting—particularly for settings of low capacity—is largely influenced by the proximity of surrounding objects. As a practical proof of this, he took a well-seasoned wood slab, of sufficient size to keep the hand well away from the condenser, and gradually brought the wood nearer to the end plate of a variable condenser which was tuned for a given signal. When the wood was directly against the end-plate of the condenser, and about an eighth of an inch from the rotor plates, it required a condenser-capacity reduction of about one microfarad to retune the signal.

What it Proves.

To make certain that the condenser was being affected and not the coil, a second test was made. The wood was fixed in a vertical position, behind the rear end-plate of the condenser. The coil was to the rear and right of the condenser, and the board test was made on the left of the condenser. This did not affect the carrier note to any appreciable extent (the coil was of the torroid type). In this second test, although the wood was much nearer to the coil than in the first test, the effect was negligible, showing that it is the condenser which must be approached and not the coil. The capacity of the condenser, when these tests were being made, was set at about half maximum.

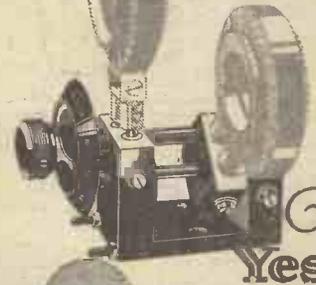
The writer of the article remarked that this shows that tests on condensers ought, in order to be reliable, to be made with the condenser well isolated from neighbouring objects. And, furthermore, that ample clearance should be given to the condenser in the assembly of the components of the receiving set—a point which is not sufficiently brought out as a rule. It possibly explains, too, high resistance at minimum capacity adjustments.

A Shrouded Variable Condenser.

Finally, these results would seem to indicate the desirability of enclosing the condenser completely, and of constructing it with a shaft of non-metallic material, end-plates of insulation, and so on; in short, to take any reasonable steps to ensure the field being confined as far as possible to the fixed and-movable vanes. As a matter of fact, a commercial condenser has just appeared on the American market which is provided with a complete metal shroud, exactly after the fashion of a L.F. transformer. The case is made from thin sheet brass, and a mica "window" is provided for the lead-in of the terminals.

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 Saturday, December 12th, 1925.

A Revelation in Selective tuning



The Yesly Ecliptic Coil holder



THE superiority of a tuning system that permits face to face adjustment in the relative positions of tuning coils can be readily appreciated by all who understand the theory of magnetic fields.

PROV. PAT. No. 24,683.

PRICE

7/6

With 6" operating spindle **8/6**

ALL YESLY components are worth your consideration. Lists free on application.

Up to the present the more simple method of coil adjustment has been employed despite the wonderful improvement that can be obtained by direct cross flux adjustment. In the new YESLY ECLIPTIC COIL HOLDER the adjustment of the coil is made to produce a perfect electrical combination between the coils by a gear cut "face to face" movement having a ratio of 6 to 1. The immediate increase in selectivity and resulting strength of signals is beyond that of all other coil holders on the market.

This unique coil holder can be fitted to either front, side, or back of panel positions.

LOOK FOR THE NAME



TRADE MARK

Ask your dealer, or write direct

ENGINEERING SUPPLIES, Ltd.

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VALVES AT WHOLESALE PRICES!

High-class Dutch Valves direct from Importers B.F. 31.4v., 30-80, DET or AMP. Our price, either type, 5/- each, post free. D.E., 31v. 06 amp, 8/- post free. Guaranteed tested before despatch

SOUTH BROS., Factors, 7, Millmead, Guildford

D.E. 4 ELECTRODES

We are pleased to announce THE ECONOMIST D.E. 4-ELECTRODE Valve, is now available. A product of the highest efficiency, sold under our usual guarantee. THE ECONOMIST 4 ELECTRODE D.E. 4v. '06 Con. 25/- THE ECONOMIST 4 ELECTRODE D.E. 4v. '2 Con. 20/- THE ECONOMIST 4 ELECTRODE D.E. 4v. '6 Con. 10/6 PHILIPS 4 ELECTRODE B.E. 4v. '6 Con. 10/6 REPAIRING D.E. 4 ELECTRODE 10/6, 7/6

Postage, packing and despatch at our risk, 6d extra.

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'PHONES REMAGNETIZED FREE

ALL MAKES REWOUND, 4,000 ohms. 5/-. 'Phones Rewound are Remagnetized Free Remagnetizing only 2/-. Loud Speakers from 3/6. Transformers from 5/-. Post extra. The H.R.P. Co., 46, St. Mary's Road, Leyton, E.10

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PANELS, RODS or TUBES, in all sizes cut while you wait. Any article in Ebonite can be quoted for. Best quality. Lowest prices.

BURGE, WARREN & RIDGLEY, LTD., 91/92, Great Saffron Hill, London, E.C.1

Makers of the B.W.R. 2-speed Vermer Coil Holder latest improvement. Illustrated List FREE.